Sampling and Management Plan for Healthcare Facilities: Guidance and Template

Version: 1.0

**New York State Department of Health**

**Bureau of Water Supply Protection**

Introduction

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.

Audience

This template is intended for use by:

1. Administrators and maintenance staff of covered facilities.[[1]](#footnote-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

This 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.

Sampling and Management Plan Checklist

*[Use the following check list as a means of determining the completeness of a 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

Sampling and Management Plan for Healthcare Facilities: Guidance and Template

Prepared for: St. Peter’s Hospital

Prepared by: Nalco Water

Effective Date: 8/11/16

Updated Date: 8/11/19

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# Facility Information

*[Insert the appropriate information into the fields below.]*

## Facility Location

|  |  |
| --- | --- |
| Hospital name | St. Peter’s Hospital |
| Street address | 315 South Manning Blvd. |
| Building name (if applicable) |  |
| City, Town or Village | Albany |
| County | Albany |
| ZIP code | 12208 |
| Latitude-Longitude (if available) |  |

## Point of Contact

|  |  |
| --- | --- |
| Name | Stephen Moran |
| Title | Director Facilities SPHP Acute Care |
| Phone number | 518-525-1883 |
| Email address | Stephen.Moran@sphp.com |

## Developer of Sampling and Management Plan

### Point of contact

|  |  |
| --- | --- |
| Point of contact name | Stephen Deschenes |
| Title | District Account Manager |
| Phone number |  |
| Mobile phone number | 978-549-7446 |
| Email address | sdeschenes@nalco.com |

### Address of Company

|  |  |
| --- | --- |
| Company name | Nalco Water |
| Address 1 | 1601 West Diehl Rd |
| Address 2 |  |
| City, State, ZIP code | Naperville, IL 60563-1198 |
| Phone number | 800-288-0878 |
| Website (if available) | https://www.ecolab.com |

## Effective Date of Sampling and Management Plan

|  |  |
| --- | --- |
| Beginning date of SMP | 8/11/16 |
| Ending date SMP |  |

## Facility Information

|  |  |
| --- | --- |
| How many potable cold water systems are in the facility? | 4 |
| How many potable hot water systems are in the facility? | 8 |
| What is the source(s) of potable water provided to the facility? | City of Albany, NY Dept. of Water and Water Supply |
| Are there any water reuse systems in the facility? | No |

# 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.

## 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.]*

|  |  |
| --- | --- |
| Name | Stephen Moran |
| Title | Director Facilities SPHP Acute Care |
| Employer | St. Peter's Health Partners |
| Address | 315 South Manning Blvd., Albany, NY 12208 |
| Telephone | 518-525-1883 |
| Email address | Stephen.Moran@sphp.com |

|  |  |
| --- | --- |
| Name | Kassandra Foley |
| Title | Manager, Infection Prevention |
| Employer or company (outside contractor) | St. Peter’s Health Partners |
| Address | 315 South Manning Blvd., Albany, NY 12208 |
| Telephone | 518-525-1258 |
| Email address | Kassandra.Foley@sphp.com |

|  |  |
| --- | --- |
| Name | Dr. Alan Sanders |
| Title | Chief Medical Officer – Acute Care |
| Employer or company (outside contractor) | St. Peter’s Health Partners |
| Address | 315 South Manning Blvd., Albany, NY 12208 |
| Telephone |  |
| Email address | Alan.Sanders@sphp.com |

|  |  |
| --- | --- |
| Name | Paul Warden |
| Title | Vice President & Director of Operations |
| Company (outside contractor) | Analytical Services, Inc. (ASI) |
| Address | 130 Allen Brook Lane, Williston, VT 05495 |
| Telephone | 800-723-4432x15 |
| Email address | pwarden@analyticalservices.com |

|  |  |
| --- | --- |
| Name | Stephen Deschenes |
| Title | Senior Water Safety Specialist |
| Outside Contractor | Nalco, an Ecolab Company |
| Address |  |
| Telephone | 978-549-7446 |
| Email address | sdeschenes@ecolab.com |

|  |  |
| --- | --- |
| Name | Brian Savoie |
| Title | Refrigeration Mechanic |
| Employer | St. Peter’s Hospital |
| Address | 315 South Manning Blvd., Albany, NY 12208 |
| Telephone | 518-525-5833 (Maintenance Shop) |
| Email address | Brian.Savoie@sphp.com |

|  |  |
| --- | --- |
| Name | Charles Mitchum |
| Title | Plumber/Welder II |
| Employer | St. Peter’s Hospital |
| Address | 315 South Manning Blvd., Albany, NY 12208 |
| Telephone | 518-525-1376 (Plumbing Shop) |
| Email address | Charles.Mitchum@sphp.com |

## 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 | Stephen Moran |
| Physical facilities management | Stephen Moran |
| Engineering | Stephen Moran |
| Infection Control | Kassandra Foley |
| Clinical representative | Dr. Alan Sanders, Chief Medical Officer - AC |
| Laboratory contact | Paul Warden, Analytical Services |
| External consultant | Stephen Deschenes, Nalco |
| Team Member 1 Facilities | Brian Savoie |
| Team Member 2 Facilities | Charles Mitchum |

# 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.]*

## 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** |
| Cold Water  Gabrilove  Nolan Riddle,  Cusack,  Mercy,  Data Center,  Maintenance Garage,  Fire Suppression | Gabrilove,  Nolan Riddle,  Cusack,  Mercy,  Data-Center, Maintenance Garage, | Gabrilove incoming chlorine disinfected water mains from City of Albany. One 6” and one 4” located in Gabrilove Ground Level Rm 0418 serving Gabrilove, Nolan Riddle, Cusack, Mercy, Data Center, Maintenance Garage, Sprinkler Paint Shop, Nolan Riddle Ground. Booster pumps pump incoming water to two 7500 gallon storage tanks located on 10 floor of Nolan Riddle.  Cross connection for redundancy with Pavilion, Brady Farrell, McAuley, Boiler House system. |
| Hot Water  Nolan Riddle, Gabrilove, Cusack | Nolan Riddle,  Gabrilove,  Cusack | Nolan Riddle Ground Floor two 1000 gallon capacity steam heated hot water tanks. HW Tank #1 serves the Kitchen Dishwasher Room. HW Tank #2 serves Gabrilove, Cusack and Nolan Riddle. Hot water treated with secondary disinfection Copper/Silver Ionization system. |
| Hot Water  Mercy | Mercy | Nolan Riddle MER#2 one 1500 gallon capacity steam heated hot water tank. One instant steam heater. Hot water treated with secondary disinfection Copper/Silver Ionization system. Serves Mercy building. |
| Cold Water  Pavilion,  Brady Farrell,  McAuley, Boiler House,  Fire Suppression | Pavilion, Brady Farrell, McAuley, Boiler House  Fire Suppression | Pavilion incoming two 12” chlorine disinfected water mains from City of Albany. McAuley one 12” incoming 12” chlorine disinfected water main from City of Albany. Mains serving Pavilion, Brady Farrell, McAuley, Boiler House and Fire Suppression. Pavilion and McAuley water mains both have booster pumps. Cross connection for redundancy with Gabrilove, Nolan Riddle, Cusack, Mercy, Data Center, Maintenance Garage system. |
| Hot Water  Pavilion,  Brady Farrell,  McAuley, | Pavilion, Brady Farrell, McAuley, Boiler House | Pavilion Ground Mechanical Room one instant steam heater. Hot water treated with secondary disinfection Copper/Silver Ionization system. Serves Pavilion, Brady Farrell and McAuley. |
| Hot Water  Boiler House | Boiler House | Boiler House one 40 gallon electric hot water heater serving Boiler House sinks and shower. |
| Cold Water  Bld. 317, | Bld. 317 | Bld. 317 incoming 4” chlorine disinfected water main from City of Albany serving Bld. 317. |
| Hot Water  Bld. 317 | Bld. 317 | Bld. 317 two 75 gallon natural gas hot water heaters and one 50 gallon electric hot water heater. Serves Bld. 317. |

## 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 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.**

**See Appendix P&ID Drawing.**

# *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.

**See Appendix P&ID Drawing.**

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

|  |  |  |
| --- | --- | --- |
| **Sample location designator** | **Sample type** | **Comments** |
|  |  |  |
| **Pavilion,**  **Brady Farrell,**  **McAuley,**  **Boiler House**  **HW/CW** |  | **Samples Taken Quarterly** |
| Pavilion  CW  Incoming Main | First Draw | Cold Water Supply |
| McAuley  CW Main | First Draw | Cold Water Supply |
| Pavilion  Rm 0646 HW | First Draw | Close to Heating System  Endo Area |
| Pavilion  Rm 1632 HW | First Draw | Riser P1 Close to End  CVICU Area |
| Pavilion  Rm 1664A HW | First Draw | Riser P2 Close to End  CV Pre-Op |
| Pavilion  Rm 2605A HW | First Draw | Riser P1 Close to End  Pre-Op |
| Pavilion  Rm 2665 HW | First Draw | Riser P2 Close to End  PACU |
| Pavilion  Rm 3643C HW | First Draw | Riser P1 Close to First Delivery  Nursery, Women’s & Children, |
| Pavilion  Rm 3646A HW | First Draw | Riser P2 Middle of System  Nursery, Women’s & Children |
| Pavilion  Rm 4643B HW | First Draw | Riser P1 Close to First Delivery  Inpatient Cardiology, Med./Surgical Unit |
| Pavilion  Rm 4649B HW | First Draw | Riser P2 Middle of System  Inpatient Cardiology, Med./Surgical Unit |
| Pavilion  Rm 6643B HW | First Draw | Riser P1 Top of Bld. Close to Return  Joint Replacement Center |
| Pavilion  Rm 6649B HW | First Draw | Riser P2 Top of Bld. Close to Return  Joint Replacement Center |
| Brady Farrell  Rm 0179 HW | First Draw | Close to End  Medical Imaging CT Work Sink |
| Brady Farrell  Rm 1178 HW | First Draw | Middle of System  Cardiac Out Patient Pre/Post |
| Brady Farrell  Rm 2155S HW | First Draw | Middle of System  ICU |
| Brady Farrell  Rm 3128 HW | First Draw | Middle of System  Birthing Center |
| Brady Farrell  Rm 4143 HW | First Draw | Middle of System  Med/Surg. |
| Brady Farrell  Rm 5140 HW | First Draw | Middle of System  Med/Surg.Pulmonary, Chronic Vents |
| Brady Farrell  Rm 6131 HW | First Draw | Top of Bld. Top of Bld. Close to Return  Thoracic Surgery, Neuro Spine, Craniotomy |
| McAuley  CW Main HW | First Draw | Cold Water Supply |
| McAuley  Rm 0232 HW | First Draw | Close to End  Emergency Department |
| McAuley  Rm 1214 HW | First Draw | Close to First Delivery  Pathology |
| McAuley  Rm 2251 HW | First Draw | Close to First Delivery  Medical/Surgical Unit |
| McAuley  Rm 3239 HW | First Draw | Close to End  Med / Surg. Including 6 Pediatric Beds |
| McAuley  Rm 4237 HW | First Draw | Close to First Delivery  Cardiac Telemetry, Stroke |
| McAuley  Rm 5237 HW | First Draw | Close to End  Inpatient Oncology, Medical/Surgical Unit |
| McAuley  Rm 6251 HW | First Draw | Close to First Delivery  Urology, Gynecological Oncology, Surgical |
| **Nolan Riddle,**  **Gabrilove, Cusack, Mercy**  **HW/CW** |  |  |
| Gabrilove  CW  Incoming Main | First Draw | Cold Water Supply |
| CW Tank 1 | First Draw | Cold Water Storage Tank |
| CW Tank 2 | First Draw | Cold Water Storage Tank |
| Nolan Riddle  HW Tank 1 Pre | First Draw | Heating System Outlet |
| Nolan Riddle  HW Tank 1 Post | Second Draw | Heating System Outlet |
| Nolan Riddle  HW Tank 2 Pre | First Draw | Heating System Outlet |
| Nolan Riddle  HW Tank 2 Post | Second Draw | Heating System Outlet |
| Nolan Riddle  HW Tank 5 Pre | First Draw | Heating System Outlet |
| Nolan Riddle  HW Tank 5 Post | Second Draw | Heating System Outlet |
| Nolan Riddle  Rm 9310 HW | First Draw | Close to First Delivery Top of Riser HW3.13  PFT/EEG, Respiratory Therapy, Offices |
| Nolan Riddle  Rm 5317A HW | First Draw | Sample from Middle of System  Offices |
| Nolan Riddle  Rm 3322 HW | First Draw | Sample from Middle of System Riser HW3.3  On Call Rooms, Offices |
| Gabrilove  Rm 8411 HW | First Draw | Close to First Delivery Top of Riser HW4.9  Facilities Management Offices |
| Gabrilove  Rm 5446 HW | First Draw | Sample from Middle of Riser HW4.4  Hospice Inn |
| Gabrilove  Rm 4410 HW | First Draw | Sample from Middle of Riser HW4.13  Patient Care Short Stay Unit |
| Gabrilove  Rm 3403 HW | First Draw | Sample close to Bottom of Riser HW4.15  Acute Medical Surgical, Dialysis |
| Mercy  Rm 3911 | First Draw | Top of System Close to First Draw  NICU |
| **Bld. 317**  **CW/HW** |  |  |
| Bld. 317 CW  Incoming Main | First Draw | Cold Water Supply |
| Bld. 317  Rm 1410 HW | First Draw | Close to Heating System  Radiation Oncology |
| Bld. 317  Rm 1439 HW | First Draw | Near Middle  Radiation Oncology |
| Bld. 317  Rm 131 HW | First Draw | Near End  Nuclear Medicine |
| Bld. 317  Rm120/123 Work Area HW | First Draw | Near End  Nuclear Medicine |
| Bld. 317  Rm 235 HW | First Draw | Near First East Riser  Infusion Oncology |
| Bld. 317  Rm 234 HW | First Draw | Near First East Riser  Infusion Oncology |
| Bld. 317  Rm 262A  Infusion Sink 1  HW | First Draw | Near First West Riser  Infusion Oncology |
| Bld. 317  Rm 262B  Infusion Sink 2  HW | First Draw | Near First West Riser  Infusion Oncology |
| Bld. 317  Rm 269E  Infusion Sink 3  HW | First Draw | Near First West Riser  Infusion Oncology |
| Bld. 317  Rm A3019  Exam Rm 2 | First Draw | Near First East Riser  Breast Center |
| Bld. 317  Rm A3029  Exam Rm 1 | First Draw | Near End East Riser  Breast Center |
| Bld. 317  Rm C385  SS Sink | First Draw | Near End  Breast Center |
| Bld. 317  Rm C385  White Sink | First Draw | Near End  Breast Center |

## 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** |
| N/A | N/A | N/A |
|  |  |  |

## 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)** |
| Nolan Riddle,  Gabrilove,  Cusack  Cold Water  Storage Tks 1&2  (2)x7,500 Gal. =  15,000 Gal. | Low | * Check Water Temperature   Monthly Limit <77F   * Check oxidant, residual, chlorine   Monthly Limit:>0.5 mg/L as free chlorine; Not to exceed 4.0 mg/L   * Aerobic bacteria test   Quarterly Limit:< 500 CFU/mL   * Legionella culture test   Quarterly Limit:<1 CFU/mL |
| Nolan Riddle,  Gabrilove,  Cusack  HW Heater  Storage Tk#1  1500 Gal.  Temp. 140F  (Serves Kitchen Dishwasher) | Low | * Check Water Temperature   Monthly Limit >140F   * Legionella culture test   Quarterly Limit:<1 CFU/mL   * System Flushing   Quarterly   * Cleaning and Disinfection   Annual |
| Nolan Riddle,  Gabrilove, Cusack Sys.  HW Heater  Storage Tank#2  1500 Gal.  Temp. 125F | Low | * Check Water Temperature   Monthly Limit >124F   * Legionella culture test   Quarterly Limit:<1 CFU/mL   * System Flushing   Quarterly   * Cleaning and Disinfection   Annual |
| Cusack 7th Fl.  Fitness Center  HW Heaters  Qty. 2 Each  Elec. 80 Gal.  Temp. 124F | Low | * Check Water Temperature   Monthly Limit >124F |
| Mercy  HW Heater  Storage Tank#5  1500 Gal.  Temp. 125F | Low | * Check Water Temperature   Monthly Limit >124F   * Legionella culture test   Quarterly Limit:<1 CFU/mL   * System Flushing   Quarterly   * Cleaning and Disinfection   Annual |
| Mercy  HW Heater  Instant Storage  0 Gal.  Temp. 125F | Low | * Check Water Temperature   Monthly Limit >124F |
| Pavilion,  Brady Farrell,  McAuley  HW Heater  HW-1A  Instant Steam  Storage 0 Gal.  Temp. 140F | Low | * Check Water Temperature * Monthly Limit >140F |
| Data Center  HW Heater  PK Compact 400  Steam 30 Gal.  Temp. 125F | Low | * Check Water Temperature   Monthly Limit >124F |
| Boiler House  HW Heater  Rheem Marathon  Elec. 40 Gal.  Temp. 125F | Low | * Check Water Temperature   Monthly Limit >124F |
| New Gen. Bld.  Sink HW Heater  Instant Sm. Elec.  Storage 0 Gal.  Temp. 125F | Low | * Check Water Temperature   Monthly Limit >124F |
| Maintenance Garage  Sink HW Heater  Instant Sm. Elec.  Storage 0 Gal.  Temp. 125F | Low | * Check Water Temperature   Monthly Limit >124F |
| Bld. 317  HW Heater  (Left)  N.G. 75 Gal.  Temp. 124F | Low | * Check Water Temperature   Monthly Limit >124F |
| Bld. 317  HW Heater  (Middle)  Elec. 50 Gal.  Temp. 124F | Low | * Check Water Temperature   Monthly Limit >124F |
| Bld. 317  HW Heater  (Right)  N.G. 75 Gal.  Temp. 124F | Low | * Check Water Temperature   Monthly Limit >124F |
| Water Treatment  Copper-Silver  Ionization  (3) HW Systems  N.R., Gab.,Cusack  Mercy  Pav.,B.F.,McA. | Low | * Check Copper Level Field Test   Weekly Limit:0.2 to 1.3 mg/L as copper  Source nearest Outlet & Distal Sites   * Check Copper Level Lab Test   Monthly Limit:0.2 to 1.3 mg/L as copper  Source nearest Outlet & Distal Sites   * Check Silver Level Lab Test   Monthly Limit:0.02 to 0.10 mg/L as silver  Source nearest Outlet & Distal Sites |
| Fire Suppression Water Systems | Low | * General system inspection   Limit: Schedule, maintain and document  Method: Inspect and certify as directed by AHJ  Frequency: Quarterly   * Action/Contingency Plan  1. Maintain as necessary |
| Decorative  Outdoor Water  Fountain  Main Entrance | Inactive No Risk | * Not in Service. No Sampling. |
|  |  |  |

# 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.]*

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| --- | --- | --- | --- | --- |
| **Control point** | **Maximum, minimum or range** | **Value** | **Frequency monitored** | **Corrective action** |
| CWS  Nolan Riddle,  Gabrilove  Cusack, Mercy, Data Cntr.  Maint. Garage | Maximum | <77°F | Monthly | Flush any areas where possible to maintain water temperature. |
| CWS  Pavilion,  Brady Farrell,  McAuley,  Boiler House | Maximum | <77°F | Monthly | Flush any areas where possible to maintain water temperature. |
| Bld. 317 | Maximum | <77°F | Monthly | Flush any areas where possible to maintain water temperature. |
| HWS  Nolan Riddle,  Gabrilove  Cusack, Mercy, Data Cntr. | Minimum | >124°F | Monthly | Maintain system and adjust water temperature as necessary. |
| HWS  HW Tanks  Nolan Riddle  Kitchen Dishwasher | Minimum | >140°F | Monthly | Maintain system and adjust water temperature as necessary. |
| HWS  Cusack 7th  Fitness Center | Minimum | >124°F | Monthly | Maintain system and adjust water temperature as necessary. |
| HWS  Mercy | Minimum | >124°F | Monthly | Maintain system and adjust water temperature as necessary. |
| HWS  Pavilion,  Brady Farrell,  McAuley, | Minimum  Heater  Outlets | To TMV’s  >140°F  To Outlets  >124°F | Monthly | Maintain system and adjust water temperature as necessary. |
| HWS  Boiler House | Minimum | >124°F | Monthly | Maintain system and adjust water temperature as necessary. |
| HWS  New  Generator  Bld. | Minimum | >124°F | Monthly | Maintain system and adjust water temperature as necessary. |
| HWS  Maint.  Garage | Minimum | >124°F | Monthly | Maintain system and adjust water temperature as necessary. |
| Bld. 317 | Minimum | >124°F | Monthly | Maintain system and adjust water temperature as necessary |

**See Appendix P&ID Drawings for Control Points**

# 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).

## 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.

**See Appendix P&ID Drawing.**

*[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** |
| Water Treatment  Copper-Silver  Ionization  (3) HW Systems  N.R., Gab.,Cusack  Mercy  Pav.,B.F.,McA. | Procedures:   * Check Copper Level Field Test   Weekly Limit:0.2 to 1.3 mg/L as copper  Source nearest Outlet & Distal Sites   * Check Copper Level Lab Test   Monthly Limit:0.2 to 1.3 mg/L as copper  Source nearest Outlet & Distal Sites   * Check Silver Level Lab Test   Monthly Limit:0.02 to 0.10 mg/L as silver  Source nearest Outlet & Distal Sites  Action/Contingency Plan:   1. Make adjustments as necessary to maintain copper and silver ions below maximum contaminant levels. 2. The Team should consider the following corrective action for cold water outlets that consistently do not meet control limits:  * Routine or more frequent flushing * Verify system operation * Contact manufacturer for troubleshooting, if necessary * Inspect distributing system for proper design and balancing |
| HW Heaters  Water Storage >200 Gal.  Nolan Riddle, Gabrilove,  Cusack, Mercy | Procedures:   * Check Water Temperature   Monthly Limit >140F (HW Tank 1Serves Kitchen)  Monthly Limit >124F (HW Tank 2,5)   * Legionella culture test   Quarterly Limit:<1 CFU/mL   * System Flushing   Quarterly   * Cleaning and Disinfection   Annual  Action/Contingency:   1. Maintain system and adjust water temperature as necessary. 2. See microbial contingency plan when control limit is exceeded. 3. Maintain system as necessary. 4. Consider replacing systems with storage with systems that do not use water storage. |
| HW Heaters  Point of Use <200 Gal.  Bld. 317  Cusack 7th Fl. Fitness Cntr  Boiler Room  New Generator Bld.  Maintenance Garage | Procedures:   * Check Water Temperature   Monthly Limit >124F  Action/Contingency:   * Maintain system and adjust water temperature as necessary. |
| Hot Water Systems  Centralized   1. Nolan Riddle, Gabrilove, Cusack 2. Mercy 3. Pavilion, Brady Farrell, McAuley 4. Data Center 5. Building 317 | Procedures:   * Check System Discharge Water Temperature   Limit:   1. >124F Nolan Riddle, Gabrilove, Cusack 2. >124F Mercy 3. >140F Pavilion, Brady Farrell, McAuley 4. >124F Data Center 5. >124F Building 317   Method: Temperature meter, gauge, thermocouple or equivalent  Frequency: Monthly   * Check TMV Discharge Water Temperature   Limit:>124F  Method: Temperature meter, gauge, thermocouple or equivalent  Frequency: Monthly   * Check Return Water Temperature   Limit>124F Method: Temperature meter, gauge, thermocouple or equivalent  Frequency: Monthly  Action/Contingency Plan:   1. Maintain system and adjust water temperature as necessary |
| Hot Water Outlets | Procedures:   * Check Water Temperature   Limit: >124F  Method: Temperature meter or equivalent  Frequency: Monthly   * Check Oxidant Residual, Chlorine (Cl2)   Limit: At least 0.3 to 0.5 mg/L as free chlorine; Not to exceed 4.0 mg/L  Method: DPD field test for free chlorine  Frequency: Monthly   * Legionella Culture Test   Limit: <1 CFU/Ml  Method: Lab Culture Test  Frequency: Quarterly  Action/Contingency Plan:   1. Flush areas where possible to maintain water temperature. 2. Flush areas where possible to maintain oxidant residuals. 3. See microbial contingency plan when control limit is exceeded. |
| Hot Water Outlets,  Showers | Procedures:   * Daily Flushing * Mechanical Inspection   Limit: Pass/Fall  Method: Perform visual inspection and document  Frequency: Annually   * Cleaning and Disinfection, Showerheads   Limit: Schedule, maintain and document  Method: See remedial procedures  Frequency: Annually  Action/Contingency Plan:   1. Maintain system as necessary including flushing of areas know to be stagnant more than 7 days. 2. Maintain system as necessary. |
| Hot Water Outlets,  Faucets & Outlets | Procedures:   * Mechanical Inspection   Limit: Pass/Fail  Method: Perform visual inspection and document  Frequency: Annually   * Cleaning and Disinfection, Facet Flow Restrictors   Limit: Schedule, maintain and document  Frequency: Annually  Action/Contingency Plan:   1. Maintain system as necessary including flushing of areas know to be stagnant more than 7 days. 2. Maintain system as necessary. |
| Recirculated Loops  Nolan Riddle, Gabrilove,  Cusack, Mercy, Pavilion, Brady Farrell, McAuley,  Cusack 7th Floor,  Data Center | Procedures:   * Inspection and Maintenance   Limit: Operate circulation pumps continuously or at least weekly  Method: Perform inspection and maintenance as recommended by manufacture.  Action/Contingency Plan:   * Maintain system as necessary and ensure all circulation pumps are operated continuously or at least weekly. |
| Expansion Vessels  Cusack 7th Floor | Procedures:   * Inspection and Maintenance   Limit: Schedule, maintain and document  Method: Perform inspection and maintenance as recommended by manufacture.  Frequency: Annual  Actions/Contingency Plan:   1. Maintain as necessary. 2. Consider using flow through design expansion vessels for systems that cannot be flushed. |
| Hot Water Distribution Piping | Procedures:   * Inspection and Maintenance   Limit: Eliminate dead-ends and flushing stagnant areas as necessary.  Method: Perform system maintenance as necessary and address known issues as appropriate upon discovery.  Frequency: As required.  Action/Contingency Plan:   1. Maintain system as necessary including the removal of known dead-end and flushing of areas known to be stagnant more than 7 days. |
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## 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.

**See Appendix P&ID Drawings**

*[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.]*

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| **System component** | **Procedure/action** |
| Cold Mains | Procedure:   * Check Water Temperature   Limit <77F  Frequency:Monthly   * Check oxidant, residual, chlorine (cl2)   Limit:>0.5 mg/L as free chlorine; Not to exceed 4.0 mg/L  Method: DPD field test for free chlorine  Frequency: Monthly  Action/Contingency Plan:   1. Cold mains that do not consistently meet the control measures should be considered for the following as determined necessary by the Team:  * Routine Legionella Testing * Secondary Disinfection * Other Corrective Action |
| Cold Water  Storage Tks 1&2  (2)x7,500 Gal. =  15,000 Gal.  Nolan Riddle,  Gabrilove,  Cusack | Procedure:   * Check Water Temperature   Limit <77F  Frequency:Monthly   * Check oxidant, residual, chlorine   Limit:>0.5 mg/L as free chlorine; Not to exceed 4.0 mg/L  Frequency: Monthly   * Aerobic bacteria test   Limit:< 500 CFU/mL  Frequency:Quarterly   * Legionella culture test   Limit:<1 CFU/mL  Frequency Quarterly  Action/Contingency Plan:   1. Water storage vessels that do not consistently meet the control measures should be considered for the following as determined necessary by the Team:  * Increase frequency of Legionella testing * Routine flushing * Increase frequency of cleaning and disinfection * Secondary Disinfection * Other Corrective Action  1. See microbial contingency plan when control limit is exceeded. 2. Maintain as necessary. |
| Backflow Prevention | Procedure:   * Inspection   Limit: Pass/Fail  Method: Inspect and certify as directed by AHJ.  Action/Contingency Plan:   1. Backflow prevention devices that fail should be fixed or replaced. |
| Booster Pumps  Applies to:   1. Gabrilove 2. Pavilion 3. McAuley 4. Mercy | Procedure:   * Pump Schedule   Limit: Operate each pump at least weekly  Method: Rotate or set pump schedules as necessary  Frequency: Weekly  Action/Contingency Plan:   1. Ensure booster pumps are operated at least weekly. |
| Expansion Vessels  Applies to:  Pavilion Booster Pump | Procedures:   * Inspection and Maintenance   Limit: Schedule, maintain and document  Method: Perform inspection and maintenance as recommended by manufacture.  Frequency: Annual  Actions/Contingency Plan:   1. Maintain as necessary.   Consider using flow through design expansion vessels for systems that cannot be flushed |
| Cold Water Outlets | Procedures:   * Check Water Temperature   Limit: <77F  Method: Temperature meter or equivalent  Frequency: Monthly   * Check Oxidant Residual, Chlorine (Cl2)   Limit: At least 0.3 to 0.5 mg/L as free chlorine; Not to exceed 4.0 mg/L  Method: DPD field test for free chlorine  Frequency: Monthly   * Legionella Culture Test   Limit: <1 CFU/Ml  Method: Lab Culture Test  Frequency: Quarterly  Action/Contingency Plan:   1. Flush areas where possible to maintain water temperature. 2. Flush areas where possible to maintain oxidant residuals. 3. See microbial contingency plan when control limit is exceeded. |
| Cold Water Outlets,  Showers | Procedures:   * Daily Flushing * Mechanical Inspection   Limit: Pass/Fall  Method: Perform visual inspection and document  Frequency: Annually   * Cleaning and Disinfection, Showerheads   Limit: Schedule, maintain and document  Method: See remedial procedures  Frequency: Annually  Action/Contingency Plan:   1. Maintain system as necessary including flushing of areas know to be stagnant more than 7 days. 2. Maintain system as necessary. |
| Cold Water Outlets,  Faucets & Outlets | Procedures:   * Mechanical Inspection   Limit: Pass/Fail  Method: Perform visual inspection and document  Frequency: Annually   * Cleaning and Disinfection, Facet Flow Restrictors   Limit: Schedule, maintain and document  Frequency: Annually  Action/Contingency Plan:   1. Maintain system as necessary including flushing of areas know to be stagnant more than 7 days. 2. Maintain system as necessary. |
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# 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 unacceptable[[2]](#footnote-2). 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**.

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

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| --- | --- |
| **Procedure designator** | **Description of procedure/activity** |
| 1  Manager Plant  Operations and  Team Leads | Immediately institute short-term control measures (i.e. heating and flushing, hyperchlorination, or temporary installation of supplemental treatment) in accordance with the direction of a qualified professional and notify NYS DOH. |
| 2  Manager Plant  Operations and  Team Leads | The water system shall be re-sampled no sooner than 7 days and no later than 4 weeks after disinfection to determine the efficacy of the treatment.   * Retreat and retest. If retest is >30% positive, repeat short-term control measures. * With receipt of results <30% positive, resume monitoring in accordance with the sampling and management plan. |
| 3  Manager Plant  Operations and  Team Leads | For persistent results, as determined by the SMP Team, showing >30% positive sites, long-term control measures (i.e., supplemental treatment) shall be implemented in accordance with the direction of a qualified professional and the department. |

# 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  Infection Prevention in conjunction with Manager Plant Operations and Team Leads | * Perform remedial disinfection of the water supply. * Remove faucet aerators from patient care areas if environmental sampling yields positive results for Legionella spp. * Restrict patients on the unit from taking showers * Provide patients with sterile water for tooth brushing, drinking, flushing nasogastric tubing and dilution of enteral nutrition for administration via a nasogastric tube. * Notify patients and family members of the need and the rationale for the water restriction on the affected unit. * If the above recommendations are in place and a case of facility-associated Legionnaires disease is identified, reinforce adherence to above recommendations, and additionally consider; * Not utilizing sinks in patient rooms. If this is initiated, the facility must ensure; * Hand hygiene products are available (e.g., alcohol-based hand rubs), and * There is reasonable access to a sink if hands are visibly soiled (i.e., the employee does not have to thread their way through doorways and/or stairs to access a sink). * Do not use tap water for patient’s sponge baths. |

# 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.

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.” [↑](#footnote-ref-1)
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. [↑](#footnote-ref-2)