NEW YORK STATE INSURANCE FUND (NYSIF)

232500 - WATER TREATMENT & MAINTENANCE SPECIFICATION

FURNISH ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY AND REQUIRED FOR THE PROPER WATER TREATMENT & MAINTENANCE OF COOLING TOWER AND ITS OPEN CIRCUIT EVAPORATIVE LOOP SYSTEMS, AND SIX (6) ADDITIONAL CLOSED LOOP HYDRONIC HVAC SYSTEMS AT 199 CHURCH STREET, NEW YORK, NEW YORK 10007 AS OUTLINED HEREIN

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I. Bidder/Vendor Specifications:

A. Objective: It is the objective of NYSIF to contract with a water treatment ***management company*** that is capable of providing;

1. Consistent and attentive service.
2. Results that meet established industry standards of performance for corrosion rates, microbiological fouling and water conservation, and are compliant with all applicable codes.
3. Consultative and laboratory resources that are used to help continuously improve operations.
4. Accurate and timely recording and documentation standards of water treatments & maintenance.
5. Chemical treatment delivery. Equipment must meet manufacturer's usage requirements.
6. Maintaining cooling tower equipment in clean and working condition.

B. Code Requirements: The water treatment provider shall be capable of performing the work specified herein while complying with the following applicable code and department requirements. Wherever there is a conflict, vendor must meet the most stringent requirement;

1. New York City Local Law 77 & 76
2. New York City Health Code, Title 24, Chapter 8
3. New York City Department of Buildings
4. ASHRAE 188-2018 sections 7.2, 5 & 6 (NYC)
5. Title 10 New York Codes of Rules and Regulations (10 NYCRR) Part 4

C. Requirements For Vendors Bidding:

1. All bidders must visit the site prior to bidding and must certify having done so in the bid submittal;
   a. Must conduct a building survey to become familiar with the existing cooling tower system, and perform a risk management assessment. This should include but not be limited to the components of the cooling tower system, including;
      i. One (1), three-cell induced draft Marley cooling tower
      ii. Pumps
      iii. Filtration System
   b. Must conduct a building survey to become familiar with six (6) existing closed loop HVAC hydronic systems and their chemical feeds, monitoring components, system volumes, and makeup water. This should include but not be limited to bypass chemical pot feeders, corrosion monitoring coupon racks, approximation of water volume, and manual makeup water introduction source. The six (6) systems are as follows:
      i. State Police 1st Floor Hot Water Radiator Perimeter Heating Loop: System treatment provisions located within cellar level NYSIF mechanical room.

ii. State Police Chilled Water Loop: System treatment provisions located within cellar level state police mechanical room.
iii. NYSIF East Zone Secondary Chilled Water Loop: System treatment provisions located within cellar level NYSIF mechanical room.
iv. NYSIF West Zone Secondary Chilled Water Loop: System treatment provisions located within cellar level NYSIF mechanical room.
v. NYSIF Interior Hot Water Reheat Loop: System treatment provisions located within cellar level NYSIF mechanical room.
vi. State Police Heating Hot Water Loop: System treatment provisions located within cellar level state police mechanical room.

2. Consultation Services to be provided by vendors bidding;
   a. The firm must make frequent site visits, not less than every 4 weeks to review water tower operation, chemical usage, readings and record keeping.
   b. Vendor must be willing and capable to review issues that arise.
   c. Vendor must be able to make service calls and respond in a timely fashion. Bidders must respond within the following timelines for Emergency & Non-Emergency services:
      i. Emergency Services: Contractor must notify NYSIF immediately upon detection of an emergency situation, and must respond within eight (8) hours or less of a service call from NYSIF.
         1. Upon detection of an emergency situation, contractor must be able to provide direction to site staff to begin immediate corrective actions.
         2. If the magnitude of the emergency situation is beyond the site staff's ability, the contractor must be able to respond within the timeframe noted above.
      ii. Non-Emergency Services: Contractor must respond within 24 hours of NYSIF's service call. Non-Emergency repair estimates to be provided within one (1) business day of service call."
   d. Review NYSIF's Management Program and Plan as laws and regulations require. Not less than annually, firm will certify NYSIF's MPP as current or notify NYSIF of the required changes necessary to make the plan current.
   e. Training of on-site staff to conduct regular maintenance, dip slide testing and any other maintenance needed in between service visits. Training must be documented and recorded on site.
      i. Indicate how chemicals are to be stored and in strict accordance with all OSHA and fire codes.
   f. Liaison with city and state health officials in all matters related to the proper operation of the cooling tower at 199 Church Street, New York, NY 10007.
   g. Must keep copies of licenses and certifications for all technicians on site.
3. Bidder's submission must demonstrate how each of the following specifications are met AND/OR attest to their ability to meet the requirement. Each response should cite the particular RFQ section and paragraph number being addressed.
   a. Legionella Culture testing as required by the New York City Department of Health and New York State Department of Health. Results and appropriate action taken must be recorded and maintained on site. Bidder must use a laboratory facility capable of performing *legionella* testing and other standard microbiological assays, metallurgical failure analysis, and standard deposit and water analyses. The Laboratory must meet NYSDOH Wadsworth laboratory regulations (ELAP).
   b. Implementation of a cleaning and disinfection program to meet or exceed regulatory requirements and in accordance with ASHRAE Standard 188-2015. This program will be the Management Program & Plan (MPP) and shall include a schedule for routine bacteriological

analysis (dip slide or heterotrophic plate counts), as well as a schedule for Legionella testing. Submit this to NYSIF for review and approval.

i. Requirements for the MPP are specified herein, see also the template for the MPP in Appendix I.

c. Cooling Tower Inspection & Certification – Refer to Section I: Service Specifications. Certification and Inspection to be documented and filed in accordance with NYC DOH and state regulations.
   i. This inspection and certification is in addition to the scheduled bacteriological testing as part of the MPP.

d. The use of automated chemical distribution system which records readings and volume of chemicals used.

e. Implementation of a closed loop water treatment program that meets the requirements identified in section L.

f. Must NYSIF's insurance requirements provided in Appendix J;

g. Must maintain a 24 hour manned chemical spill response service hotline to handle urgent calls regarding any chemical spill or handling concerns.

h. Must have certified commercial pesticide applicator/technician (in accordance with title 6 NYCRRR Part 325 and Environmental Conservation Law Article 33) or an apprentice under the supervision of a certified person perform cleaning/disinfection with biocides.

4. Must have a NYS licensed & registered professional engineer; certified industrial hygienist; certified water technologist with training & experience developing maintenance plans and performing inspections or an environmental consultant with at least two (2) years of operational experience in water management planning and operation. Compliance inspection will result in issuance of reports described herein to the Agency/Owner. **Reference the tabular listing in Appendix F indicating a general guide for tasks with responsible parties.**

D. Risk management assessment: This section (Risk Management Assessment) is limited to the operation of the cooling tower.

The building survey (Section C1a) must be performed to create a risk management assessment. This assessment must determine control locations where control measures are required and must be included in the MPP. This assessment must also identify risk factors for Legionella proliferation and specify risk management procedures for all or parts of the cooling tower system, and anticipated conditions including:

1. Any dead legs (as defined in Appendix A) or stagnant water in the recirculation system.
2. Operating configurations and conditions that may occur after periods of extended inactivity lasting more than three (3) days, including idling or low circulation while not being fully drained.
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.

E. Service Requirements for Vendors Bidding:

1. Must assign a primary and secondary representative for handling the account; Written

notification and approval must be obtained for making any changes to representation;
2. Any person who performs cleaning and disinfection or applies biocides for service must be a commercial pesticide applicator or a pesticide technician certified in accordance with the requirements of Article 33 of the NYS Environmental Conservation Law and 6 NYCRR Part 325, or a pesticide apprentice under the supervision of a certified applicator.
3. Must guarantee response within 24 hours for emergency service requests;
4. Must provide a complete list of local personnel available for service;
5. Service activities required are detailed later in the Specification.

F. Training:

1. Each site shall be provided with a MPP that will contain at a minimum:
   a. Normal and emergency vendor contact information;
   b. Product description and MSDS sheets for each product used;
   c. Test procedures;
   d. Blank log sheets for Engineers performing testing, complete with recommenced ranges for each parameter tested and actions to be taken if out of specification;
   e. Equipment operating manuals for equipment provided;
   f. Checklists for maintenance and monitoring of each cooling tower
   g. See detailed MPP requirements specified herein, and Appendix I – Sample MPP Template.
2. The successful bidder shall be required to provide training annually at each site on the following topics at a minimum: chemical handling safety, program parameters, testing and log-keeping;
3. All training is to be documented.

G. Chemical Delivery and Handling:

The vendor shall make all chemical deliveries to the point(s) of use at the building. The vendor shall immediately remove all empty chemical shipping containers from the building. The vendor may store unopened shipping containers only with the prior written approval of the owner and only in locations designated by the owner.

1. The vendor shall maintain a minimum chemical inventory at the building of four (4) week's consumption of each product based on peak conditions of cooling tower operation. The vendor shall note the minimum allowable and actual inventory levels for each product in the routine monitoring reports. If the inventory for any product falls below the minimum allowable level, the vendor shall deliver sufficient product to the building within 48 hours. All product shall be properly stored.
2. The vendor shall indicate the shelf life of each product and shall replace all product beyond its shelf life. The vendor shall, at the Owner's discretion, remove all unused chemical inventory within thirty (30) days following the end of the contract period.
3. MSDS must be provided for all chemicals and products used and an MSDS binder will be maintained at the building with MSDS of all products provided.
4. The vendor shall be responsible for cleaning up after any leaks or spills made during delivery or failure of any feed equipment not due to negligence.

H. Equipment Standards:

Provide product details and manufacturer certified submittal of data for all new or replacement equipment. All replacement parts and field "add on" equipment must be verified to be compatible with tower manufacturer. **Replacement components must be Original Equipment Manufacturer (OEM) Certified. For non-OEM components, documentation must be provided from the manufacturer indicating CTI and manufacturer certified OEM operating performance.**

In the walk-through survey, bidders are to inspect installed equipment and propose new equipment as needed to address any deficiency based upon the bidder's experiences, the requirements of this specification, and observations of the existing system at the building. The items below are given for reference as potential supplements to the existing cooling tower system. The Owner shall be responsible for plumbing and electrical. Water treatment vendor shall be responsible for tubing installation and start-up and servicing of equipment. Any equipment sold and provided to the Owner must be new, out of the box and must include original shipping containers and warranty information. Basic test kits and replacement solutions and reagents will be provided at no additional cost to each facility. Test instruments such as conductivity meters and pH meters and colorimeters would be proposed as additional equipment if they are required.

a. Considerations for Protective Coatings:
   i. Preconditioning of surfaces with hydrophobic coatings can discourage bacterial attachment and adhesion to these surfaces.
   ii. Nano-silica coating has been proposed for the reduction of biofilm formation in manufactured water systems.
   iii. A coating procedure for cooling tower fills, as appropriate biofilm control, is essential to maintain maximum heat transfer efficiency in cooling towers.

b. Cooling Tower Drift Eliminators:
   i. Determine configuration and type (i.e. nested cellular PVC)
   ii. Discharge angle and configuration (crossflow vs. counterflow)
   iii. Fill Pressure drop and fan input
   iv. For cleaning of loose deposits of silt, fibers, etc., a water spray can be used, provided the spray nozzle is kept moving continually and the water pressure is not excessive (recommend less than 30 psi).

   V. The cooling tower system must be operated at all times to minimize the formation and release of aerosols and mist. Owners must install and maintain drift eliminators in accordance with the manufacturer's specifications and the New York City Construction Codes. The calculated drift loss at maximum design water circulation must not exceed the manufacturer's tested value for maximum drift loss. Replacement drift eliminators and fill materials must be OEM Certified Components. For non-OEM components, documentation must be provided from the manufacturer indicating CTI and manufacturer certified OEM operating performance.

c. Equalizer lines:
   i. Must be used when two or more cooling towers are piped with a common header.
   ii. Lines must be properly sized for 15% of the largest cooling tower flowrate to accommodate any slight flow imbalance that may occur during the operation of the tower. Cooling towers must be installed so that the overflow connections of all towers are at the same level.
   iii. A separate make-up must be provided for each cell. A common remote sump for multi-cell installations can simplify make-up and water treatment.

d. Mechanical Seals: Verify seals are properly functioning and there are no leaks. Replacement seals must be verified compatible with tower manufacturer. All pumps necessary to allow cooling tower operation are to be inspected, including basin pumps, chemical feed pumps, condenser water pumps. Pump lubrication shall be inspected per requirements of pump manufacturer.

e. Non-chemical Water Treatment (**cannot be used alone** to control bacteria levels in accordance with Ch.8-05 of NYC department code, unless approved by the department):
   i. Pulsed Power: imparts a pulsed high frequency electromagnetic energy into the circulating water by inducing varying magnetic fields.
   ii. Hydrodynamic Cavitation: dynamic process of formation, growth, and collapse of micro-sized bubbles in a fluid.
   iii. Cyclonic/centrifugal separators.
   iv. Bag filtration.

2. **Contractor to recommend best practices, solutions and repairs utilizing the specifications herein as a guide, however not as an exclusive list.**

3. Replacement in kind: Any replacement part or equipment used in the cooling tower system must comply with the manufacturer's design and performance specifications. As applicable, replacement materials must be corrosion resistant and effectively prevent the penetration of sunlight. Any alteration or replacement of the cooling tower system must comply with the New York City Construction Codes.

I. Service Specifications:

1. Service reports are to be reviewed on site with the lead Engineer and a copy forwarded to the Owner.

2. *Cooling Tower System Routine System Monitoring:* The owner must designate a "responsible person" as defined in (Appendix A) to monitor the cooling tower system at least *weekly* while such system is in use. Remote monitoring capabilities shall also be available, refer to section K.3.a.ii.
   a. 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.
   b. The responsible person must possess the skills and have the knowledge necessary to be able to monitor the system under the guidance of a qualified person, in accordance with the management program and plan.
   c. All wetted surfaces visible during cooling tower operation without shutting down the system, tower basins and drift eliminators must be observed during monitoring and the presence of organic material, biofilm, algae, scale, sediment and silt/dust deposits, organics (oil and grease), and other visible contaminants observed must be noted on the checklist.
   d. The responsible person must observe and note the condition of chemical dosing and control equipment and the bleed-off system, and determine if there is sufficient storage and delivery of treatment chemicals.
   e. Any system anomalies or problems must be recorded on the checklist and reported to the management and maintenance team for immediate corrective action.

3. *Cooling Tower Certification:* The owner shall file a certification, completed by the contractor, each year that the cooling tower was inspected, tested, cleaned and disinfected in compliance with NYC administrative code section 17-194.1, the rules of the NYC department of health and mental hygiene, and that a maintenance program and plan has been developed and implemented as required by these authorities.
   a. Verification that the maintenance program and plan has been implemented shall include, but not be limited to;

i. All bacteriological culture sampling and analysis.
ii. All legionella culture sampling and analysis, including any immediate Legionella culture sampling and analysis performed as a result of extenuating circumstances (power failure) as detailed in the maintenance program and plan.
iii. Any immediate action taken as required due to Legionella culture analysis.
iv. Disinfections & inspections were performed.

b. Such certification shall be submitted by November 1st of each year. Certification shall be filed with the NYC Department of Buildings and the NYC Department of Mental Health and Hygiene. The certification shall also be provided to the owner for their records.
c. The certification must document any deviations from compliance with the maintenance program and plan and the corrective actions taken to address any deficiencies.

4. Cooling Tower Cleaning and disinfection: Contractor shall clean and disinfect the cooling tower system if it has been shut down for more than five (5) days. Cleaning and disinfection shall occur within 15 days of intended use of the cooling tower. Refer to Appendix B for additional information.
5. *Cooling Tower System Compliance inspections:* A qualified person (as defined in Appendix A & retained by the owner) must conduct a compliance inspection prior to seasonal startup (within 15 days of intended use) and at least once every ninety (90) days while the cooling tower system is in operation. The 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:
   a. Presence of organic material, biofilm, algae, and other visible contaminants.
   b. General condition of the cooling tower, the basin, remote sump, packing material and drift eliminator.
   c. Quality of water makeup connections and control, including backflow prevention and/or air gaps as needed.
   d. Proper functioning of the conductivity control.
   e. Proper functioning of all water treatment dosing equipment including but not limited to pumps, timers, valves and strain gauges.
   f. Review of routine maintenance records to ensure proper implementation of required activities and corrective actions as needed.
   g. Each inspection to include evaluation of cooling tower and associated equipment for presence of organic material, biofilm, algae and other visible contaminants
   h. Each inspection shall include test for presence of microbes in the water of the cooling tower. The department shall establish (i) the targets and acceptable methods of microbial testing and laboratory analysis, (ii) the levels of microbes in cooling towers that indicate maintenance deficiency and requiring mitigation, including but not limited to maintenance to prevent potential health risks, and (ii) the levels of microbes in cooling towers that present a serious health threat and require immediate action and reporting.
   i. Vendor/Bidder shall notify owner of all tests results upon receiving them. Any deficiencies found during inspections shall be reported to the owner for immediate corrective action. The qualified person shall document all deficiencies, and all completed corrective actions. **The owner** shall retain such information.
   j. When test results indicate levels of microbes that indicate maintenance deficiency requiring mitigation, including but not limited to maintenance to prevent potential health risks, **the owner** of the building shall clean and disinfect the cooling tower in accordance with the rules of the department within 48 hours of the owner knowing of the results of the test or reasonably should know the results of the test.
   k. When the test results indicate levels of microbes that pose a serious health threat, **the owner**

shall within 24 hours of knowing the results (or reasonably should know the results) notify the department, clean and disinfect the cooling tower including an additional application of biocide in accordance with the rules of the department.

i. **The owner** shall notify the local health department within 24 hours of receipt of a legionella culture sample result that exceeds 1000 CFU/ml. The local health department shall notify the state health department within 24 hours of such a report.
ii. **The owner** shall notify the public of such test results in a manner determined by the local health department or, in the event that the health department elects to determine the manner of public notification, by the department.

l. The qualified person performing the inspection(s) shall report to the department within five (5) days of performing such inspection the date on which such inspection occurred. The owner shall ensure the report is submitted to the department by the qualified person within 5 days of the inspection.

6. For Closed Loop Hydronic HVAC System service requirements refer to section L.

J. Cooling Tower System Maintenance Program & Plan (MPP):

1. *Requirements:* A qualified person must provide a maintenance and program plan for the cooling tower system for the owner in accordance with sections 5, 6 and 7.2 of ASHRAE 188-2018, New York City & New York State Code, the manufacturer's instructions, and the requirements herein. Wherever there is a conflict, the vendor must meet the most stringent requirements. The plan must be kept current and amended by the qualified person as needed to reflect any changes in the management and maintenance team, system design, or operation or system control requirements of the cooling tower system. The plan must be kept in the building where the cooling tower system is located and must be made available to the department for inspection upon and at time of request. At a minimum, the plan must include and describe;
   a. Management and Maintenance team
      i. Identify (including names, contact info, and description of function) each person on the cooling tower system management and maintenance team including the owner or responsible person for compliance, managers, any person the owner designates as a responsible person, and every consultant/service company/qualified person who cleans/disinfects/delivers chemicals or services the cooling tower system.
      ii. This team should have knowledge of the cooling tower system design and water management as it relates to legionellosis. Refer to ASHRAE Guideline 12: Minimizing the Risk of Legionellosis associated with building water systems for additional information on legionellosis.
      iii. Establish documentation and communication procedures for all activities of the MPP. The team is responsible for communication and coordination among subgroups covering different parts of the cooling tower system and associated equipment.
   b. Identify cooling tower system with specifications and description of the cooling tower system and all components. Also include;
      i. The number of cooling towers in the cooling tower system.
      ii. Location of each cooling tower in relation to the building and building address, block and lot number.
      iii. Dimensions and characteristics of the of cooling tower system including but not limited to total recirculating water volume, cooling tower tonnage, biocide delivery method, flow rate and other key characteristics.
      iv. 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 scaling or cycling related to cooling demand, must be noted.

v. The NYCDOB registration number for the cooling tower.
vi. Cooling tower manufacturer, model number and serial number.
vii. A flow diagram or schematic of the cooling tower system that shall have sufficient detail to enable the identification, analysis, and management of the risk of legionellosis throughout the cooling tower system. The flow diagram shall be representative of the cooling tower system as-built, and shall include identifying all of the principle components and appurtenances including makeup water and waste stream plumbing locations, as well as the items listed below;
    1. The cooling tower with its individual number of cells and circulation pumps marked
    2. All system pumps and control valves All standby equipment, e.g. spare pumps
    3. The location of cooling tower makeup valve(s) in compliance with all applicable local/regional/national codes and regulations for air gaps and backflow preventers. If no such codes for valve location exist, program shall include requirements to comply with ASME/ANSI A112.1.2 for air gaps and for maintaining compliance with code regulations for backflow preventers, as well as the cooling tower manufacturer's recommendations.
    4. The locations of system bleed valves
    5. All associated storage tanks
    6. All associated pipework
    7. The location of chemical dosing points and/or injection points
    8. The location of the system drain valve
    9. Any parts that may be temporarily out of use
    10. Other systems (as marked above)
    11. Water quality monitoring points in the tower pan (for water quality measurements, bacteriological indicator sampling, and Legionella sampling)
    12. The locations of end-point uses of the cooling tower system, and how water is received and processed, conditioned, stored, heated, cooled, re-circulated, and delivered to end-point uses.
    13. The locations of water processing equipment and components.

c. The Management and maintenance team shall use the flow diagram to evaluate where hazardous conditions may occur in the cooling tower system, and determine where control measures (control locations) can be applied to control potentially hazardous system conditions. The analysis shall also take into consideration the vulnerability of occupants and shall include provisions to respond to water service disruptions.
    i. At each control location, determine control limits range (min and max) for chemical and physical parameters to reduce hazardous conditions to an acceptable level. Establish a system for monitoring these parameters. (**Refer to Appendix D, as well as "water treatment specifications" section**)

d. Establish corrective action(s) to be taken when bacteriological and legionella culture analysis indicates control parameters are outside of control limits (Refer to Appendix E). Establish procedures to confirm all program elements are being implemented as designed, and establish documentation concerning all procedures and maintain records appropriate to these principles and their application. (Refer to Appendix D)

2. *Preventative measures:* Program to include procedures for cleaning machines during commissioning, as well as management and control means to ensure ongoing water treatment is initiated immediately once system is charged with water. (**Refer to "water treatment specifications" section**). For system maintenance, program documents shall include;
    a. Schedule for inspections for general system cleanliness, drift eliminator condition, condition

of fill material and water distribution system operation;

b. Requirements and schedule for treatment and flushing of any piping, basin/remote sump cleaning and purging of stagnant or low flow zones during idle conditions
c. Documentation requirements
d. **Water treatment documentation; refer to "water treatment specifications" section**
e. For shutdown and startup, program documents shall include;
    i. Requirements to manage hazardous conditions associated with fans during untreated water conditions
    ii. Procedures for shutdowns that include all chemical pretreatment steps, pump cycling protocols for system drainage for shutdown periods longer than the duration specified by the program team
    iii. Refer to Appendix B for detailed shutdown and startup procedures

3. *Cooling Tower Operation*: Control measures, corrective actions, documentation, including a written checklist for routine monitoring, and reporting 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 maintenance program and plan.
    a. Specific, detailed seasonal and temporary shutdown and start-up procedures. See Appendix B.
    b. Notification and communication strategies among management 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.

4. Routine Maintenance: 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.
    a. The cooling tower system must be cleaned whenever routine monitoring indicates a need for cleaning, but no less than twice a year. Cleaning protocol indicated by the manufacturer's instructions or industry standards, and worker protective measures, as required by applicable law must be specified in the MPP. Water contact areas such as the basin, sump, fill, spray nozzles and fittings, drift eliminators and air intake louvers must be properly accessed or removed to facilitate cleaning.
5. Schedules: For bacteriological and legionella culture sampling. Refer to "Water Treatment Specifications" section for more information.
    a. The schedule for routine bacteriological culture sampling and analysis to assess microbiological activity shall be at intervals not to exceed 30 days while the cooling tower is in use, and any additional bacteriological culture sampling and analysis as needed to validate process adjustments.
    b. The schedule for routine Legionella culture sampling and analysis shall be within 14 days of seasonal startup, and thereafter, at intervals not to exceed 90 days while the cooling tower is in use. If the cooling tower is used year-round, Legionella culture sampling and analysis must be performed within two weeks after start-up following maintenance. Additional conditions requiring immediate Legionella culture sampling and analysis are given in the "Water Treatment Specification" section, part K4c.
6. The management and maintenance team shall establish procedures to confirm both initially and on an ongoing basis that all of the MPP elements are being implemented as designed (verification). The team shall confirm that when implemented as designed, the MPP effectively controls the hazardous

conditions throughout the cooling tower system (validation).

K. Cooling Tower System Water Treatment Specifications:

1. Bidders must fill in the chart provided in Appendix C for cost estimating. Vendor/Bidder must submit a chemical treatment plan with rationale indicated based on tower specific characters such as material composition, use, size, etc.
2. *Requirements (ASHRAE 188-2018):* Program documents shall include water treatment requirements to control microbiological activity, scaling and corrosion. Program shall also:
   a. Specify all equipment and chemicals used for purposes of treating the open recirculating loop
   b. Include minimum required schedule for inspection, maintenance and monitoring with a corrective actions plan
   c. Identify minimum requirements for documenting system water treatment
3. *Requirements (Ch.8 NYC Department of Mental Health and Hygiene – 8-05***)**: Prior to changing an existing chemical treatment system or introducing a new chemical treatment agent, cooling tower design, installation, operation, and maintenance must be evaluated by a qualified person to ensure compatibility between the chemicals and the cooling tower system's materials, and to minimize microbial growth and the release of aerosols. The evaluation must describe the optimum level of chemicals to achieve the desired result in a manner which can be used as a system performance measure.
   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 plan explicitly states how manual or less frequent biocide additions will provide effective control of Legionella growth.
      i. Automated chemical feed system must be remotely accessible/available, and adjustments can be made remotely.
      ii. Must have the ability to generate reports remotely.
      iii. Bidders must provide non-proprietary specs and capabilities.
   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 plan specifies in detail how the intended water treatment schedule will be carried out, and how effective biofilm and microorganism control will be achieved when the whole or a part of the system is idle during the scheduled chemical injection.
   c. Chemicals and biocides: Chemicals and biocides must be used in quantities and combinations sufficient to control the presence of Legionella, minimize biofilms, and prevent scaling and corrosion that may facilitate microbial growth. Only New York State Department of Environmental Conservation approved oxidizing chemicals may be used as the primary biocide control. For systems where oxidizing chemicals cannot be used as the primary biocide to control the presence of Legionella building owners must submit an alternative plan for effective bacteriological control for approval by the Department.
      i. Any person who performs cleaning and disinfection or applies biocides in a cooling tower system must be a Commercial Pesticide Applicator or a Pesticide Technician who is qualified to apply biocide in a cooling tower and 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.
      ii. The name and certification number of the applicator or the business name and registration number of the company providing the disinfection shall be maintained

on-site.

iii. Only biocide products registered with the New York State Department of Environmental Conservation for use in cooling towers may be used to meet the disinfection requirements.

iv. The term “disinfect” and “disinfection” in the above three (3) subsections means the control of microorganisms or microbial growth. The term “disinfection” shall not include the cleaning of the cooling tower through application of detergents, penetrants, brushes or other tools, high-powered water, or any other method that does not involve the use of pesticide, as defined in 6 NYCRR part 325.

v. *Records:* Water treatment records must be kept for all chemicals and biocides added, noting the purpose of their use, manufacturer’s name, brand name, MSDS, date and time of each addition, and the amount added each week. Documentation must also include sampling frequency, number of samples, locations, sampling methods and test methods.

vi. *Chemical and biocide additions.* Chemicals and biocides must be added in accordance with this section and the procedures described in the 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 instructions.

d. *Non-chemical water treatment devices restricted:* Only biocide products registered with the New York State Department of Environmental Conservation may be used to meet the disinfection requirements. Non-chemical water treatment devices that employ alternative technologies to control biological growth may not be used in lieu of chemical biocide unless approved by the Department. Non-chemical water treatment devices may be installed as part of a cooling tower system as specified in the management program and plan, provided that the required chemical water treatment also being used adequately controls for Legionella.

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, 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. Condenser water service to include at a minimum:

i. Testing of makeup water (hardness, conductivity), cooling tower water (conductivity, pH, iron, copper, molybdate or other active, phosphate, azole, chlorine, bacteria); (Refer to Appendix D)

ii. Inspection of cooling tower condition;

iii. Tracking of cooling tower makeup meter;

iv. Adjustment to chemical metering pumps or timers, recommendations for any supplemental feed or layup chemical addition by Engineers;

v. Inventory and delivery of chemical products; Quarterly replacement of corrosion coupons where racks are provided and submittal of coupons for laboratory analysis with results to building.

4. Water quality monitoring*:*

a. *Frequency:* Water quality parameters, including but not limited to pH, temperature, conductivity and biocidal indicators, must be measured and recorded as specified in the management program and plan as follows:

i. Manual measurements. At least three times each week, provided that no more than two days pass without such measurement when the cooling tower system is operating.
ii. Continuous, automated and/or remote measurements. When continuous, automated and/or remote measurements and recordings are used, the management program and plan must show how effective measurements of system process control are being monitored. Automated measurements must be properly recorded and results made immediately available to responsible and qualified persons and to Department inspectors when requested.

b. *Minimum weekly biological process control indicators:* A bacteriological indicator to estimate microbial content of recirculating water must be collected and interpreted in accordance with Appendix D at least once each week while the cooling tower system is operating. Indicators must be taken at times and from water sampling points, as detailed in the maintenance program and plan that will be representative of water microbial content. Indicators may be taken at any time from constant chemical treatment systems. Indicators from systems that use intermittent biocide applications must be taken before biocide application and reflect normal cooling tower operating conditions.

c. *Legionella samples:* Legionella culture testing must be conducted no less frequently than every 90 days during cooling tower system operation. A Legionella sample must be analyzed by ELAP (New York State Environmental Laboratory Approval Program) Program certified laboratory, or by the New York State Department of Health Wadsworth Center. Test results of all Legionella species at or above the magnitude of level 4 as indicated in Appendix E must be reported to the Department within 24 hours of receiving the test results. Additional emergency Legionella sampling must be conducted if any of the following occur:
i. Power failure of sufficient duration to allow for growth of bacteria
ii. Loss of biocide treatment sufficient to allow for growth of bacteria
iii. Failure of conductivity controls to maintain proper cycles of concentration
iv. 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.
v. Any time two consecutive bacteriological indicator sample results are above Level 4 as indicated in Appendix E
vi. Any other conditions specified by the Department (as defined in Appendix A).

d. *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 collection of samples.

e. *Water quality corrective actions:* The maintenance program and plan must identify the procedures, responsible parties, required response time(s) and notification protocol for corrective actions and must include, at a minimum, corrective actions that must be implemented according to the result levels in Appendix E.

5. Routine Treatment: Target values for cooling water systems shown below;

Parameter	Dipslides	Agar Pour Plate or Petrifilm	Microscopic Exam
Planktonic Counts (Bulk Water)	<10,000 CFU/mL	<10,000 CFU/mL	No living organisms
Sessile Counts (Surfaces)	<100,000 CFU/cm^2	<100,000 CFU/cm^2	No living organisms

Deposits	NA	NA	No living organisms

a. Feed a source of halogen (chlorine or bromine) continuously and maintain a free residual of 0.5 to 1.0 ppm (as Cl2) in the cooling tower hot water return. Periodically monitor the residual at sample points throughout the system to insure adequate distribution.
b. Stabilized halogen products should be added according to the label instructions, and sufficient to maintain a measurable halogen residue.
c. A bio dispersant/bio detergent may aid in the penetration, removal and dispersion of biofilm and often increases the efficiency of thee biocide.
d. Continuous halogen programs may require periodic use of nonoxidizing biocides. This should be based on results of toxicant evaluations, and they should be re-applied as dictated by the results of biomonitoring.

6. Summertime Hyperhalogenation: Hyperhalogenation is the maintenance of a minimum of 5 ppm free halogen residual for at least 6 hours. Periodic Hyperhalogenation will discourage development of large populations of legionella and their host organisms. This may be necessary for systems that; have process leaks, heavy biofouling, use reclaimed wastewater or makeup water, have been stagnant for a long time, whose total aerobic bacteria count regularly exceeds 100,000 CFU/ml, or whose legionella test results show > 100 CFU/ml.
   a. The cooling tower system must undergo a summertime hyperhalogenation at least once each year between July 1 and August 31. The hyperhalogenation must be performed by a person qualified to apply biocide. The hyperhalogenation must be performed with a registered chlorine or bromine based biocide that is effective at Legionella control. The cooling tower system is exempt from hyperhalogenation if the system is in full shutdown and completely drained of water for the entire period between July 1 and August 31.
   b. Prior to the hyperhalogenation, the cooling tower system must be prepared to ensure that water flow reaches the entire cooling tower system. Biocide applied during the hyperhalogenation must reach all parts of the cooling tower system, including offline or standby equipment that may be out of service, or only used on-demand or during peak demand periods.
   c. During the hyperhalogenation, a minimum of 5 ppm free halogen residual must be continuously maintained in the cooling tower system for at least six hours. Additionally, the pH and halogen residuals must be measured at two independent sampling locations within the cooling tower system during the hyperhalogenation to verify the minimum biocide residual was achieved and maintained. The water treatment program shall be reviewed by the management and maintenance team to determine if additional chemical inhibitors are desirable to prevent corrosion and scaling.
   d. A Legionella culture sample must be collected within 3 to 45 days after the hyperhalogenation. Sample results must be interpreted, and corrective actions implemented, in accordance with the result levels indicated in Appendix E.
   e. **The owner** must submit a declaration of summertime hyperhalogenation within 30 days of completion of the hyperhalogenation through the NYC Cooling Tower Registration Portal. The declaration must include the cooling tower system ID; the hyperhalogenation protocol performed, including the name and quantity of biocides and chemicals applied; dose and contact time; effective pH range of biocides; pH and halogen residual monitoring results during hyperhalogenation; service date and name and qualifications of the person who applied the biocide. The declaration must be kept with required cooling tower records.
7. Emergency Disinfection: Use this procedure as called for in Appendix D. This is based upon OSHA and other government recommendations, and may require modification based on system volume, water availability and wastewater treatment capabilities;

a. Remove the heat load from the cooling system if possible
b. Shut off fans associated with the cooling equipment
c. Shut off the system blowdown. Keep makeup valves open and operating
d. Close building air intake vents in the vicinity of the cooling tower (especially downwind) until after the cleaning procedure is complete
e. Continue to operate the recirculating pumps
f. Add a biocide sufficient to achieve 25 to 50 ppm of free residual halogen
g. Add an appropriate bio dispersant (and antifoam if needed)
h. Maintain 10 ppm free residual halogen for 24 hours, add more biocide as needed to maintain 10 ppm residual
i. Monitor the system pH. Add acid and/or reduce cycles in order to achieve and maintain a pH of less than 8.0 (for chlorine based biocides) or 8.5 (for bromine-based biocides)
j. Drain the system to a sanitary sewer
k. Refill the system and repeat the steps above
l. Inspect after the second drain off, if a biofilm is present repeat the procedure again
m. When no biofilm is obvious, mechanically clean the tower fill, supports, cell partitions and sump. Workers engaged in cleaning should wear at a minimum eye protection and a half face respirator with HEPA filters and all required PPE.
n. Refill and recharge the system to achieve a 10 ppm free halogen residual. Hold this residual for one hour and then drain the system until free of turbidity
o. Refill the system and charge with the appropriate corrosion and deposit control chemicals, re-establish normal biocontrol residuals and put the cooling tower back into service

8. In addition to the criteria in Appendix D, an emergency disinfection should be conducted when;
   a. Very high legionella counts exist (>1000 CFU/ml)
   b. Legionnaires disease is known or suspected and may be associated with the cooling tower
   c. Very high total microbial counts (>100,000 CFU/ml) reappear within 24 hours of a routine disinfection

L. Closed Loop Hydronic HVAC System Water Treatment Specifications

1. Bidders must fill in the chart provided in Appendix C for cost estimating. Vendor/bidder must submit a water treatment program with rationale indicated based on loop specific characteristics to control to water quality defined in “Performance Requirements” section.
2. Provide all hardware, chemicals, and other material necessary to maintain HVAC water quality in all systems, as indicated in this Specification. Water quality for hydronic systems shall minimize corrosion, scale buildup, and biological growth for optimum efficiency of hydronic equipment without creating a hazard to operating personnel or the environment.
3. Base HVAC water treatment on quality of water available at project site, hydronic system equipment material characteristics and functional performance characteristics, operating personnel capabilities, and requirements and guidelines of authorities having jurisdiction.
4. Performance Requirements: Closed hydronic systems, including hot-water heating below 250 deg F, chilled water, and dual-temperature water shall have the following water qualities controlled within appropriate range as determine by water treatment vendor qualified chemistry expert:
   a. pH
   b. Alkalinity
   c. Steel Corrosion Inhibiters: Provide sufficient inhibitors to limit mild steel corrosion. Maintain soluble iron concentrations.
   d. Yellow Metal Corrosion Inhibitor: Provide sufficient copper and brass corrosion inhibitors to limit copper corrosion. Maintain soluble copper concentrations.

e. Scale Control: Provide sufficient scale inhibitors to prevent formation of scale and maintain all scale-forming material in solution.
f. Dispersants: Provide sufficient dispersants to prevent sedimentation of fine particulate matter.
g. Microbiological Limits:
    i. Total Aerobic Plate Count: Maintain a maximum value of organisms/mL.
    ii. Total Anaerobic Plate Count: Maintain a maximum value of organisms/mL.
    iii. Nitrate Reducers: Maintain a maximum value of organisms/mL..
    iv. Sulfate Reducers: Maintain a maximum value of organisms/mL..
    v. Iron Bacteria: Maintain a maximum value of organisms/mL.

5. Chemical treatment and testing equipment:
    a. Each system is provided with bypass Feeders including fill opening in the top, NPS ¾ bottom inlet and top side outlet, threaded fill cap with gasket seal and diaphragm.
    b. Each system is provided with corrosion test-coupon assembly, complete with piping, valves, and provisions for insertion of mild steel and copper coupons. Locate copper coupon downstream from mild steel coupon in the test-coupon assembly.
    c. Provide Owner On-Site Testing Kits: Manufacturer-recommended equipment and chemicals in a wall-mounted cabinet for testing pH, corrosion inhibitors, alkalinity, hardness, and other properties recommended by manufacturer.
        i. Provide one test kit per system in location nearby corrosion test coupon assemblies.
6. Chemicals:
    a. Shall be as recommended by water treatment vendor, compatible with piping system components and connected equipment, and able to attain water quality specified in “Performance Requirements” Section.
7. Execution
    a. Utilize chemical treatment and testing equipment in previous section for chemical introduction, corrosion coupon analysis, and water sampling.
    b. Initial Water Analyses
        i. Perform analysis of supply water to determine quality of water available at Project site.
        ii. Perform analysis on each hydronic system to determine initial loop water quality conditions. Submit written report of water analysis advising owner of concerns or recommendation for changes to current treatment program to adhere to “Performance Requirements” section.
    c. Maintenance Service
        i. Provide chemicals and service program to maintain water conditions required above, to inhibit corrosion and scale formation for hydronic piping and equipment. Services and chemicals shall include the following, for bid tally purposes (Appendix C) at one-month intervals for the first three months and three (3) month intervals thereafter.
            1. Periodic field service and consultation.
            2. Customer report charts and log sheets.
            3. Laboratory technical analysis.
            4. Corrosion coupon analysis.
            5. Analyses and reports of all chemical items concerning safety and compliance with government regulations.
    d. Comply with ASTM D3370 and with the following standards:
        i. Silica: ASTM D859
        ii. Acidity and Alkalinity: ASTM D1067
        iii. Iron: ASTM D1068

iv. Water Hardness: ASTM D1126

M. Estimated Amount/Term of Contract:

8. The term shall be for a three (3) year period, with the option to renew for two additional 1-year periods. The remaining terms regarding the exact start date will be addressed in the Contract agreement document with the final awarded firm.

N. Method of Bidding:

The following rates shall be "all inclusive". All prices shall include all direct and indirect costs, including, but not limited to, direct labor costs, overhead, fee or profit, clerical support, equipment, materials, supplies, managerial (administrative) support, system maintenance, system trouble shooting and modifications, all documents, reports, forms, reproduction, travel time, parking, tools, insurance, travel/transportation, and any other costs.

1. Part I - Unit Rate
   a. The vendor shall submit a Unit Cost for various water treatment products. Refer to Appendix C and section 7 of the sample MPP in Appendix I.
   b. This cost shall not include the cost of labor to perform non-destructive testing and equipment installation services which will be issued via work order letter and billed under Part II and Part III of the contract.
   c. For bid purposes the Product Class packages have a set fixed lb/drum or gal/drum with a set Key Active Ingredient %. The vendor deviating from this set point must indicate the Adjusted $/lb or gal/drum for any product with a different active %

2. Part II - Labor Rate
   a. Contractor shall submit an Hourly Labor Rate to perform additional labor services other than the labor required to transport chemicals, provide monthly testing, review of water treatment logs and training.
   b. NOTE: This request for additional labor shall be issued through a work order. Contractor must sign-in and out on the sign-in sheet. This time sheet must be signed by the Engineer of the building and must be submitted when request for payment is made. The Prevailing Wage Classifications for additional labor services are Refrigeration & Air Conditioner Service Person I, II, III.
   c. Unit pricing shall be indicated separately for regular business hours (7am-4pm) and overtime (after hours and weekends).
   d. The fees shall not be increased during the base term of the Contract. Thereafter, the fees may be increased for each subsequent annual period of said term upon the anniversary of the Contract with no less than 60 days' written notice to NYSIF. Such increase shall be limited to the lesser of the Consumer Price Index for All Urban Consumers ("CPI-U"), U.S. City Average, All Items, as reported by the U.S. Department of Labor, Bureau of Labor Statistics for the preceding 12-month period or 3% over the prior year's fees, whichever is lower. Any increase granted shall be effective on the Contract anniversary date and calculated using the index number published four months preceding the anniversary date of the Contract. If at any time the above index is discontinued or becomes unavailable, NYSIF reserves the right to implement a comparable index. **Note:** All requested increases shall be subject to negotiation between NYSIF and the Contractor; and escalated rates will be rounded to the nearest whole dollar value."

3. Part III - Material Rate

a. Under Part III, the Bidder shall submit a percentage mark-up on any equipment, materials and/or additional chemicals not covered under Part II (but requested by NYSIF) over his actual cost, to cover all overhead and profit. The BID PERCENTAGE mark-up shall be applied to the estimated [to be determined] in equipment, materials and/or additional chemicals. The Bidder shall include this amount and make it part of the Total Bid Price.
   i. For payment purposes under this Section, the Contractor shall be required to submit copies of their bills/invoices (substantiating actual cost) to NYSIF with request for payment. Asset Management (AM) shall approve the acceptability of the price lists and individual prices to be used, and shall apply the bid percentage mark-up.
   ii. When the Contractor does not substantiate by invoice his actual cost for materials, NYSIF shall use current wholesale price catalogs less fifty percent (50%) OR current discount to establish probable cost to the Contractor and then shall apply the bid percentage mark-up.

b. The fees shall not be increased during the base term of the Contract. Thereafter, the fees may be increased for each subsequent annual period of said term upon the anniversary of the Contract with no less than 60 days' written notice to NYSIF. Such increase shall be limited to the lesser of the Consumer Price Index for All Urban Consumers ("CPI-U"), U.S. City Average, All Items, as reported by the U.S. Department of Labor, Bureau of Labor Statistics for the preceding 12-month period or 3% over the prior year's fees, whichever is lower. Any increase granted shall be effective on the Contract anniversary date and calculated using the index number published four months preceding the anniversary date of the Contract. If at any time the above index is discontinued or becomes unavailable, NYSIF reserves the right to implement a comparable index. **Note:** All requested increases shall be subject to negotiation between NYSIF and the Contractor; and escalated rates will be rounded to the nearest whole dollar value."

O. Estimated Quantity:

1. NYSIF reserves the right, during the term of this contract, to determine the Scope of Work to be included therein, and shall not be deemed to be limited by the estimated amount of the contract, nor does this contract guarantee or obligate NYSIF to issue a required number of locations for testing and treatment. The Contractor is cautioned that payment will not be made for any work that is not authorized by NYSIF.

P. Payments:

1. Requests for payments shall be submitted to NYSIF which will, inspect the work performed, review the cost and approve request for payment.
2. The Contractor shall submit with his application for payment a Field Service Sheet for each service visit. The information on the Field Service Sheet shall be as previously specified.
3. In addition, along with each request for payment, a Certified Payroll Report issued by the City of New York - Office of the Comptroller, Bureau of Labor Law must be submitted for the period of which payment is being requested.
4. Also, Contractor must submit a Contractor's Time-Sheet as issued by the User Agency. The Contractor's Time-Sheet must be filled out completely, including the Social Security Number (SSN). It also must be signed off by a User Agency representative at the location.
5. Must have **original invoices** for materials billed.

6. Materials Ordered In **Bulk** - Contractor must supply Original Invoice, with the first payment that the materials is being billed for. Further billing to that invoice will be reference to the original payment and a copy supplied.

Q. Billing:

1. Contractor shall submit an Invoice within Sixty (60) days of performance of the work. Failure to promptly submit an invoice may result in delayed or non-payment.
2. Worked shall be paid no less than the rate stated for each trade in the Prevailing Wage Schedule or as such schedule may be amended by the Comptroller.
3. Work to be billed must reflect the units and prices on the bid sheet.
4. ***Request For Payment Must Include:***
   a. Invoice cover-sheet stating the Company's Name, Contract No., Work Order No., Payment No., Location, Scope of Work, and Dollar Amount Being Billed In Relation To The Bid Sheet;
   b. Service Tickets for all Work Orders being billed on a Time and Material Basis [if applicable];
   c. Work Order Letter(s) [if applicable];
   d. Certified Payroll Report issued by the City of New York - Office of the Comptroller, Bureau of Labor Law, for the period for which payment is being requested;
   e. Copy of approved signed proposal [if applicable];
   f. All written schedules of work;
   g. Original Invoice(s) for material(s) being billed;
5. All forms must be filled out completely. Failure to comply will lead to a delay in processing/deduction or the return of payment request to the Contractor.

R. Guarantee of Prices:

1. Proposal prices must be guaranteed through the life of the Contract. Bidders must indicate in their proposal any modifications planned or anticipated during the Contract Period.
2. The bid prices set forth in the Bid Proposal shall include everything necessary or proper for furnishing and installing the item(s) specified, including proper packing and the cost of delivery, and for performing and completing the work required by the Specifications to provide finished satisfactory work.

S. Damage to Property:

1. The Contractor shall repair or replace to the satisfaction of NYSIF any or all damage done to the building or its contents as a result of negligence in the delivery of any supplies, material or equipment, or resulting from defective equipment, material or supplies furnished by such Contractor.

T. Miscellaneous:

1. NYSIF reserves the right, during the term of this contract, to terminate this contract after ten (10) days written notice to the Contractor.
2. The Bidder shall visit the site of the proposed service and familiarize himself - with the conditions thereof and shall determine for himself the quantities of materials required, so that he fully understands the work specified. NYSIF shall not be responsible for any misunderstanding of the service specified.
   a. Bidder must have emergency service call capability. Refer to section C.2.c.
3. During the terms of this contract, it is the responsibility of the Contractor to bring any technical discrepancies or problems to the attention of NYSIF.
4. Contractor shall supply all necessary treatment chemicals, test equipment, and test reagents, as

required by chemical specifications.

5. These Specifications contemplate only perfect and completed work in every case, done in a first class workmanlike manner. The labor and materials must be of the best quality. All work must be done to the entire satisfaction of NYSIF.
6. NYSIF reserves the right, during the term of this contract, to add and/or remove from the total number of tests required.

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APPENDIX A

DEFINITIONS

When used in this specification, the following terms mean:

“Analysis of building water systems” means the systematic evaluation of potentially hazardous conditions associated with each step in the process flow diagrams.

“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.

“At-risk” means any person who is more susceptible than the general population to developing legionellosis because of age, health, medication, occupation, or smoking.

“Authority having jurisdiction (AHJ)” means an organization, office, or individual responsible for enforcing the requirements of ASHRAE standard 188-2015.

“Bacteriologic culture sampling and analysis” means the collection of a water sample for the measurement of live culture growth of the aerobic bacteria populations by heterotrophic plate count (HPC), dip slides, or similar method used by the industry and according to the manufacturer’s directions.

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

“Biocidal indicator” means a direct or indirect measure of the effectiveness of biocide, consisting of free halogen residual concentration or oxidation reduction potential (ORP), as specified in the management program and plan.

“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.

“Building water systems” means potable and nonpotable water systems in the building or on the site. For the purposes of this specification, this shall refer to the cooling tower system.

“Centralized building water system” means any system that distributes water to multiple uses or multiple locations within the building or site.

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

“Control” means to manage the conditions of an operation in order to maintain compliance with the established criteria.

“Control limit” means a maximum value, a minimum value, or a range of values of a chemical or physical parameter associated with a control measure that must be monitored and maintained in order to reduce occurrence of a hazardous condition to an acceptable level.

“Control measure” means a disinfectant, heating, cooling, filtering, flushing, or other means, methods, or procedures used to maintain the physical or chemical conditions of water to within control limits.

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

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

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

“Compliance inspection” means the 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, including the completion of a written or electronic checklist, and must be conducted and certified by a qualified person.

“Dead legs” mean lengths of pipe normally closed at one end or ending in a fitting within the cooling tower system that limits water circulation and is likely to result in 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) or physical treatment used to kill or inactivate pathogens.

“Disinfectant residual” means the net amount of chemical disinfectant remaining in treated water after chemical demand exerted by the water is satisfied.

“Disinfection” means using one or more of the biocides registered with the New York State Department of Environmental Conservation 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 designed to remove aerosols from cooling tower exhaust.

“Hazard” means legionella bacteria in a building water system that, in absence of control, can cause harm to humans.

“Hazardous condition” means a condition that contributes to the potential for harmful human exposure to legionella.

“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.

“HVAC&R” means heating, ventilation, air conditioning, and refrigeration.

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

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

“Immunocompromised” means a condition describing an individual who has increased susceptibility to infections due to existing human disease, medication regimens, or other types of medical treatment. (See at-risk).

“Legionella” means the genus of bacteria that was subsequently identified as the causative pathogen associated with the 1976 outbreak of disease at the American Legion convention in Philadelphia. Legionella are common aquatic bacteria found in natural and building water systems, including the recirculated water of cooling tower systems that are not properly or regularly maintained. There are more than 50 different species of Legionella, all of which are potentially pathogenic.

“Legionella culture sampling and analysis” means the collection of a water sample for the measurement of the live culture of legionella involving the use of specialized media and laboratory methods for growth to determine the species and serogroup.

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

“Legionellosis” is the term used to describe legionnaires’ disease, Pontiac fever, and any illness caused by exposure to Legionella bacteria.

“Maintenance program and plan”, “plan”, or “MPP” means a written set of measures (a risk management plan) describing monitoring, cleaning, disinfection and all other activities for the prevention and control of Legionella growth in the 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. This includes documentation of the plan’s implementation and operation.

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

“Management and maintenance team” means the individual or individuals designated by a building owner to be responsible for the continued effective and safe operation of a cooling tower system.

“Monitoring” means conducting a planned sequence of observations or measurements of the physical and chemical characteristics of control measures.

“Nonpotable” means water that is not safe for drinking or for personal or culinary use and that has the potential to cause harmful human exposure to legionella.

“NYSIF” means New York State Insurance Fund.

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

“Process control measures” mean actions that must be taken to evaluate internal functioning of the cooling tower system, including monitoring conductivity, pH, biological indicators and other parameters, and observing phenomenon such as scaling, corrosion and biofilm.

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

“Qualified person” means a New York State licensed 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 program and plan, and making recommendations for diagnosing anomalous conditions that require corrective actions, under the guidance of a qualified person. The responsible person should be capable of measuring water pH, temperature and disinfectant residual levels at proper locations/frequencies; checking biocide storage container levels; recording dates, amounts and times of biocide injection; and logging all other relevant data and comments.

“Risk” means the potential for harm to humans resulting from exposure to Legionella.

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

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

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

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

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

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

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

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

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

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

“Water quality parameters” means temperature, pH, conductivity, biocidal indicator, bacteriological indicator and other chemical and physical indicators of system process control.

“Water service disruption” means planned or unplanned events that reduce water delivery pressure below 20 psi and that are caused by, but not limited to, new construction tie-ins; replacement of valves, hydrants, or meters; pumping failures; pipeline breaks; and other system repairs or emergency conditions.

“Water-use end points” means the points at which water exists from all potable and nonpotable building water systems, fixtures, and equipment.

APPENDIX B

SYSTEM SHUTDOWN AND START-UP

System shutdown and start-up; commissioning and decommissioning cooling towers:

- *Full system shutdown:* Procedures to shutdown the cooling tower system must conform to the manufacturers' recommendations. When shut down, the system must be completely drained and protected from offline contamination.
- *Full system startup:* At a minimum, before the cooling tower system is started-up, **an owner** must clean and disinfect the cooling tower if it has been shut down or idle for more than five days. Cleaning and disinfection must be done no later than 15 days before the first seasonal use of such tower. The maintenance program and plan must include detailed seasonal and idle period startup procedures that include, at a minimum:
  - Either fully clean and disinfect, drain to waste and disinfect, or sufficiently hyper halogenate the recirculated water before startup; and
  - Before the startup of the cooling tower system after an extended shutdown of five or more days, collect samples for Legionella culture and take actions required by Appendix E when results are received; and
  - Before seasonal startup of the system after it has been fully shut down, perform a pre-startup inspection by a qualified person.

Shutdown, Startup and Idling Procedure Summary	
Seasonal Shutdown	**When the system is to be shut down for an extended period of time, the following services should be performed:** 1. The evaporative cooling unit cold water basin should be drained. 2. The cold water basin should be flushed and cleaned with the suction strainer screens in place. 3. The suction strainer screens should be cleaned and reinstalled. 4. The cold water basin drain should be left open. 5. The fan shaft bearings and motor base adjusting screws should be lubricated. This should also be performed if the unit is going to sit idle prior to start up. 6. The water make up valve needs to be closed. All water make-up, overflow and drain piping needs to be drained, if not beat traced and insulated. 7. The finish of the unit should be inspected. Clean and refinish as required. 8. The fan bearings and motor bearings need to be turned at least once a month by hand. This can be accomplished by making sure the unit's disconnect is locked and tagged out, and grasping the fan assembly, rotating it several turns.
Seasonal Startup	Describe seasonal startup procedure, including inspection protocol if pre-startup inspection is implemented 1. Engineering Personnel must ensure that before beginning any maintenance, be certain that the power is turned off and the unit is

Shutdown, Startup and Idling Procedure Summary	
	properly locked and tagged out. 2. Engineering Personnel must verify that the overall installation reflects the requirements of the installation guidelines found in the Manufacturer's Operation and Maintenance Manual. 3. For multi-speed fan motors, Engineering Personnel must verify that 30 second or greater time delays are provided for speed changes when switching from high to low speed. Also check to see if interlocks are provided to prevent simultaneously energizing high and low speed and confirm both speeds operate in the same direction. 4. Engineering Personnel must verify all safety interlocks work properly. 5. For units operating with a variable frequency drive, Engineering Personnel must make certain that minimum speed requirements have been set. Check with VFD manufacturer for recommended minimum speeds and recommendations on locking out resonance frequencies. 6. Engineering Personnel must verify that the sensor used for fan sequencing and/or by-pass valve control is located downstream of the point where the bypass water mixes with the condenser supply water, if applicable. 7. Engineering Personnel must verify that a water treatment plan has been implemented including passivation of galvanized steel units. 8. Engineering Personnel must clean and remove any debris, such as leaves and dirt from the air inlets. 9. Engineering Personnel must flush the cold water basin (with the strainer screens in place) to remove any sediment or dirt. 10. Engineering Personnel must remove the strainer screen, clean and reinstall. 11. Engineering Personnel must check mechanical float valve to verify it operates freely. 12. Engineering Personnel must inspect water distribution system nozzles and clean as required. Check for proper orientation. 13. Engineering Personnel must check to ensure drift eliminators are securely in place and in proper orientation. 14. Engineering Personnel must adjust fan belt tension as required. 15. Engineering Personnel must lubricate fan shaft bearings prior to seasonal start-up.

Shutdown, Startup and Idling Procedure Summary	
	16. Engineering Personnel must turn the fan(s) by hand to insure it turns freely without obstructions. 17. Engineering Personnel must visually inspect the fan blades. Blade clearance should be approximately 3/8" (1/4" minimum) from tip of blade to the fan cowl. 18. Engineering Personnel must ensure that the fan blades are securely tightened to the fan hub. 19. Engineering Personnel must ensure that if any stagnant water remains in the system including "dead legs" in the piping, the unit must be disinfected prior to the fans being energized. Please refer to Ashrae Guideline 12-2000 and CTI Guideline WTP-148 for more information. 20. Engineering Personnel must manually fill the cold water basin up to the overflow connection. 21. Engineering Personnel must ensure that cleaning and disinfection shall occur within 15 days before the use of such tower. 22. Engineering Personnel must prepare the cooling tower for Mechanical Cleaning by the Independent Commercial Pesticide Company. 23. *Legionella* culture testing must be conducted no less frequently than every 90 days during cooling tower system operation and before the startup of a cooling tower that has been shut down for five or more days. A *Legionella* sample must be analyzed by the New York State Department of Health Wadsworth Center or other ELAP laboratory approved by the Department. Test results of all Legionella species at or above the magnitude of level 4 as indicated in Table 1 of Chapter 8 must be reported to the Department within 24 hours of receiving the test results. 24. Engineer Personnel must ensure that facilities towers are isolated from the system. Turn off and secure the electrical service to the tower. Be sure the tower fan is off, the main circulating pumps are off, and the temperature sensors are off or put in a nonoperational mode. Lock out and tag out the main power switch. 25. Engineering Personnel prior to cleaning must close the valves that supply and return water to and from the tower. 26. Engineering Personnel must close the make-up water valve to the tower. 27. Engineering Personnel must open bottom drain of the tower. Remove overflow pipe if equipped 28. Engineering Personnel must remove the grate covering the suction intake

Shutdown, Startup and Idling Procedure Summary	
	for cleaning if possible. 29. Engineering Personnel must have a hose ready, charged, and placed in tower once the tower has been drained out. Have your squeegee, broom, and shovel ready and place in tower. 30. Engineering Personnel must suit up with water proof boots, coveralls, gloves, hat, and face protection. 31. Engineering Personnel must supervise the safe cleaning of the tower. Once cleaned, reverse the procedure for startup.
Idling	1. Two or More Days: Energize motor space heaters or run motors for 10 minutes twice daily 2. Few Weeks: Run gear reducer for 5 minutes - weekly 3. Several Weeks: Completely fill gear reducer with oil. Drain to normal level prior to running 4. One Month or longer: Rotate motor shaft/fan 10 turns - bi-weekly 5. One Month or longer: Megger test motor windings - semi-annually 6. Continue with biocide and pH testing procedure.

APPENDIX C

FEE SCHEDULE

Please complete and return the Appendix Z Fee Schedule included in the RFQ.

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APPENDIX D

WATER MONITORING AND TESTING PROCEDURES

REFER TO SECTION 7 OF MODEL MAITENANCE PROGRAM AND PLAN

APPENDIX E

CORRECTIVE ACTIONS FOR WATER TEST RESULTS

Table 8-1. Corrective actions required for *Legionella* culture results.

Level	*Legionella* Culture Result[1]	Process Triggered by *Legionella* Culture Results
1	<10 CFU/ml	Maintain water chemistry and biocide levels, as well as treatment program and Legionella monitoring in accordance with the maintenance program and plan.
2	≥ 10 CFU/ml to <100 CFU/ml	Initiate immediate disinfection by increasing biocide concentration or using a different biocide within 24 hours: review treatment program; and retest water within 3-7 days. Continue to retest and disinfect at the same time interval until level 1 is reached. Subsequent test results must be interpreted in accordance with this Table. Once level 1 is reached, resume routine maintenance program and plan.
3	≥ 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. Continue to retest and disinfect at the same time interval until level 1 is reached. Subsequent test results must be interpreted in accordance with this Table. Once level 1 is reached, resume routine maintenance program and plan.

4	≥ 1000 CFU/ml	For *Legionella* results at this level, notify the department within 24 hours of receiving test result[3]. Initiate immediate disinfection by increasing biocides within 24 hours. Within 48 hours perform full remediation of the tower by hyperhalogenating[2], draining, cleaning, and flushing. Review treatment program, retest water within 3-7 days. Continue to retest and disinfect at the same time interval until level 1 is reached. Subsequent test results must be interpreted in accordance with this Table. If any *retest* is ≥ 1000 CFU/mL, carry out system decontamination[4]: Maintain between 5 – 10 ppm free residual halogen for a minimum of one hour; drain and flush with disinfected water; clean wetted surface; refill and dose to 1 – 5 ppm of free residual halogen and circulate for 30 minutes. Refill, reestablish treatment and retest for verification of treatment. For chlorine treatment the pH range should be 7.0 to 7.6; for bromine treatment the pH range should be 7.0 to 8.7. At higher pH values the treatment times may need to be extended. .

1. Performed by NYSDOH Wadsworth Laboratory, or other ELAP laboratory approved by the Department. Combine all species of *Legionella* detected.
2. At a minimum, dose the cooling water system with a halogen based compound (chlorine or bromine)[4] 5 to 10 ppm Free Halogen Residual for at least 1 hour; pH 7.0 to 7.6.
3. In a manner as specified on the Department's website.

4. Stabilized halogen products should not be used.

Table 8-2. Corrective actions required for bacteriological indicator results.

Level	Heterotrophic Plate Count[1] and Dip Slide Result	Process Triggered by Test Results
1	<10,000 CFU/ml	Maintain water chemistry and biocide levels.
2	≥ 10,000 CFU/ml to <100,000 CFU/ml	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 must be interpreted in accordance with this Table until level 1 is reached.
3	≥ 100,000 CFU/ml to <1,000,000 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 must be interpreted in accordance with this Table until level 1 is reached.
4	≥ 1,000,000 CFU/ml	Initiate immediate disinfection by increasing biocides within 24 hours. Within 48 hours perform remediation of the tower by hyperhalogenating[2], cleaning, and flushing. Review treatment program, retest water within 3-7 days. Subsequent test results must be interpreted in accordance with this Table until level 1 is reached.

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

2. At a minimum, dose the cooling water system with 5 to 10 ppm Free Halogen Residual for at least 1 hour; pH 7.0 to 7.6.

A list of conditions requiring corrective action	**Description of Notification Procedure and Corrective Actions**
Routine System and Water Quality Monitoring: detection of anomaly in tower condition and process as described in §8-04(a)	Upon detection of anomaly, responsible person is to notify management and maintenance team to plan a course for immediate corrective action or process revision.
Compliance Inspections: detection of presence of conditions as described in §8-04(b)	The qualified person (contractor or vendor) shall notify the management and maintenance team of non-compliant tower conditions or inadequate records and make needed corrections to rectify the problem(s) observed.
Routine Maintenance and Part Replacement: inspection results trigger replacement and repair as described in §8-04(c)	If any replacement parts are needed, they must be in accordance with NYC construction codes and must meet the specifications of the original equipment manufacturer. Replacement materials must be corrosion resistant and effectively block the penetration of sunlight into the tower.
Legionella and Bacteriological Indicator Sampling: results trigger corrective action levels as described in §8-05(f)	Should any legionella bacteria be detected, an immediate corrective course of action will be initiated as per Tables 8-1 and 8-2 of this appendix and in compliance with the Rules of the City of New York Chapter 8, title 24 and New York State Title 4, Appendix 4-A.

APPENDIX F

SUMMARY OF OWNERS REQUIREMENTS

OWNER:

A. Equipment Registration: All owners of cooling towers shall register such towers with the NYC department of health and mental hygiene prior to initial operation in a form and manner as required by the commissioner and shall include at a minimum:

1. Address of the building at which the cooling tower is located
2. Intended use of cooling tower
3. Distance of cooling tower from nearest building outdoor air intake
4. Name, address, telephone number and email address of owner
5. Manufacturer of the cooling tower
6. Model number of the cooling tower
7. Specific unit serial number of the cooling tower
8. Cooling capacity (tonnage) of the cooling tower
9. Basin capacity of the cooling tower
10. Cooling tower system volume, inclusive of all piping, basin(s), and sump
11. Commissioning date of the cooling tower, including year the cooling tower was placed in service
12. Whether the cooling tower operates year-round or seasonally and, if seasonally, start and end date operation
13. Whether systematic disinfection is maintained manually, through timed injections, or through continuous delivery.
14. Whether maintenance is performed by in-house personnel, by a contractor, or by other parties

15. Owners of existing cooling towers shall register such towers within 30 days after the effective date of this section.
16. *Annual certification* – The owner or operator of a cooling tower shall file a certification each year that the cooling tower was inspected, tested, cleaned and disinfected in compliance with section 17-194.1 of the administrative code and the rules of the department of mental health and hygiene, and that a maintenance program and plan has been developed and implemented. Such certification shall be submitted by November 1 of each year.

B. Recording: At intervals of no more than 90 days while the cooling tower system is in use, the owner of the cooling tower system shall report to the department using the statewide electronic system:

1. Date of last bacteriological culture sample collection, the analysis result(s), and date of any required remedial action.
2. Date of last Legionella culture sample collection, the analysis result(s), and date of any required remedial action.
3. Date of last inspection.
4. Date of last certification.
5. Date of removal or permanent discontinued use of the cooling tower system, if applicable.
6. Such other information as shall be determined by the department.

C. Routine System Monitoring: An owner must designate a responsible person as defined in Appendix A to monitor the cooling tower system 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. Any system anomalies or problems must be recorded on the checklist and reported to the management and maintenance team for immediate corrective action.

D. Routine Maintenance: Cooling tower systems must be maintained and operated in accordance with the 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.

E. Cleaning: The cooling tower system must be cleaned whenever routine monitoring indicates a need for cleaning, but no less than twice a year, in accordance with the maintenance program and plan. Cleaning protocol indicated by the manufacturer's instructions or industry standards, and worker protective measures, as required by applicable law must be specified in the maintenance program and plan. Water contact areas such as the basin, sump, fill, spray nozzles and fittings, drift eliminators and air intake louvres must be properly accessed or removed to facilitate cleaning.

F. Aerosol and mist control: The cooling tower system must be operated at all times to minimize the formation and release of aerosols and mist. Owners must install and maintain drift eliminators in accordance with the manufacturer's specifications and the New York City Construction Codes. The calculated drift loss at maximum design water circulation must not exceed the manufacturer's tested value for maximum drift loss. Replacement drift eliminators and fill materials must be OEM Certified Components. For non-OEM components, documentation must be provided from the manufacturer indicating CTI and manufacturer certified OEM operating performance.

G. Change In Usage or Schedule: At the time of new or replacement cooling tower installation, design drawings must be reviewed and hazardous conditions identified and addressed prior to beginning instruction. Identify; site issues that allow contamination from the building systems or facility processes to be drawn into the equipment, siting that allows cooling tower exhaust to infiltrate buildings and outside air intakes, access issues that inhibit required maintenance and inspection.

1. 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.
1. Removal or permanently discontinuing use of cooling towers: The owner or operator of a cooling tower shall notify the department (as defined in Appendix A) 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 shall include a statement that the cooling tower has been drained and sanitized in compliance with the requirements of the department and this specification.
2. At a minimum, an owner shall clean and disinfect cooling towers that are shut down for more than five (5) days.
3. Cleaning and disinfection shall occur within 15 days before the use of tower.
4. Refer to Appendix B for system shutdown/startup procedures

H. Compliance Inspections: An owner must retain a qualified person to conduct a compliance inspection at least once every ninety (90) days while a cooling tower system is in operation.

1. Owner shall keep and maintain records of all inspections and tests performed for at least three (3) years. Owner shall maintain a copy of the program and maintenance plan on the premises where a cooling tower is located. Records and plans should be made available immediately to the department upon request.
2. When test results **[received from vendor/bidder]** indicate levels of microbes that indicate maintenance deficiency, the owner of the building shall clean and disinfect the cooling tower in accordance with the rules of the department within 48 hours of the owner knowing of the results of the test or reasonably should know the results of the test
3. When the test results indicate levels of microbes that pose a serious health threat, the owner shall within 24 hours of knowing the results (or reasonably should know the results) notify the department, clean and disinfect the cooling tower including an additional application of biocide in accordance with the department
4. If an owner does not meet the timelines established above, the department may serve an order on the owner requiring compliance within a specified time. If this order is not complied with, the department may authorize any agency of the city to act as an agent of the department and execute such order, and recover the costs of such execution from the owner

I. Contingency Response Plan: Refer to Appendix E

1. Procedures to be followed if there are known or suspected cases of legionellosis associated with the use of cooling towers and evaporative condensers.
2. Directions issued by national, regional and local health department authorities.
3. If testing for legionella shall be performed, procedures shall include criteria for when and where tests shall be performed.
4. Procedures for emergency disinfection.
5. Procedures for other actions identified by the program team to prevent exposure to contaminated water.

J. Records and Owner Documentation: The owner must keep for at least three (3) years in the building where the cooling tower system is located a record of any maintenance, sampling and analyses, disinfections schedules and applications, inspection findings, deficiency, corrective action, water treatment, test result, cleaning performed on the tower and certifications.

1. *Certification:* The owner of a cooling tower must file an annual certification each year as specified by the Department of Buildings, indicating that such tower was inspected, tested, cleaned and disinfected in accordance with the maintenance program and plan. The certification must document any deviations from compliance with the maintenance program and plan and the corrective actions taken to address any deficiencies.
2. *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.
3. *Summertime Hyperhalogenation:* The owner must submit a declaration of summertime hyperhalogenation within 30 days of completion of the hyperhalogenation through the NYC Cooling Tower Registration Portal. The declaration must include the cooling tower system ID; the hyperhalogenation protocol performed, including the name and quantity of biocides and

chemicals applied; dose and contact time; effective pH range of biocides; pH and halogen residual monitoring results during hyperhalogenation; service date and name and qualifications of the person who applied the biocide. The declaration must be kept with required cooling tower records.

4. Such records and plan shall be made available to the department or local health department immediately upon request.
5. The owner shall make available the results of each inspection to any member of the public within five business days of a request, or within five business days of the receipt of such results by the owner, whichever is later.

K. General Information: A summary of the owner's responsibilities is shown in Appendix F.

1. An officer, employee or agent of the department may enter the property to inspect the cooling tower and review records of maintenance for compliance with the requirements of this section
2. Owners who violate this provision shall be a liable for a civil penalty of not more than $2,000 for a first offense, and not more than $5,000 for a second or subsequent violation. An owner shall be liable for a civil penalty of not more than $10,000 for any violation that results in a serious injury or fatality.
3. Owners who violate an order of compliance shall be subject to a misdemeanor punishable by a fine of not more than $25,000 or imprisonment for not more than one year, or both.
4. A notice of violation served for civil penalties shall be returnable at the environmental control board or any tribunal established within the office of administrative trials and hearings.
5. The department (as defined in Appendix A) may require any submission required be submitted electronically
6. *Penalties:* The following penalties (in Appendix G) 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.

L. Building Your Cooling Tower System (CTS) Team

Managing your building's cooling tower requires a team of people who, together, can ensure that you are complying with NYC's cooling tower regulations (24 RCNY 8). These regulations were put in place to prevent the growth of *Legionella* bacteria -which, if inhaled, can lead to Legionnaires' disease, a sometimes fatal illness.

Your management and maintenance team includes all individuals that have a role in meeting regulatory requirements. The regulations identify the following team members:

- *Owner – any person or legal entity having a legal or equitable interest in the premises*
- Quo/f/fed person -on expert *in* water quality *management, planning and operations. Such a person may be a NYS licensed* professional *engineer, a certified industrial hygienist, a certified water technologist or an environmental consultant with 2 years of* experience *in* water *quality management*
- Responsible *person – a person(s) capable of performing 'day-to-day' monitoring, maintenance and operational tasks, including reporting to the qualified person, when necessary, any out-of-the ordinary conditions associated with* the *cooling tower system*

- *Biocide applicator - a New York State certified commercial pesticide applicator/technician*
- *Laboratory - a NYS Department of Health-approved laboratory certified to perform Legionella culture testing*

In addition to a building's existing staff, these roles can be performed by the following types of vendors:

- *Consultant – individual/company that may provide expertise in water quality management, mechanical* systems, *or other cooling tower-related services*
- *Service company- a company providing cleaning, disinfection or mechanical services for a cooling tower system*
- *Management company – company providing day-to-day oversight and management of a building, including its cooling tower system*

Completing the Matrix

As a building owner, you need the right team of individuals to properly manage, maintain and operate your building's cooling tower system. The attached matrix was developed to help you determine what your cooling tower team needs are. It is organized by task, type of team member responsible for each task and personnel resources needed. For each task you should put an 'X' in at least one of the 'Personnel Resource' columns. To complete some tasks, you may need more than one personnel resource.

If you are unfamiliar with cooling tower systems and the NYC regulations governing them, you may need to have a 'qualified person' assess your facility and prepare a maintenance program and plan (MPP). This 'qualified person' should work with you to identify the personnel resources needed to maintain your cooling tower system and complete the matrix.

To identify a 'qualified person', you should review other MPPs (or similar documents) the 'qualified person' has prepared to ensure that:

- The MPP(s) includes all of the tasks listed in the matrix
- All tasks/responsibilities are assigned to a team member
- Procedures described in the MPP provide enough detail to ensure compliance with the regulations
- Examples of forms and checklists are provided
- Examples of specific system conditions and recommended corrective actions are provided

RESPONSIBILITY MATRIX

	In-House	Management Company	Mechanical Vendor	Treatment Vendor	Consultant	Other
Assemble management and maintenance team	x					
Register Cooling Tower System	x					
Notify Health Dept if decommissioning tower	x					
File annual certification	x					
Keep all sample results, inspection results, maintenance records Cleaning and disinfection records, water quality monitoring records, and copy of Maintenance Program & Plan (MPP)	x	x				
Provide checklist for routine monitoring	X	x				
Post cooling tower registration number on tower	X	X				
Communicate to team members in accordance with MPP and as otherwise needed	x	x				
Review and sign off on MPP	x					
Other responsibilities specified in the MPP		x	x	x		
Perform and record results of weekly routine system monitoring	x	x				
Measure and record water quality parameters including: pH temperature disinfectant residual levels conductivity bacteriological indicator (HPC or dipslide)		x		x		
Assist in performing corrective actions when necessary	x	x	x			
Measure and record biocide addition		x				
Measure and record other chemical addition		x				
Amend MPP as needed under guidance of qualified person	x	x				

	In-House	Management Company	Mechanical Vendor	Treatment Vendor	Consultant	Other
Operate and maintain cooling tower system in accordance with MPP Routine operation and maintenance tasks may include: -Troubleshoot operational issues with assistance from qualified person -clean all system components -purge stagnant and low flow areas -remove debris form system -replace gaskets/seals -repair/replace louvers -repair/replace drift eliminators and/or fill packing -order chemicals -repair chemical feed pump -repair/replace monitoring equipment	X	X	X			
Communicate to team members in accordance with MPP and as otherwise needed	X	X				
Review and sign off MPP	X					
Other responsibilities specified in MPP	X	X				
Prepare Maintenance Program and Plan (MPP)	X	X			X	
Provide guidance to responsible person in performance of their duties	X					
Communicate to team members in accordance with MPP and as otherwise needed	X	X				
Other responsibilities specified in MPP	X	X				
Amend MPP as needed	X	X				
Perform compliance inspection at least every 90 days, observing the following items: -presence of organic material, biofilm, algae or other contaminants -general condition of tower, basin, packing material, drift eliminators -makeup connections and control -functioning of doing equipment -maintenance and other records		X				
Review changes to chemical treatment, cooling tower design, maintenance or operation	X	X				
Perform a pre-startup inspection		X				
Review and sign off on MPP	X					
Clean and disinfect cooling tower system		X		X		
Apply biocide to cooling tower system		X		X		
Perform Legionella culture sampling: -quarterly -at startup -after 5 day idle -as otherwise needed/required by regulations		X		X		
Maintain biocide inventory		X		X		
Maintain treatment chemical inventory		X		X		
Maintain equipment inventory		X		X		
System startup and shutdown	X	X				
System removal	X	X				
Permanent system shutdown	X	X				

Procuring Vendors

Once the matrix is complete, you will likely need to procure personnel resources to perform some of the tasks/responsibilities required under the regulations. At this point, the owner can use the matrix to draft a scope of services for soliciting bids. Not all vendors offer the same 'basket of services', and you need to make certain that each prospective vendor can perform the tasks needed before a bid is accepted. Vendors may excel at performing some tasks, but not others. You may determine that multiple vendors are needed to address all tasks/responsibilities laid out in the regulations and the cooling tower system's MPP.

As in procuring service, it can be difficult to determine the quality of the vendor. Take the time to reach out to references, review examples of past work products and interview all prospective vendors. Remember that in choosing a vendor, you are choosing a member of your cooling tower maintenance and management team. You should ensure that the vendor:

- Can be available promptly when needed
- Has a thorough understanding of the cooling tower system's MPP
- Is knowledgeable in the proposed service area
- Can provide written procedures for performing requested service(s) OR is capable of following procedures described in the MPP
- Understands their role as a team member
- Building a cooling tower system management and maintenance team takes time and effort. A good team can not only minimize expenses associated with regulatory compliance, but more importantly, limit the spread of *Legionella.*

APPENDIX G

PENALTIES FOR NON-COMPLIANCE

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)
24 RCNY §8-03	No maintenance program and plan	$1000	$2000
24 RCNY§8-03	Maintenance program and plan incomplete or not on premises	$500	$1000
24 RCNY §8-04(a)	Routine monitoring not conducted, documented at least once a week when tower is in use	$500	$1000
24 RCNY§8-04(b)	Compliance inspections not conducted, documented at least once every 90 days when the tower is in use	$500	$1000
24 RCNY §8-04(c)	Routine maintenance according to maintenance program and plan not conducted or documented	$500	$1000
24 RCNY§8-04(d)	Twice yearly or other required cleaning not conducted or documented	$500	$1000
24 RCNY §8-04(e)	Aerosol control do not meet manufacturer's design specifications or drift loss reduction requirements in new or existing towers when required	$1000	$2000
24 RCNY §8-04(f)	Failure to submit declaration of hyperhalogenation performed at least once each year between July 1 and August 31	$500	$1000
24 RCNY§8-05(a)	Daily automatic or approved alternative water treatment plan not provided	$500	$1000
24 RCNY§8-05(b)	Cooling water system not continually recirculated and no acceptable alternative	$500	$1000

24 RCNY §8-05(c)(1)	Use of an unqualified biocide applicator	$500	$1000
24 RCNY §8-05(c)(2)	Use of an unregistered biocide product	$500	$1000
24 RCNY §8-05(c)(3)	No records of all chemicals and biocides added	$500	$1000
24 RCNY §8-05(c)(4)	Sufficient quantities and combinations of chemicals not added as specified in the maintenance program and plan	$500	$1000
24 RCNY §8-05(d)	Using unacceptable alternative non-chemical water treatment device	$500	$1000
24 RCNY §8-05(e)	Use of captured rainwater or recycled water as makeup water not in accordance with approved alternative water source plan	$1000	$2000
24 RCNY §8-05(f)(1)	Minimum daily water quality measurements not taken or recorded	$500	$1000
24 RCNY §8-05(f)(2)	Failure to collect, analyze or record weekly biological process control indicators	$500	$1000
24 RCNY §8-05(f)(3)	*Legionella* samples not collected or analyzed, or results not recorded or reported to the Department as required	$1000	$2000
24 RCNY §8-05(f)(4)	Failure to monitor and sample from representative locations and times	$500	$1000
24 RCNY §8-05(f)(5)	Required corrective actions not taken based on bacteriological results	$1000	$2000
24 RCNY §8-06(a)	Improper or inadequate shutdown procedures	$500	$1000
24 RCNY §8-06(b)(1)	Improper or inadequate start-up procedures	$500	$1000

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

APPENDIX I

MODEL TEMPLATE

MAINTENANCE PROGRAM & PLAN

APPENDIX J

NYSIF INSURANCE REQUIREMENTS

INSURANCE REQUIREMENTS

Prior to the commencement of the work to be performed by the successful Bidder, the Bidder shall file with NYSIF Certificates of Insurance evidencing compliance with all requirements contained in this RFP. Acceptance and/or approval by NYSIF does not and shall not be construed to relieve Bidder of any obligations, responsibilities or liabilities under the contract awarded by this RFP.

All insurance required by the RFP shall be obtained at the sole cost and expense of the Bidder, shall be maintained with insurance carriers licensed to do business in New York State and acceptable to NYSIF, shall be primary and non-contributing to any insurance or self-insurance maintained by NYSIF, shall be endorsed to provide written notice be given to NYSIF at least thirty (30) days prior to the cancellation, non-renewal, or material alteration of such policies, which notice, evidenced by return receipt of United States Certified Mail, and shall be sent in accordance to the 'Notice' provision of the Agreement.

The Contractor shall cause to be included in each of the liability policies required below, here the Commercial General Liability, the Comprehensive Business Automobile Liability, the Contractors Pollution Liability, coverage for on-going and completed operations naming as additional insured on a primary and non-contributory basis (via ISO coverage forms CG 20 10 11 85 or the combination of CG 20 10 04 13 or 20 38 04 13 and CG 20 37 04 13 and form CA 20 48 10 13, or a form or forms that provide equivalent coverage) NYSIF, its officers, agents, and employees. An Additional Insured Endorsement evidencing such coverage shall be provided to NYSIF after renewal and/or upon request. For Contractors who are self-insured, the Contractor shall be obligated to defend and indemnify the above-named additional insureds with respect to Commercial General Liability and Business Automobile Liability, in the same manner that the Contractor would have been required had the Contractor obtained such insurance policies.

The Bidder shall be solely responsible for the payment of all deductibles and self-insured retentions to which such policies are subject. Deductibles and self-insured retentions must be approved by NYSIF. Such approval shall not be unreasonably withheld.

If NYSIF allows subcontracting, the Bidder shall require that any subcontractors hired carry insurance with the same limits and provisions provided herein.

Each insurance carrier must be rated at least "A-" Class "VII" in the most recently published Best's Insurance Report. If, during the term of the policy, a carrier's rating falls below "A-" Class "VII", the insurance must be replaced no later than the renewal date of the policy with an insurer acceptable to NYSIF and rated at least "A-" Class "VII" in the most recently published Best's Insurance Report.

The Bidder shall cause all insurance to be in full force and effect as of the commencement date of the contract awarded as a result of this RFP, and to remain in full force and effect throughout the term of the contract and as further required by this RFP. The Bidder shall not take any action, or omit to take any action that would suspend or invalidate any of the required coverages during the period of time such coverages are required to be in effect.

Not less than thirty (30) days prior to the expiration date or renewal date, the Bidder shall supply NYSIF with updated replacement Certificates of Insurance, and amendatory endorsements.

The Bidder, throughout the term of the contract, or as otherwise required by this RFP, shall obtain and maintain in full force and effect, the following insurance with limits not less than those described below and as required by the terms of this RFP, or as required by law, whichever is greater (limits may be provided through a combination of primary and umbrella/excess policies):

1. Workers Compensation and NYS Disability Benefits, as required by New York State. Visit the Workers' Compensation Coverage website and the Disability Benefits Coverage website for further information.

   A. Proof of Compliance with Workers' Compensation Coverage Requirements:

i. Form CE-200, *Certificate of Attestation for New York Entities With No Employees and Certain Out of State Entities*, That New York State Workers' Compensation and/or Disability Benefits Insurance Coverage is Not Required, which is available on the New York State Workers' Compensation Board's website;

ii. Form C-105.2 (9/07), *Certificate of Workers' Compensation Insurance*, sent to NYSIF by the Contractor's insurance carrier upon request, or if coverage is provided by the New York State Insurance Fund, they will provide Form U-26.3 to NYSIF upon request from the Contractor; or

iii. Form SI-12, *Certificate of Workers' Compensation Self-Insurance*, available from the New York State Workers' Compensation Board's Self-Insurance Office, or Form GSI-105.2, *Certificate of Participation in Workers' Compensation Group Self-Insurance*, available from the Contractor's Group Self-Insurance Administrator.

B. Proof of Compliance with Disability Benefits Coverage Requirements:

i. Form CE-200, *Certificate of Attestation for New York Entities With No Employees and Certain Out of State Entities*, That New York State Workers' Compensation and/or Disability Benefits Insurance Coverage is Not Required, which is available on the New York State Workers' Compensation Board's website;

ii. Form DB-120.1, *Certificate of Disability Benefits Insurance*, sent to NYSIF by the Contractor's insurance carrier upon request; or

iii. Form DB-155, *Certificate of Disability Benefits Self-Insurance*, available from the New York State Workers' Compensation Board's Self-Insurance Office.

2. Commercial General Liability Insurance with a limit of not less than $2,000,000 each occurrence, with a limit of not less than $2,000,000 aggregate. Such liability shall be written on the ISO occurrence form CG 00 01, or a substitute form providing equivalent coverages and shall cover liability arising from premises operations, independent contractors, products- completed operations, broad form property damage, personal & advertising injury, cross liability coverage, liability assumed in a contract (including the tort liability of another assumed in a contract) and explosion, collapse & underground coverage.

3. Comprehensive Business Automobile Liability Insurance with a limit of not less than $1,000,000 each accident. Such insurance shall cover liability arising out of any automobile including owned, leased, hired and non-owned automobiles. If the contract involves the removal of hazardous waste or otherwise transporting hazardous materials, pollution liability coverage for covered autos shall be provided by form CA 99 48 03 06 or CA 00 12 03 06 and the Motor Carrier Act Endorsement (MCS90) shall be attached.

4. Contractors Pollution Liability Insurance with limits of not less than $1,000,000 each occurrence, providing coverage for bodily injury, property damage or damage of actual, alleged, or threatened emission, discharge, dispersal, seepage, release or escape of pollutants, including any loss, cost or expense incurred as a result of any cleanup of pollutants or in the investigation, settlement or defense of any claim, suit, or proceedings against NYSIF, arising from Contractor, use, storage, handling, processing or disposal of Hazardous Materials.

5. Professional Liability Insurance, during and for a period of three (3) years after completion of this contract covering damage for liability imposed on the Contractor by this contract or law arising out of any negligent act, error, or omission in the rending of or failure to render by the Contractor, its agents or employees the professional services required by this contract. The policy coverage shall extend to include bodily injury and property damage from negligent performance of professional services and personal injury liability coverage for claims arising out of performance of services. The

policy shall have limits of liability of not less than $1,000,000 each occurrence, with a limit not less than $2,000,000 aggregate. The Contractor shall be responsible for payment of all claim expenses and loss payments with the deductible. The professional liability insurance may be issued on a claims-made policy form, in which case the Contractor shall purchase, at its sole expense, extended Discovery Clause coverage of up to three (3) years after work is completed if coverage is cancelled or not renewed. If applicable, the Contractor shall provide coverage for its negligent act, error or omission in rendering or failing to render professional services required by this contract arising out of specifications, installation, modification, abatement, replacement or approval of products, materials or processes containing pollutants, and the failure to advise of or detect the existence or the proportions of pollutants.

Waiver of Subrogation. Bidder shall cause to be included in each of its policies insuring against loss, damage or destruction by fire or other insured casualty a waiver of the insurer's right of subrogation against NYSIF, or, if such waiver is unobtainable (i) an express agreement that such policy shall not be invalidated if Bidder waives or has waived before the casualty, the right of recovery against NYSIF or (ii) any other form of permission for the release of NYSIF.

Awarded Bidder shall furnish evidence of all policies to NYSIF, before any work is started. Certificates of Insurance may be supplied as evidence of such aforementioned policies; however, if requested by the Agency, the Bidder shall deliver to NYSIF within forty-five (45) days of the request a copy of such policies, certified by the insurance carrier as being true and complete. If a Certificate of Insurance is submitted it must: (1) be signed by an authorized representative of the insurance carrier or producer and notarized; (2) disclose any deductible, self-insured retention, aggregate limit or any exclusions to the policy that materially change the coverage; (3) indicate the Additional Insureds and Named Insureds as required herein; (4) reference the Agreement by number on the face of the certificate; and (5) expressly reference the inclusion of all required endorsements.

If, at any time during the term of the resulting contract, insurance as required is not in effect, or proof thereof is not provided to NYSIF, NYSIF shall have the option to: (i) direct the Contractor to suspend work with no additional cost or extension of time due on account thereof, or (ii) treat such failure as a breach in contract.

DESCRIPTION OF SYSTEMS

CONDENSER SYSTEM:

Equipment:	Marley Induced draft cooling tower Two (2) Carrier centrifugal units: 1 @ 660 tons: 1 @ 330 tons
Circulation Rate:	Approximately 2,770 gpm at full load
Temp. drop across tower:	Approximately 10.0°F.
Losses by Evaporation: by Windage & Drift: by Bleedoff:	1.7% 0.2% 0.3% 2.2% total losses or 61 gpm max.
Cycles of centration to maintain:	8 – 12 cycles of NYC water
Makeup based on 12 hours/day operation:	43,920 gallons per day.
Volume of water in system:	Approximately 18,000 gallons.
Period of Operation:	12 hours/day, 5 days/week Full load operation – May – September Half load operation – October – April

CLOSED RECIRCULATING SYSTEMS:

Primary Chilled Water
Secondary East and West Systems
Interior Re-heat

Any laws referenced within New York Codes, Rules and Regulations, 10 CRR-NY I 4 4-1 are incorporated by reference.