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SAMPLING AND MANAGEMENT PLAN FOR HEALTHCARE FACILITIES: GUIDANCE AND TEMPLATE

VERSION: 1.0

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Water Supply Protection

11/2017

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INTRODUCTION TO THIS TEMPLATE

All health care facilities covered under Article 28 are required to adopt and implement a *Legionella* culture sampling and management plan (SMP) for their potable water system in accordance with 10NYCRR Subpart 4-2. Additionally, Subpart 4-2 includes requirements for evaluating risk factors in a facility and specific activities that must occur when sampling results exceed limiting values. The purpose of a SMP is to provide an outline specific to each facility for sampling the water distribution system for *Legionella*, and for implementing responsive actions when culture results exceed the limitations specified in Subpart 4-2.

PURPOSE

This document provides maintenance and operations personnel **with guidance and a template** for developing a SMP to ensure that the essential elements needed to control *Legionella* are addressed. This template focuses on the procedures used to commission, operate, maintain and repair potable water systems in a building. This template should be used as a guide and may need to be adapted to the complexities of an individual facility. SMPs should be revised periodically to incorporate any changes that may include, but not limited to: operational changes, renovations, new analytical methods and information obtained from prior sampling and changing conditions.

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AUDIENCE

This template is intended for use by:

1. Administrators and maintenance staff of covered facilities.¹
2. Water treatment consultants and maintenance providers, defined here as persons, firms, or other entities that provide cleaning, inspection, sampling, disinfection, and/or other services that ensure the proper functioning of a covered facility's potable water system as it pertains to Subpart 4-2.

DISCLAIMER

¹ Covered facilities are defined in Section 4-2.2 as “all general hospitals and residential health care facilities as defined in Article 28 of the Public Health Law.”

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This template is a suggested outline for a SMP required by 10NYCRR Subpart 4-2. This material should be considered the minimum information used to define the SMP; each facility and situation is unique, and an adjustment to the elements, on a case by case basis, may be required.

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SAMPLING AND MANAGEMENT PLAN CHECKLIST

Use the following check list as a means of determining the completeness of the SMP.

Items to be included in the Sampling and Management Plan (SMP):

Facility Information

- Facility Location
- Point of Contact
- Developer of Sampling and Management Plan (Company)
 - Point of Contact for Company or Organization
 - Address of Company
- Effective Date of SMP

Personnel Roles and Responsibilities

- SMP Team Members
- SMP Team Functions

Building Water Systems Descriptions

- Potable Water Systems List
- Potable Water Systems Descriptions

***Legionella* Sampling Plan**

- Sampling Locations for Domestic Hot Water in a Facility
- Non-Medical Equipment Sampling
- Infrastructure Equipment Sampling

Potable Water System Monitoring

Potable Water System Maintenance

- Hot Potable Water System Maintenance
- Cold Potable Water System Maintenance

Procedures for Responding to Sampling Exceedances

Procedures in Event of Nosocomial Illnesses

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SAMPLING AND MANAGEMENT PLAN FOR HEALTHCARE FACILITIES: GUIDANCE AND TEMPLATE

PREPARED FOR:

PREPARED BY:

EFFECTIVE DATE:

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SECTION 1. FACILITY INFORMATION

[Insert the appropriate information into the fields below.]

1.1 FACILITY LOCATION

Hospital name	
Street address	
Building name (if applicable)	
City, Town or Village	
County	
ZIP code	
Latitude-Longitude (if available)	

1.2 POINT OF CONTACT

Name	
Title	
Phone number	
Email address	

1.3 DEVELOPER OF SAMPLING AND MANAGEMENT PLAN

1.3.1 POINT OF CONTACT

Point of contact name	
Title	
Phone number	
Mobile phone number	
Email address	

1.3.2 ADDRESS OF COMPANY

Company name	
Address 1	
Address 2	
City, State, ZIP code	
Phone number	
Website (if available)	

1.4 EFFECTIVE DATE OF SAMPLING AND MANAGEMENT PLAN

Beginning date of SMP	
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Ending date SMP	
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1.5 FACILITY INFORMATION

How many potable cold water systems are in the facility?	
How many potable hot water systems are in the facility?	
What is the source(s) of potable water provided to the facility?	
Are there any water reuse systems in the facility?	

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SECTION 2. PERSONNEL ROLES AND RESPONSIBILITIES

An effective Legionella sampling and management plan (SMP) requires a multidisciplinary team including members from management, engineering, infection control, maintenance, and housekeeping, and in some instances a consultant. The focus of this team is to plan, execute and evaluate the results from a SMP to control Legionella and its potential effects. It is critical to establish a structure of operations to ensure there is a clear understanding of who on the SMP team is charged with various responsibilities. The outline below provides a space to list the individuals of this multidisciplinary team for a facility. However, there may be a need for more functions than those outlined below. The developer of the maintenance plan should recognize the key individuals who are tasked with the implementation of a SMP.

2.1 SMP TEAM MEMBERS

[The team members who contribute to the Legionella SMP should be documented below. Include the information for each member that is specified below. Please copy and paste the table for each SMP Team Member]

Name	
Title	
Employer or company (outside contractor)	
Address	
Telephone	
Email address	

2.2 SMP TEAM FUNCTIONS

[The following functions should be represented on the Legionella SMP team. If there are additional functions represented, then they should be documented as well. List the name of the person or persons carrying out each function.]

Function	Individual charged
Maintenance program administrator	
Physical facilities management	
Engineering	
Infection Control	
Clinical representative	
Laboratory contact	
External consultant	

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SECTION 3. BUILDING WATER SYSTEMS DESCRIPTIONS

[The building water system(s) description must be included in this section. Each potable water system (hot and cold) within the building and on the building site should be described individually.]

3.1 POTABLE WATER SYSTEMS LIST

[Buildings may contain several potable water systems. Each water system should be separately listed in this section with a brief explanation of its purpose.]

Water system designation	Location or portion of building	Purpose

3.2 POTABLE WATER SYSTEMS DESCRIPTIONS

Each water distribution system listed in Section 3.1 should be described in detail. A piping and instrumentation diagram (P&ID) is one of the most efficient methods of documenting the design and operation of a water system. Insert a P&ID or process diagram and include the following:

- The locations of end-point uses of potable water systems (Annex A, American Society of Heating Refrigeration and Air-Conditioning Engineers, 2015). Examples of end-point uses include showers, lavatories, toilets, water fountains, water bottle fill stations, sinks for food processing, humidifiers and other uses not described above (NYSDOH Health Advisory, August 10, 2015; DOH 5222).*
- The locations of water processing equipment and components (Annex A, American Society of Heating Refrigeration and Air-Conditioning Engineers, 2015). Examples include cooling towers, boilers, distillation systems, deionizers, sterilizers, water hammer arrestors and filters. There may be other water system or processing devices that have not been described above.*
- Locations of potentially susceptible conditions that may be present in the building. Examples of these conditions include dead ends, low flow regions and other devices where Legionella and/or biofilm may grow.*
- A description of how water is received and processed (conditioned (treated), stored, heated, cooled, recirculated, and delivered to end-point uses) (Annex A, American Society of Heating Refrigeration and Air-Conditioning Engineers, 2015). When water enters a building, it may be used for a wide variety of applications ranging from drinking water fountains to sterilized water for surgery. Each application of water has its own set of specifications that must be met to make the water useful for its intended application. A description of each water process should be included this section.*

*Maintenance locations should be documented on the P&ID. Control locations are where maintenance measures/treatment are administered (injection points, flushing locations, etc.). **Include a piping and***

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instrumentation diagram (P&ID) or process diagram for each of the potable (hot and cold) water systems in the building. A set of drawings on large format paper may be used and included in the appendix or referred to by drawing number. The drawings should be maintained with this document.

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SECTION 4. *LEGIONELLA* SAMPLING PLAN

Legionella culture sampling is the fundamental method by which the effectiveness of the maintenance procedures is validated. The sampling data provide feedback for the SMP team to make adjustments for improving the maintenance operations of a hot or cold water distribution system.

Legionella sampling plans must be developed specifically for each facility, since each has its own unique piping, equipment layout, and conditions throughout the distribution system. The following guidance should be considered during the development of the sampling procedures in the SMP. The recommended sampling sites should include, but not be limited to the following locations:

- *A sample of the inlet cold water supply at the first available tap;*
- *One sample from the return piping of the circulated potable water heating system(s);*
- *One sample from the outlet of the heating system(s);*
- *At least three samples should be collected from each floor. This is normally done as follows:*
 - *Tap closest to first delivery of hot water from the riser*
 - *One sample from the middle of the system*
 - *One sample from the last outlet before the water returns to the piping that conveys water back to the heater.*
 - *During an investigation of illness, samples from locations that housed ill patients/residents will be needed.*
- *Risers sometimes feed multiple circulation loops with each loop providing water to a group of rooms. Several sample locations should be designated for each loop;*
- *One additional random sample should be collected from each floor when wings have extensive lengths of piping and complex paths;*
- *During the initial building assessment, it is suggested that a surface sample (swab) be performed at locations representing the middle or end of the hot water line on each floor.*

Cold water distribution systems can also harbor Legionella bacteria if the water is allowed to become stagnant and/or tepid. These conditions cause a depletion in disinfectant and allow the water to increase in temperature to a range in which Legionella can amplify. A temperature profile and a P&ID diagram should show locations of the distribution system that may present potential Legionella problems. These potentially problematic locations should be sampled to determine the presence of Legionella and if so, design and/or operational changes may need to be implemented to correct the problem.

A table that documents location names (designators), sampling technique (e.g. first draw, swab) and any comments should be developed for each water (hot and possibly cold) distribution system(s). An example of a table is shown below. Each location designator must correspond to a specific location which should be documented on either the plumbing drawings for the building or a P&ID. A separate table should be used for each water distribution system.

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[Document the sampling plan for each potable water system in the facility.]

Sample location designator	Sample type	Comments

4.1 NON-MEDICAL EQUIPMENT SAMPLING

Hospitals and nursing homes utilize a variety of other equipment types and processes that use water such as food preparation sites and analytical laboratories, on-site beauty salons, laundry/housekeeping and therapeutic pools and spas. This section should include a list of equipment or sites that use water and each piece or location should be specified as to what type of water it uses (e.g. sterile, distilled, filtered, treated, etc.) and what sampling and maintenance operations will be applied to ensure the water used for or resides in the equipment does not become a potential location for the growth of Legionella.

Equipment	Water type	Sampling procedure and schedule

4.2 INFRASTRUCTURE EQUIPMENT SAMPLING

Hospitals and nursing homes utilize a variety of infrastructure elements such as sprinkler systems, decorative fountains and cooling towers. This section of the SMP should include an assessment of the infrastructure components in terms of their potential contact with patients and/or visitors and a sampling and maintenance schedule for demonstrating how the potential effects of Legionella will be addressed. Cooling towers and other evaporation-based heat removal devices are covered separately under Subpart 4-1 and should not be discussed in this sampling and maintenance plan.

Infrastructure item	Potential for contact	Sampling procedure and schedule (excluding cooling towers)

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SECTION 5. POTABLE WATER SYSTEM MONITORING

Monitoring provides data for determining whether a water system is operating within the parameters needed to control the growth of *Legionella*. In this section, a monitoring plan should be outlined to document the procedures used to collect data. The following items are needed:

- A list of all monitoring sites that were included on the P&ID/process diagram. Use the same designators as on the P&ID/process diagram.
- Control limits at each control location when appropriate, documented on the P&ID/process diagram. Control limits represent the ranges or limits of process variables that are acceptable for maintaining a distribution system. Examples of control limits are maximum/minimum water temperature, disinfectant concentrations or other variables that are monitored/maintained to ensure the conditions are not conducive to the growth of *Legionella* bacteria. Monitored variables may include temperature, pH, conductivity, and disinfectant concentration (e.g. chlorine, silver, copper, chlorine dioxide and chloramine).
- Temperature profile of the water system. This should be performed using specific monitoring points.
- Frequency at which each monitored site is evaluated.
- Action(s) that will be used to investigate and correct out of range values.

[Enter the control point designations, control values and potential corrective actions to be taken into the table below. Sample values are provided for reference.]

Control point	Maximum, minimum or range	Value	Frequency monitored	Corrective action
CWS-1	Maximum	40°F	Weekly	Flush system to maintain cool temperature, if chronic add piping insulation where needed.
HWS-1	Minimum	140°F	Weekly	Adjust water heater temperature. If chronic, look for faulty/damaged piping insulation.
HWS-2	Minimum	145°F	Weekly	Adjust water heater temperature, look for faulty thermostat and or thermocouple.

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SECTION 6. POTABLE WATER SYSTEM MAINTENANCE

Preventative measures may be used to maintain the integrity of a water distribution system. Preventative measures include operations and maintenance procedures developed by the SMP Team. The items outlined below represent the elements of the maintenance portion of the SMP. As each facility is unique in its design, history and use, various components may be added to the existing list or deleted as necessary.

Legionella grow in water effectively between 45°C ~ 50°C (104°F ~ 122°F), which is a common water storage temperature range in hospitals (Lin, Stout, Yu, & Vidic, 1998). The potential to grow Legionella exists in both cold and hot water distributions systems as well as in equipment used for medical, therapeutic or other healthcare support. For this reason, the following procedures provide a list of components that should be sampled and maintained to ensure that Legionella is not an issue. The topics discussed below outline the portions of the water distribution system that require attention. Further information on this topic may be found in the document produced by the American Society of Heating, Ventilation, Refrigeration and Air-Conditioning Engineers (ASHRAE), ANSI/ASHRAE Standard 188-2015, (Annex A, American Society of Heating Refrigeration and Air-Conditioning Engineers, 2015).

6.1 HOT POTABLE WATER SYSTEM MAINTENANCE

Domestic hot water is circulated throughout a building to ensure the temperature at the tap is sufficient for the need within a short period of time (or nearly instantly). The heat transfer through piping insulation may still allow the temperature at far reaches of a distribution system to decrease sufficiently to allow the growth of Legionella there. For this reason, it is very important for the engineering department of a hospital to understand the temperature profile of each hot water distribution system to provide a basis for understanding where there will be a greater likelihood for Legionella problems.

In this section or in an appendix, include a P&ID/process diagram of the hot water distribution system with temperature and/or disinfectant concentration values that were obtained from test points. This diagram should be the same as the one used previously, with the temperatures included and any unnecessary information removed for greater clarity. The P&ID/process diagram with temperatures and concentrations (e.g. chlorine, chlorine dioxide, chloramine, copper ions, and silver ions) should include various components such as boilers, heat exchangers, storage vessels, boiler water hammer arrestors, and other relevant components. Dead ends to the hot water distribution system and locations that have lower than optimum temperatures should be identified and addressed by specifying what corrective activities will be used to address these potential sites for Legionella amplification. The temperature of the hot water loop should be maintained at sufficiently high values to minimize Legionella growth but still meet all appropriate codes and regulations.

[List the procedures used or actions taken to maintain the hot water distribution system. Procedures may include super-heated water flushing and chlorinating for Legionella control purposes.]

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System component	Procedures/action

6.2 COLD POTABLE WATER SYSTEM MAINTENANCE

Domestic cold water is provided throughout a building for a variety of uses including drinking and/or other human contact. When the cold water becomes sufficiently warm, Legionella bacteria can begin to amplify which presents a potential problem for consumers of the water. For this reason, it is very important for the engineering department of a facility to understand the temperature profile of water distribution system to provide a basis for understanding where there will be a greater likelihood for Legionella problems.

In this section or in an appendix, include a P&ID/process diagram of the cold water distribution system with temperature and disinfectant concentration values that were obtained from test points. The P&ID with temperatures and concentrations (e.g. chlorine, chlorine dioxide, chloramine, copper ions, and silver ions) should include various components such as heat exchangers, storage vessels, chillers and other relevant components. Dead ends to the cold water distribution system and locations that have greater than optimum temperatures should be identified and addressed by specifying what corrective activities will be used to address these potential sites to reduce the likelihood of Legionella amplification.

[List the procedures used or actions taken to maintain the cold water distribution system. Procedures may include intermittent water flushing and chlorination for Legionella control purposes.]

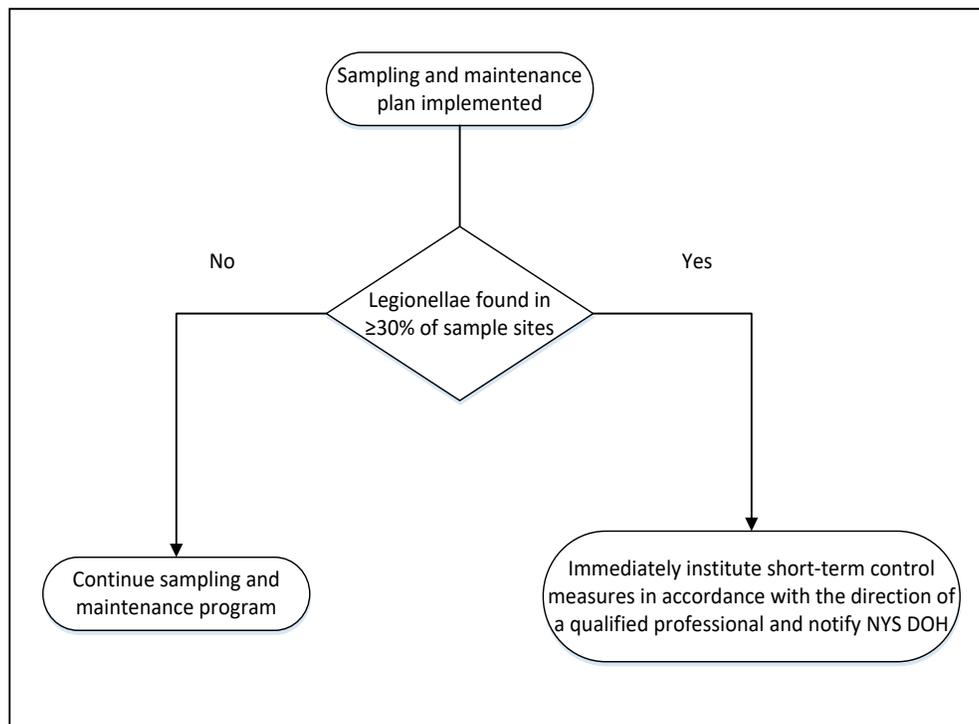
System component	Procedure/action

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SECTION 7. PROCEDURES FOR RESPONDING TO SAMPLING EXCEEDANCES

Legionella culture results equal to or in excess of 30% positive of sampled sites require a definitive response by Subpart 4-2 in accordance with Appendix 4-B as outlined in the figure below. In this section, a plan of response should be documented for both sample results in excess of the maximum permissible values and in the event of confirmed nosocomial disease.

Decision algorithm for *Legionella* sampling results



*In this section, a description of the policies and procedures should be documented for instances when sampling results determine the presence of Legionella at levels that are unacceptable². When Legionella sampling results are determined to be unacceptable either by Subpart 4-2 and/or the SMP team, a procedure must be followed that specifies treatment, continued sampling and/or other methods that will mitigate the potential effects on patients and employees in a facility. **Any procedure initiated following a Legionella exceedance must include contacting the New York State Department of Health at hcf.legionella@health.ny.gov.***

² The goal for the number of positive *Legionella* samples is zero. However, Subpart 4-2 places a limit on the number of positive samples to <30% of the total number of appropriate samples collected.

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[List the procedures used to address the presence of Legionella in the potable water system when measured levels exceed 30% of sampled sites.]

Procedure designator	Description of procedure/activity
1	
2	
3	

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SECTION 8. PROCEDURES IN EVENT OF NOSOCOMIAL ILLNESSES

In the event that there are confirmed nosocomial cases of legionellosis associated with the facility, there must be an intervention to address the growth of and potential exposure to Legionella. In this section, an outline is needed to describe the policies and the procedures that will be used to protect the patients and employees associated with the facility.

During an event of nosocomial legionellosis, the facility will be required to proactively share the water quality measurements, including Legionella culture values, with the New York State Department of Health. The procedures that are to be outlined below should include a method by which results are logged and organized to make the process of data sharing with the New York State Department of Health efficient.

[Outline the activities and interventions used to protect patients and employees at a facility that tests greater than 30% positive for Legionella.]

Procedure designator	Procedure/activity
1	
2	
3	

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REFERENCES

- American Society of Heating Refrigeration and Air-Conditioning Engineers. (2015, May 27). Legionellosis: Risk Management for Building Water Systems. Standard 188-2015. Atlanta, Georgia: ASHRAE.*
- Lin, Y.-s. E., Stout, J. E., Yu, V. L., & Vidic, R. D. (1998, June). Disinfection of Water Distribution Systems for Legionella. Seminars in Respiratory Infections, 13(2), 147-159.*