SUNY Cortland - Environmental Health and Safety Office
Service Group, Room 108
P.O. Box 2000
Cortland, NY 13045
607-753-2508

SUNY CORTLAND
ENVIRONMENTAL HEALTH
AND SAFETY OFFICE

COOLING TOWER MAINTENANCE PROGRAM

PROGRAMS, POLICIES, AND PROCEDURES

Inception Date: March 1, 2016
Latest Revision / Review: October 14, 2021
Previous Revision / Review: December 28, 2022

Contents

Reviewed by	Signature	Date
Amy Markowski		
Thomas Hingher		
Robert Maarberg		
Richard Nauseef		

Cooling Tower Maintenance Program

1. Introduction

This document is the maintenance program for cooling towers at SUNY Cortland. It outlines responsibilities and protocol for all aspects of cooling tower planning and maintenance, including: commissioning new cooling towers; inspections; regulatory certifications; system start-up and shut-down; water treatment; disinfection; sampling for bacteria, including Legionella culture sampling and analysis; regulatory notifications; emergency response; and recordkeeping. An electronic copy of this program will be maintained by the EHS Office, and a copy of this program will be maintained in the chiller or boiler room at each cooling tower.

This program complies with New York State Public Health Law, Title 10, Part 4, Section 225(5)(a), and ANSI/ASHRAE Standard 188-201. It is reviewed at least annually by the Environmental Health and Safety Office and other members of the program team.

2. References

- New York State Public Health Law, Title 10, Part 4, Section 225(5)(a)
- ANSI/ASHRAE Standard 188-2015 – Legionellosis: Risk Management for Building Water Systems, Section 7.2
- SUNY Cortland's Chemical Procurement and Control, Hazard Communication, Lockout/Tagout, and Personal Protective Equipment programs

3. Responsibilities

The program team for campus cooling towers consists of members of the following offices: Environmental Health and Safety, Facilities Planning Design and Construction, and Facilities Operations and Services. Aside from these campus offices, this team includes the services of a cooling tower service contractor. Specific responsibilities involving team members are outlined in this section as follows:

Cooling Tower Service Contractor – The cooling tower service contractor provides inspection services for campus cooling towers and is a secondary source for ensuring the integrity of systems used to treat cooling towers. In accordance with Part 4-1.8 of the New York State Public Health Law, Title 10, Part 4, Section 225(5)(a), the contractor providing periodic mandatory inspections must have credentials as either:

1. a New York State licensed professional engineer;
2. a certified industrial hygienist;
3. a certified water technologist; or
4. an environmental consultant with appropriate training and experience.

Responsibilities involving the cooling tower service contractor are discussed further in Section 6.

Environmental Health and Safety Office (EHS) – The EHS Office is responsible for providing administrative support and regulatory compliance oversight for this program. These responsibilities include: reviewing the written program at least annually; periodically reviewing the program's effectiveness; approving cooling tower chemicals in accordance with SUNY Cortland's Chemical Procurement and Control and Hazard Communication Programs; reporting requisite information to the New York State Department of Health using the statewide electronic database; and acting as the liaison between the campus and regulatory or enforcement authorities.

Director of Facilities Operations and Services Office (FOS) – The FOS Office Director is responsible for providing administrative support related to the operation of cooling towers and assisting the EHS Office with regulatory compliance. The FOS Office Director also supervises maintenance personnel who service cooling towers and assists with enforcing safe work practices related to these activities.

Facilities Planning Design and Construction Office (FPDC) – The FPDC Office coordinates, processes and manages all planning, design and construction activities related to cooling towers.

Facilities Operations and Services Office – Certain personnel within the FOS Office are assigned maintenance responsibilities for campus cooling towers. Only those who possess a Category 7G commercial pesticide applicator license, or those under such supervision, are permitted to apply biocides in cooling towers. Maintenance responsibilities involving cooling towers include: start-up and shut-down; inspections; water treatment; remedial and emergency disinfection; sampling for bacteria; and promptly correcting unsafe conditions. While servicing campus cooling towers, maintenance personnel must observe safe work practices in accordance with department expectations and protocol as outlined in EHS Office programs. Programs that apply to cooling towers include, but are not limited to: Chemical Procurement and Control; Hazard Communication; Lockout/Tagout; and Personal Protective Equipment. Aside from these responsibilities, maintenance personnel must also promptly report unsafe situations to the EHS Office and the Director of FOS when circumstances merit additional support, and particularly when public health is compromised.

4. Campus Cooling Towers

SUNY Cortland currently has eight campus cooling towers. Specific cooling towers, as well as their locations, manufacturers and model numbers are summarized in Table 1 on page 10. Note: the cooling towers that service Dowd Fine Arts and Memorial Library (unit 1) are currently inactive.

Prior to introducing new cooling towers to the campus, such units will be reviewed by the EHS, FOS, and FPDC Offices. Most of this effort will be spearheaded by the FPDC Office. Aside from preconstruction planning, drawings for cooling towers will be reviewed and the following considerations will be evaluated:

- Contamination from building systems or processes that could be drawn into the equipment;
- Potential for equipment to discharge into occupied spaces, trafficable areas, pedestrian thoroughfares, outdoor intakes and building openings; and
- Equipment accessibility for maintenance and inspection consistent with manufacturer's instructions and guidelines.

5. Cooling Tower Maintenance

With the exception of the Bowers Hall cooling towers, which have a different operation schedule, all campus cooling towers run from April to the end of October each year (Note: as specified in Section 4, the Dowd Fine Arts and Memorial Library (unit 1) cooling towers are currently inactive). Aspects of cooling tower maintenance are contingent on conditions and the regularity in which certain protocol is prescribed. Most of the responsibilities involving cooling tower maintenance are provided by FOS maintenance personnel; however, the services of a cooling tower service contactor are also employed for consultations, inspections, certifications and Legionella testing.

This section outlines procedures, protocol, schedules, and services for cooling tower maintenance. The following are presented further in this section: maintenance records; treatment chemicals and equipment; pre-startup and other scheduled inspections; cooling tower start-up; daily maintenance; weekly to 30-day maintenance; remedial disinfection; mid-season maintenance; maintenance related to idle conditions and extended power failures; end-of-season maintenance; and removing cooling towers from service. Maintenance related to the cooling tower service contractor is discussed in Section 6.

Maintenance Records

Records related to chiller maintenance are maintained in the biocide and chiller logbooks. While the biocide logbook records water usage, chemical usage, water conductivity levels, bacteria density and system condition; the chiller logbook records Freon pressure, evaporator and condenser temperatures, and other parameters. Logbook records are maintained for at least 3 years. Recordkeeping is further discussed in Section 9.

Treatment Chemicals and Equipment

At a minimum, water treatment chemicals consist of biocides, biodispersants and inhibitors. Chemical concentrations that are used in cooling towers are specified by the product manufacturers. Disinfectants are also used for the cooling towers. It is important to note that individuals who disinfect cooling towers have a Category 7G commercial pesticide applicator license, or are under such supervision. The pesticide

applicator licenses are maintained in the FOS office for at least three years. Each license will specify the name and certification number of the applicator. Additionally, biocides used for disinfection are registered by the New York State Department of Environmental Conservation.

The following are equipment used for water treatment: chemical feed and conductivity controllers; chemical feed pumps; chemical injectors; dry chemical feeders; make-up water meters; blow-down water meters; blow-down valves; condenser and evaporator and water circulation pumps; pH meters; conductivity testers; inhibitor test kits; and bromine test kits.

Pre-startup and Other Scheduled Inspections

With the exception of Bowers Hall cooling towers which are on a different operational schedule, campus cooling towers will be activated in the spring each year. Prior to start-up, cooling towers and associated equipment will be inspected by the cooling tower service contractor. The inspection will include evaluation of:

1. Organic material, biofilm, algae, debris and other visible contaminants;
2. General condition of the cooling tower basins, remote sump, and drift eliminators;
3. Water make-up connections and controls, and backflow protection;
4. Conductivity control functionality; and
5. Functionality of water treatment equipment, including pumps, timer valves, and strain gauges.

Any deficiencies found during the inspection will be promptly addressed by FOS maintenance personnel. The service contractor will provide the inspection report to the FOS Office thereafter. The report will include, whenever applicable, all corrective action.

Aside from pre-startup inspections, additional inspections will be scheduled with the cooling tower service contactor. The inspection frequency will not exceed 90 days while cooling towers are operational. Expectations involving these inspections will be outlined in this section.

Note: responsibilities related to the cooling tower service contractors are discussed further in Section 6.

Cooling Tower Start-up

Once cooling towers are inspected by the service contractor, start-up procedures will be consistent with requirements and guidelines specified by the cooling tower manufacturer. Start-up protocol, in the following order, is observed for each cooling tower:

1. Unit components are inspected for integrity. Any deficiencies identified are corrected.
2. Pumps and fans are lubricated, and fan oil is changed when applicable.
3. Units are rinsed with water, and then cleaned and disinfected.
4. Units are filled with water and recirculation pumps are started. Units are then evaluated for leaks and proper flow. Water is also introduced into the chemical feed system and then evaluated for leaks and proper flow.
5. Chemical controllers are checked for proper settings and calibration.
6. The biocide, biodispersant and inhibitor are introduced into the system. While the biocide and inhibitor are introduced using a chemical feed controller, the biodispersant is added with a timer pump. Additionally, test kits will be used to determine inhibitor concentrations and bromine levels.

Start-up from undrained or stagnant systems should never occur. However, if such a start-up is required, a cooling tower will be drained, disinfected, and rinsed with water. The tower will then be filled with water and dosed with a biocide.

Within 14 days of start-up, arrangements will be made with the cooling tower service contractor to conduct Legionella sampling and analysis. Legionella sampling and analysis shall be scheduled with the cooling tower service contractor at intervals not to exceed 90 days for all campus cooling towers. Legionella sampling and analysis is discussed further in Section 7. Responsibilities related to the cooling tower service contractor are discussed further in Section 6.

Daily Maintenance

The Building Management System is checked each morning to verify cooling towers are operational. This includes verifying water is flowing, pumps are running, and checking for alarms. Operational parameters for each cooling tower are recorded in the Building Management System and records are retained for one year.

Weekly to 30 Day Maintenance

The following are conducted for each cooling tower at least once per week:

1. Water is tested for pH, bromine levels, inhibitor levels, and total dissolved solids.
2. Chemical feeder controllers are checked for operational integrity, including verifying the date and time for chemical programming are accurate.
3. Conductivity meters are checked for calibration and cleaned, if needed.
4. Chemical feeders are monitored for chemical usage.
5. Cooling towers are checked for water flow.

6. Cooling tower tops, basins, basin strainers and drift eliminators are checked for debris, silt, biofilms and algae. Silt within the basin strainer will be removed with a syphon pump and the basin strainer will be removed and cleaned.
7. Fans and fan belts are checked for operational integrity. Additionally, fan gear box oil levels will be checked, when applicable.
8. Inhibitor levels are checked with a test kit and adjustments are made, as needed.
9. The chiller is checked and information is recorded in the logbook.

Aside from the above-mentioned weekly maintenance, dip slide tests will be conducted at least every 30 days. In instances where bacteria colony density is above 10,000 colony-forming units, appropriate biocidal treatment is employed. Additionally, the results of dip slide tests will be reported to the EHS Office. The EHS Office will subsequently update the bacteriological sampling field in the New York State Department of Health's cooling tower database. Note: information included in this database is discussed further in Section 9.

Remedial Disinfection

As specified under "Weekly to 30-Day Maintenance" in this section, dip slide tests are conducted to check bacteria density. When colony density is above 10,000 colony-forming units, additional biocidal treatment is employed. Additional dip slide tests will be conducted to verify the effectiveness of biocidal treatment.

Mid-Season Maintenance

Mid-season coincides with the month of August for the campus cooling towers. Mid-season maintenance includes:

1. Disinfection with appropriate agent.
2. Cleaning pumps strainers.
3. Lubricating pumps and fans.
4. Changing gear box oil, when applicable.

Maintenance Related to Idle Conditions or Extended Power Failures

While cooling towers are not expected to be shut down for extended periods, appropriate cleaning and disinfection protocol will always be maintained, including instances where cooling towers are shut down for more than five days. The following are observed for idle condition or power failures of more than one day:

1. Disconnects for chillers and water pumps are engaged. These shall remain engaged until power is restored.
2. Chiller crankcase oil, if applicable, is warmed for one day before returning chillers to service.

3. Cooling tower water is drained if power is off for more than five days.
4. Legionella sampling and culture analysis is conducted for power failures of sufficient duration to cause bacterial growth or when stagnant water remains in the cooling tower for more than five days. Legionella and culture sampling and analysis are discussed further in Section 7.

End-of-Season Maintenance

The following are observed for end-of-season maintenance:

1. Cooling tower components are disinfected and then the water is drained (Note: an alternate biocide, or the same biocide at a maximum dose, is used for one day).
2. Cooling tower strainers are cleaned.
3. Cooling towers are drained and then washed.
4. Cooling towers are filled with water and blowdown valves are unplugged. An appropriate amount of inhibitor is added to prevent metal corrosion (Note: inhibitor levels and molybdenum levels are maintained at 8 parts per million for one day).
5. Chemicals are removed from the chemical feeders, flushed with clean water and then pumped dry.
6. Cooling towers are drained.

Removing Cooling Towers from Service

When a cooling tower is no longer used, appropriate cleaning and disinfection, including bacteriological sampling and analysis, will be observed prior to removing the cooling tower from service. The cooling tower service contractor will be included in activity related to removing a cooling tower from service. After the cooling tower is removed from service, the EHS Office will update the Department of Health's statewide database for the affected cooling tower.

6. Cooling Tower Service Contractor

SUNY Cortland's service contractor provides periodic maintenance and inspection support for campus cooling towers. This service includes pre-startup inspections, 90-day inspections, annual certifications, and sampling for Legionella.

Prior to seasonal start-up, and at intervals not exceeding 90 days while cooling towers are in use, the service contractor visits the campus to perform inspections in accordance with protocol as outlined in Section 5 under the Pre-startup and Other Scheduled Inspections sub-section. Additionally, the service contractor will conduct Legionella culture sampling within 14 days of seasonal start-up, and thereafter at intervals not exceeding 90 days. Legionella culture sampling is discussed further in Section 7.

On a monthly basis, the service contractor visits the campus to evaluate the effectiveness of chemical treatment methods. Deficiencies and recommendations related to these evaluations are conveyed to FOS maintenance personnel. Note: FOS maintenance personnel will promptly address deficiencies related to these inspections.

Aside from the aforementioned inspections, sampling and monthly evaluations, the service contractor provides annual certification by November 1 each year. This certification confirms the existence of this maintenance program, including the implementation of program elements and regulatory mandated activities. At a minimum, mandated activities include: bacteriological culture sampling and analysis; Legionella culture sampling and analysis; observing disinfection protocol; and prestart-up and 90-day inspections.

Records related to the service contractor, including annual certifications, will be retained for at least three years in the FOS Office. Additionally, the EHS Office will update the Department of Health's statewide database to identify the most recent annual certification date.

7. Legionella Culture Sampling, Analysis and Notification

Within 14 days of cooling tower seasonal start-up, and at intervals not exceeding 90 days, the cooling tower service contractor will conduct Legionella culture sampling. Legionella culture sampling will also be conducted by the service contractor under, but not limited to, the following circumstances:

- Power failure of sufficient duration to allow for the growth of bacteria;
- Loss of biocide treatment of sufficient duration to allow for the growth of bacteria;
- Failure of conductivity control or any other control methods to maintain proper cycles of concentration;
- A determination by the health department that one or more cases of legionellosis, is or may be associated with the cooling tower, based upon epidemiologic data or laboratory testing; and
- Any other condition specified by the department of health.

Legionella culture samples will be sent by the service contractor to laboratories that are approved by the New York State Environmental Laboratory Approval Program. After Legionella culture analysis is conducted, the laboratory will send the written analytical report to the service contractor. The service contractor will send the report to the FOS Office thereafter. Remedial action by FOS maintenance staff related to Legionella culture analysis will be in accordance with Appendix 4-B of the New York State Public Health Law, Title 10, Part 4, Section 225(5)(a).

In instances where Legionella sampling results exceed 1,000 colony forming units per milliliter, the EHS Office will contact the Cortland County Health Department within 24 hours after receiving the analytical report from the service contractor. If the Cortland County Health Department determines that a public notification is required, the EHS Office will coordinate the notification with the appropriate campus departments.

8. Responses to Emergencies and Regulatory Directives

The EHS Office will coordinate responding to directives issued by national, regional, and the local health department authorities related to cooling tower emergencies. Additionally, when there are known or suspected cases of legionellosis associated with a cooling tower, the cooling tower will be shut down immediately, and the local health department will be contacted for guidance.

9. Regulatory Reporting and Recordkeeping

Regulatory Reporting

At intervals not exceeding 90 days while cooling towers are in use, the EHS Office will provide the following information using the New York State Department of Health's statewide electronic database:

1. Date of last bacteriological culture sample collection, the analytical results and date of any required remedial action;
2. Date of last Legionella culture sample collection, the analytical results, and date of any remedial action;
3. Date of last inspection;
4. Date of last certification; and
5. Date of removal or permanent discontinued use of the cooling tower, if applicable.

Recordkeeping

The FOS Office will maintain records of the following cooling tower activities for at least three years: all sampling and analysis; disinfection schedules and applications; inspection findings, deficiencies, and corrective actions; and certifications. These records will be made available to the New York State Department of Health or the Cortland County Health Department upon request.

Appendix A – Cooling Tower List

Table 1 – Campus Cooling Towers

Building Served	Location	Manufacturer	Model Number
Bowers Hall, Unit 1	Bowers I, northwest end	BAC	FXV-0812B-30-T-L
Bowers Hall, Unit 2	Bowers I, northwest end	BAC	FXV-0812B-30-T-L
*Dowd Fine Arts**	*Northwest end*	*BAC*	*15146*
Neubig Hall	Neubig Hall roof	BAC	FXT-130C
*Smith Tower**	*Smith Tower roof*	*Marley*	*4655*
Sperry Hall	Southeast end of Sperry Hall	Marley	AV806921-A1
*Memorial Library, Unit 1**	*Memorial Library roof*	*BAC*	*3235 JMG*
Memorial Library, Unit 2	Memorial Library roof	BAC	3235 JMG

**denotes inactive cooling tower*