WATER MANAGEMENT PLAN

Nationwide Children's Hospital

700 Children's Drive
Columbus, Ohio 43205

2/14/2022

V1

legionella assessment and LAMPS management plan support

www.hcinfo.com

Table of Contents

Abbreviations and Acronyms

AHU	air handling unit
BAS	Building Automation System
BFP	backflow preventer
Bldg	building
BWD	bottled water dispenser
CFU/mL	colony forming units/milliliter
CL	control location
CLS	closed-loop system
CM	control measure
Conf	confirmation (verification and validation)
CT	cooling tower
CWT	cold water storage tank
DC	design and construction
DCW	domestic cold water
DCWS	domestic cold water system
DEAC	direct evaporative air cooler
DECFNT	decorative fountain
DF	drinking fountain
DFLOOP	chilled water loop supplying water to drinking fountains
DHW	domestic hot water
DIALLOOP	piping network for dialysis connections
DIALTRMT	dialysis water treatment system
DW	domestic water
DWI	domestic water incident
DWM	domestic water system maintenance
DWS	domestic water system
FIRE	fire protection system
HHW	heating hot water
HPC	heterotrophic bacteria plate count
HUMIDSTM	steam humidifier in HVAC duct
HUMIDWTR	cold water humidifier in HVAC duct
HVAC	heating, ventilating, and air conditioning
HWR	hot water return
HWT	hot water storage tank
HX	heat exchanger
IC	infection control
IRR	irrigation
KIT	kitchen centralized hot water system

LD	Legionnaires' disease
Mgmt	Management
MIST	misting system
ORP	Oxidation Reduction Potential
POE	water supply point of building entry
POEFLTR	filter on cold water line near point of building entry or on hot water supply
POOL	swimming pool, hydrotherapy pool, or whirlpool spa
POU	domestic water point of use
POUDHW	building with water heaters at or near points of use
POUFLTR	filters on lines supplying water to equipment at or near points of use
ppm	parts per million
PRV	pressure reducing valve
PWMT	public water main tap
PWS	public water supply
SHD	showerhead
SHH	shower hose and wand
SOFT	softening system
SWAMP	swamp (evaporative) cooler
TMV	thermostatic mixing valve
TREAT	domestic water continuous treatment system
WH	water heater

Team Members

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Overview

OBJECTIVE
The objective of the water management program is to manage microbial risk associated with the building water systems while also managing risks from scalding (the primary physical hazard associated with water) and from chemicals used for water treatment or in devices connected to the water systems.

SCOPE
The water management plan (WMP) outlines procedures for managing the building water systems at one site. The water systems on the site are described in the "Water Systems" section and shown in the flow diagrams. The assessment process and risk reduction approach are described below under "Strategy."

Most of the control measures in the WMP are based on scientific studies and guidelines for Legionella because it has been studied extensively in both laboratory and field settings. Control measures effective in minimizing Legionella may be effective against many other opportunistic pathogens in the building water systems (e.g. Pseudomonas, Acinetobacter, Burkholderia, Stenotrophomonas, nontuberculous mycobacteria, fungi), especially those associated with biofilms.

The WMP may also include control measures primarily for pathogens other than Legionella. Control measures are to be implemented by the WMP team with best practices for minimizing physical (e.g., scalding) and chemical hazards.

Performance of the water management program will be measured as described below ("Performance") and further in the WMP Confirmation (Validation) section.

Be aware that, although the vast majority of reported cases of Legionnaires' disease have been caused by exposure to Legionella-contaminated water, some cases have been contracted in the handling of compost or potting soils. Since this plan pertains to the management of building water systems, it does not include control measures for gardening. Persons responsible for the property's gardens or landscaping should be advised to take necessary precautions. For more information, see LAMPS training note 4.094, "Precautions for Gardeners."

HC Info, the provider of the LAMPS cloud-based software used to develop this WMP, believes the LAMPS default WMP content--if set up properly and implemented fully and successfully--satisfies ASHRAE Standard 188 and, for hospitals and nursing homes, the CMS Legionella requirement (QSO-17-30). However, HC Info does not guarantee compliance with ASHRAE Standard 188 or CMS QSO-17-30, in part because the requirements are not specific and are subject to interpretation.

FUNDAMENTALS
For many years, government agencies and industry groups have agreed that (1) waterborne Legionella bacteria can cause Legionnaires' disease, (2) minimizing Legionella in building water systems is the best strategy for reducing the risk of disease and, therefore, (3) building water systems should be managed to minimize Legionella bacteria.

With the June 2015 release of ASHRAE Standard 188 came broad agreement about the approach for Legionella prevention in building water systems: to implement a water management plan that has the seven key elements outlined below in "Strategy."

ORGANIZATION
The WMP will be overseen by the team leader and members listed in the "Team" section. The team's duties are listed in the "Management" section.

If required by law or preferred by the team, a printout of the WMP and necessary documentation will be kept on site and made available for inspection upon request by authorities.

PERFORMANCE
Methods for validating the effectiveness of the water management program are outlined in the "Confirmation" section. A water management program cannot guarantee the absence of Legionella or any pathogen; it is not realistic or possible to eliminate all risks. Legionella is the "target" pathogen by which this water management program is validated because it is the only pathogen that meets all of the following criteria: (a) Causes numerous cases of severe illness; (b) Entirely environmental; (c) Almost entirely waterborne; (d) Primarily building water related; (e) Detectable in water via reliable methods. However, the WMP team may decide to test for pathogens

other than Legionella, particularly if infections caused by other pathogens are reported or if water treatment methods designed to minimize Legionella could promote the growth of other pathogens.

PROCESSES

The procedures (control measures) are outlined in the Control Measures section. The persons responsible for verifying the implementation of the control measures are also listed in that section.

RISK ASSESSMENT AND MANAGEMENT STRATEGY

The risk management strategy involves the following steps:

1. Assess risk

a. Identify and describe all water systems on the property.

Water systems are named, numbered, briefly described, and shown on a flow diagram.

The LAMPS facility survey form (WMP Configuration Step 1.5) provides a checklist of water system types to identify on the property and information to record about each system. Notes about specific conditions or risk factors can be entered in the comments box of each water system description (Step 2.7) or in the "Risk Assessment Per Hazard Analysis."

See the system descriptions ("Water Systems" section) and the flow diagrams.

b. Identify systems that present a significant risk of Legionella growth and transmission.

ASHRAE Standard 188 and the CDC toolkit base Legionella risk primarily on water system types. Types of water systems that present a risk of Legionella growth and transmission must be managed even if they are in excellent condition and possesses no specific risk factors at the time of an assessment.

LAMPS includes control measures for domestic (potable) water systems even for buildings that do not meet the risk factors (e.g., > 10 stories) outlined in ASHRAE 188, because certain conditions and risk factors should be managed to reduce risk regardless of building size or type.

See the "Risk Assessment Per Hazard Analysis."

c. Establish control locations.

For the water systems that present a significant Legionella risk, determine points and processing steps at which control measures can and should be applied. (See the "Risk Assessment Per Hazard Analysis.")

2. Implement control measures

Water system conditions and risk factors are assessed and mitigated ongoing by the WMP team via control measures (CMs).

The control measures check for, minimize, and/or mitigate conditions favorable for growth or transmission of Legionella.

Listed for each control measure are a monitoring procedure, control limit, and corrective action. If monitoring of a control measure shows it is not performed within the limit, the corrective action must be taken.

See the control measures.

3. Verify implementation

Control measures must be documented. The documentation must be reviewed on a schedule to verify implementation.

See the Confirmation section, verification information for each control measure, and the control measure verification reports.

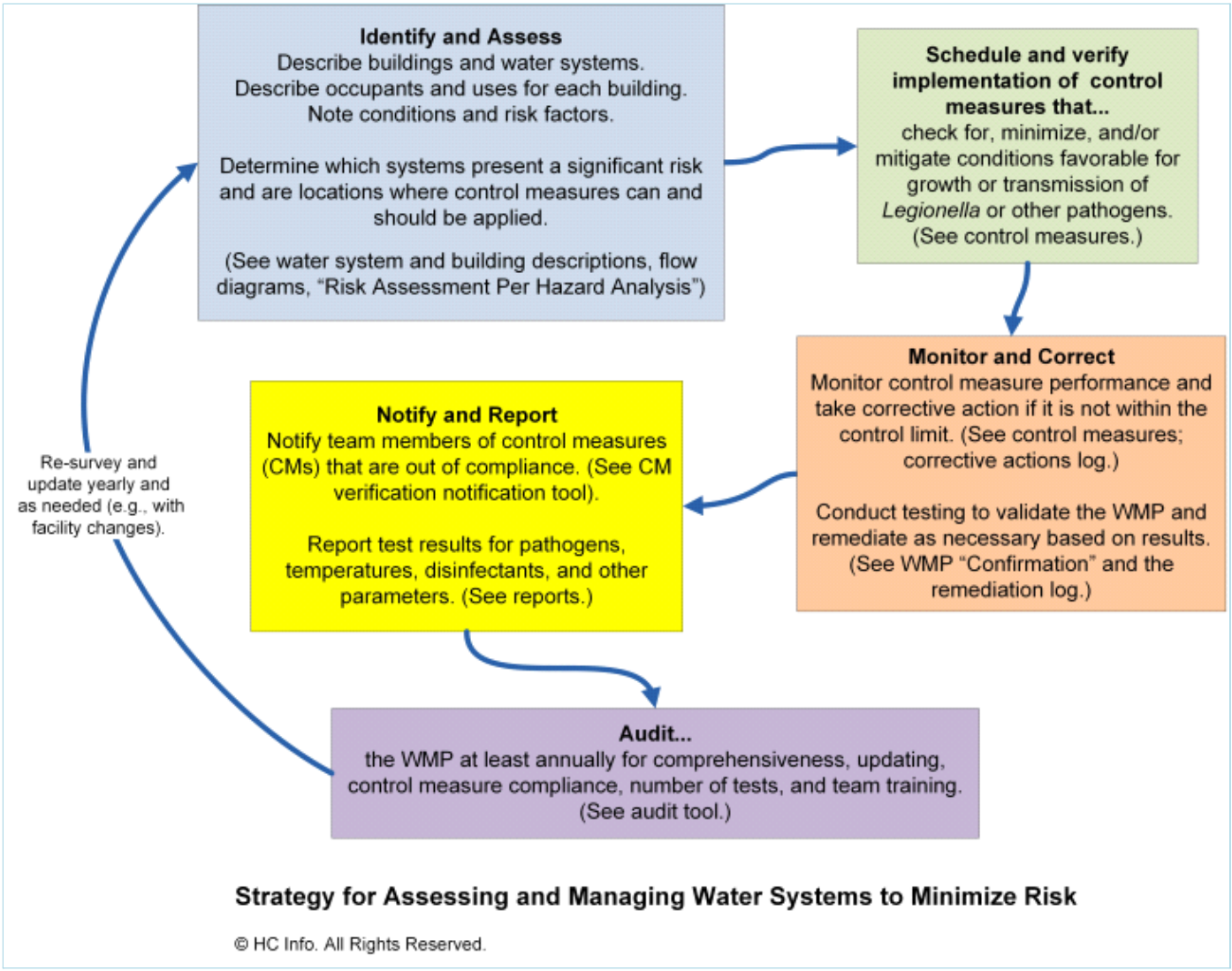
4. Validate effectiveness

Validation procedures show the effectiveness of the WMP in controlling Legionella.

See the Confirmation section for the validation procedures, and test results in the Reports section.

The risk assessment and management strategy is illustrated in the diagram below.

Overview Diagram



Strategy for Assessing and Managing Water Systems to Minimize Risk

Notification and Communication

Fast, efficient, and accurate communication is crucial to the success of implementing the water management program (WMP).

The notification and communication plan for all pathogen test results and for control measures that are outside performance limits is as follows:

CONTROL MEASURES FOR WHICH LIMITS ARE EXCEEDED

The person(s) carrying out control measures (e.g., cooling tower inspections, water quality monitoring, maintenance)--referred to as the "Technician" for the purposes of this section--will report the need for corrective action to the Verification Person listed for that control measure. The Verification Person will then communicate what is necessary to implement the corrective action to the person(s)--referred to as "Remediators"--who will implement it.

Communication and notification for control measure corrective actions will flow as follows:

1. When a Technician sees a deficiency, he or she must notify the Verification Person within 1 day.

2. Within 2 days of receiving notification, the Verification Person must review the condition and notify the Remediator(s).

3. The Remediator(s) must propose corrective action within 2 days.

4. Corrective action will be implemented in a time frame appropriate for the condition, risk, and work required.

TEST RESULTS FOR LEGIONELLA OR OTHER PATHOGENS

Key persons include:

a. Laboratory that tests the samples for Legionella or another pathogen ("Lab")
b. The person to whom the lab report is submitted ("Recipient")
c. The persons on the WMP team who will review the test results and decide what actions to take, if any ("WMP Team")
d. Person(s) responsible for executing the implementation of the follow-up actions

Communication and notification for pathogen test results will flow as follows:

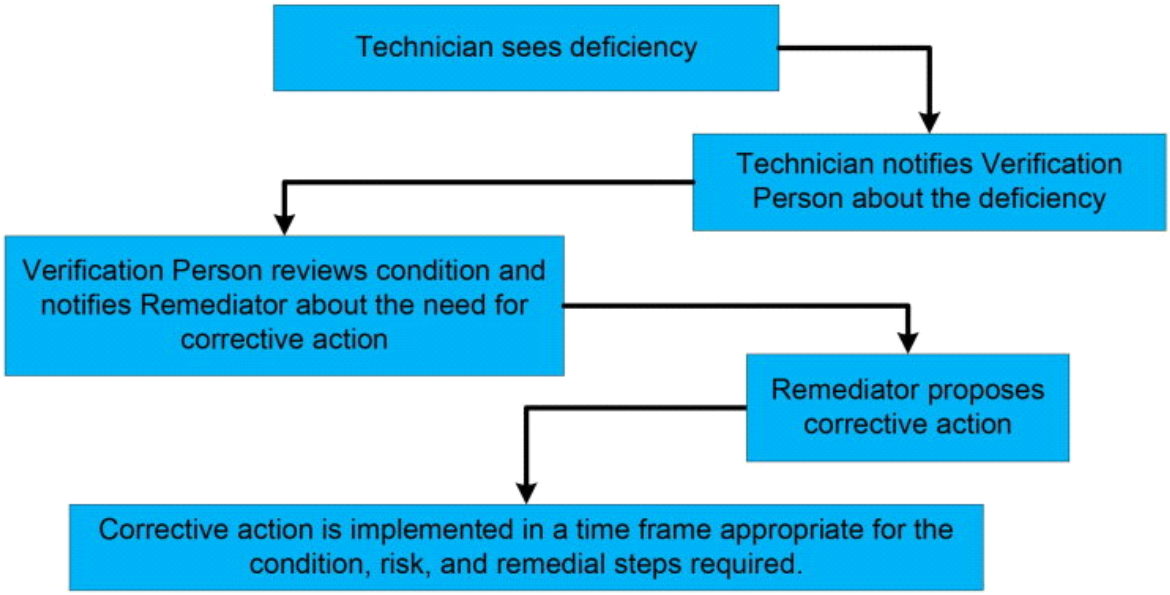
1. Within 1 day after the Lab delivers the test results, the Recipient must notify the WMP Team about the results.

2. Within 2 days, the WMP Team must decide on initial follow-up action and notify the Remediators as applicable.

3. Corrective action will be implemented in a time frame appropriate for the risk and work required.

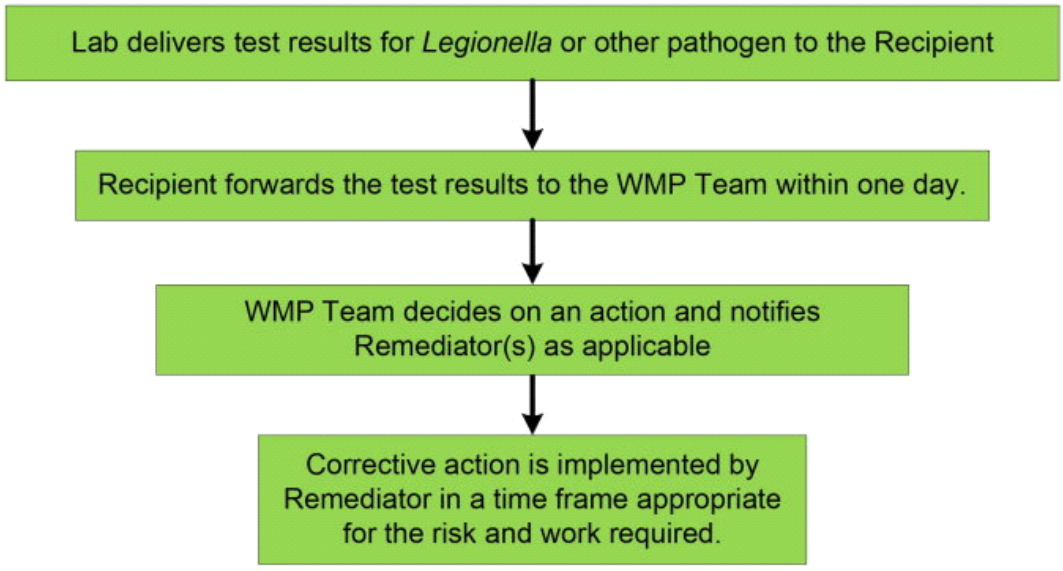
It is especially important to promptly communicate pathogen test results that indicate a significant health risk. The test results should ideally be forwarded to all WMP team members and other key stakeholders as soon as possible after receipt from the lab.

Notification and Communication Diagram



Communication and Notification for Responding to Control Measure Deficiencies

- Verification Person: Person responsible for reviewing documentation and verifying implementation of a control measure
- Technician: The person(s) carrying out the control measures (e.g., inspecting a cooling tower basin)
- Remediator: Person responsible for executing the implementation of the corrective action



Communication and Notification for Responding to *Legionella* and Other Pathogen Test Results

- Lab: Laboratory that tests the samples
- Recipient: Person to whom the lab report is submitted
- Remediator: Person(s) responsible for executing the implementation of the follow-up actions

Management

Task	Minimum Frequency
Review verification and validation in a team meeting. Consider control measure changes based on the validation data.	Quarterly
Educate employees on Legionella awareness (e.g., C101) and procedures in the WMP that are relevant to their jobs. In this WMP, suggested training references beginning with "4" (e.g., 4.093) refer to LAMPS training notes. Videos references begin with "V" (e.g., V22) and online course references with "C" (e.g., C301). Review LAMPS training course records for WMP team members in the "Training Progress Report" in the WMP Reports section. Records for other courses and employees can be uploaded in the Documentation section of the WMP.	a. Initiation of plan b. New employees c. Refresher every three years
Resurvey facilities for risk factors (e.g., chlorine level in incoming water supply) and added or removed water systems.	At least once yearly
Update the water system information, control measures, Risk Assessment Per Hazard Analysis, and other parts of the WMP as necessary (e.g., per water system changes). See Training Note 1.021.	At least once yearly
Make other WMP updates as applicable.	Ongoing with facility alterations, staffing or team member changes, scientific findings, and new technologies

Confirmation (Verification and Validation)

VERIFICATION

For this water management plan to be most effective in preventing disease, it must be fully implemented.

The persons responsible for verifying implementation of control measures, and the verification frequency, are listed within each control measure. The schedule for reviewing verification is in the Management section.

VALIDATION

The effectiveness of the WMP will be validated as follows:

BY RELYING ON EVIDENCE PRESENTED IN SCIENTIFIC LITERATURE
Studies have shown Legionella was less prevalent in water systems where similar control measures were applied.

BY MONITORING CASES OF FACILITY-ACQUIRED LEGIONNAIRES' DISEASE
Per CDC guidelines, provide clinicians with laboratory tests for the diagnosis of Legionnaires' disease. The CDC recommends a culture of respiratory specimen in addition to the urine antigen (UA) test. Culture is especially important if strains other than Legionella pneumophila serogroup 1 (Lp1) are found in the water systems because UA tests will detect only Lp1. Encourage clinicians to maintain a high index of suspicion for Legionnaires' disease and to perform laboratory appropriate diagnostic tests in patients with pneumonia if Legionnaires' is suspected, especially in high-risk patients. Extra caution is warranted if Legionella is detected in water samples. Per the CDC's Guidelines for Preventing Health-Care-Associated Pneumonia, 2003, periodically review the availability and clinicians' use of laboratory diagnostic tests for Legionnaires disease and implement measures to foster use of the tests if necessary. If a case of definite or possible nosocomial Legionnaires' disease is identified, follow the procedures outlined in the "Responding to disease" section and consider changes to the WMP based on the results of the investigation. For example, consider changes to the control measures to prevent re-contamination of the water system believed to be associated with illness.

BY ROUTINELY TESTING CERTAIN BUILDING WATER SYSTEMS
Collect water samples from appropriate locations (see LAMPS Training Note 4.078). Specific water systems are listed below.

Have the samples tested for Legionella by a highly qualified laboratory that has applicable certifications and approvals - e.g., CDC's Environmental Legionella Isolation Techniques Evaluation (ELITE) Program, the state Environmental Laboratory Approval Program (ELAP), National Environmental Laboratory Accreditation Program (NELAP), American Association of Laboratory Accreditations (A2LA), American Industrial Hygiene Association (AIHA).

Distribute the test results to the Team and as applicable to clinical providers. Note: In the WMP "Sampling Data" section in LAMPS, lab reports can be uploaded and test results logged in a database. In the "Reports" section in LAMPS, summary reports based on data analytics can be generated for specified date ranges.

Respond to the test results appropriately, considering applicable regulations, the general plan outlined in the diagram below, and best practices.

Notify authorities having jurisdiction (AHJ) and the public of the test results if required by law.

Make appropriate changes to the WMP per test result trends.

Domestic Water (Plumbing) Systems

Test domestic water systems and other drinking water (e.g., bottled water dispensers) for Legionella at least four times yearly initially and then more frequently if indicated by test results. Buildings used entirely for office, research, or other non-housing and non-healthcare uses can be sampled once yearly initially and then more frequently if indicated by test results.

Respond to domestic water test results based on thorough review of Legionella positivity (percentage of samples in which Legionella is found) and concentrations (see Course 404 and LAMPS Training Notes 4.101 and 4.103).

Consider routine testing for nontuberculous mycobacteria (NTM) as well as Legionella for validating the WMP, especially if the domestic water is treated with chloramine either via the water supply or a supplemental disinfection system (see LAMPS Training Note 4.111).

If an infection possibly contracted from the building water system is reported, then test water systems for the associated pathogen as recommended by the expert(s) investigating the case(s) of disease. Testing can help determine whether water was the source and, if so, where to apply remedial measures.

Cooling Towers

Sample cooling towers for Legionella testing within two weeks of start-up following shutdown (whether shut down for the season or for maintenance) and at least once every 3 months (ideally monthly) during operation. Collect the water samples from a point in the cooling tower basin that is far from the make-up water, or from water returning to the cooling tower from the load (e.g., chiller), after the system has been operating normally and water circulating with routine chemical treatment for at least one hour.

Respond to cooling tower Legionella test results per AHJ rules and best practices (see LAMPS Training Note 4.102):

No Legionella detected: No remedial action required. Continue treatment, maintenance, and monitoring.

For any Legionella strain detected, respond as follows per the Legionella concentration:

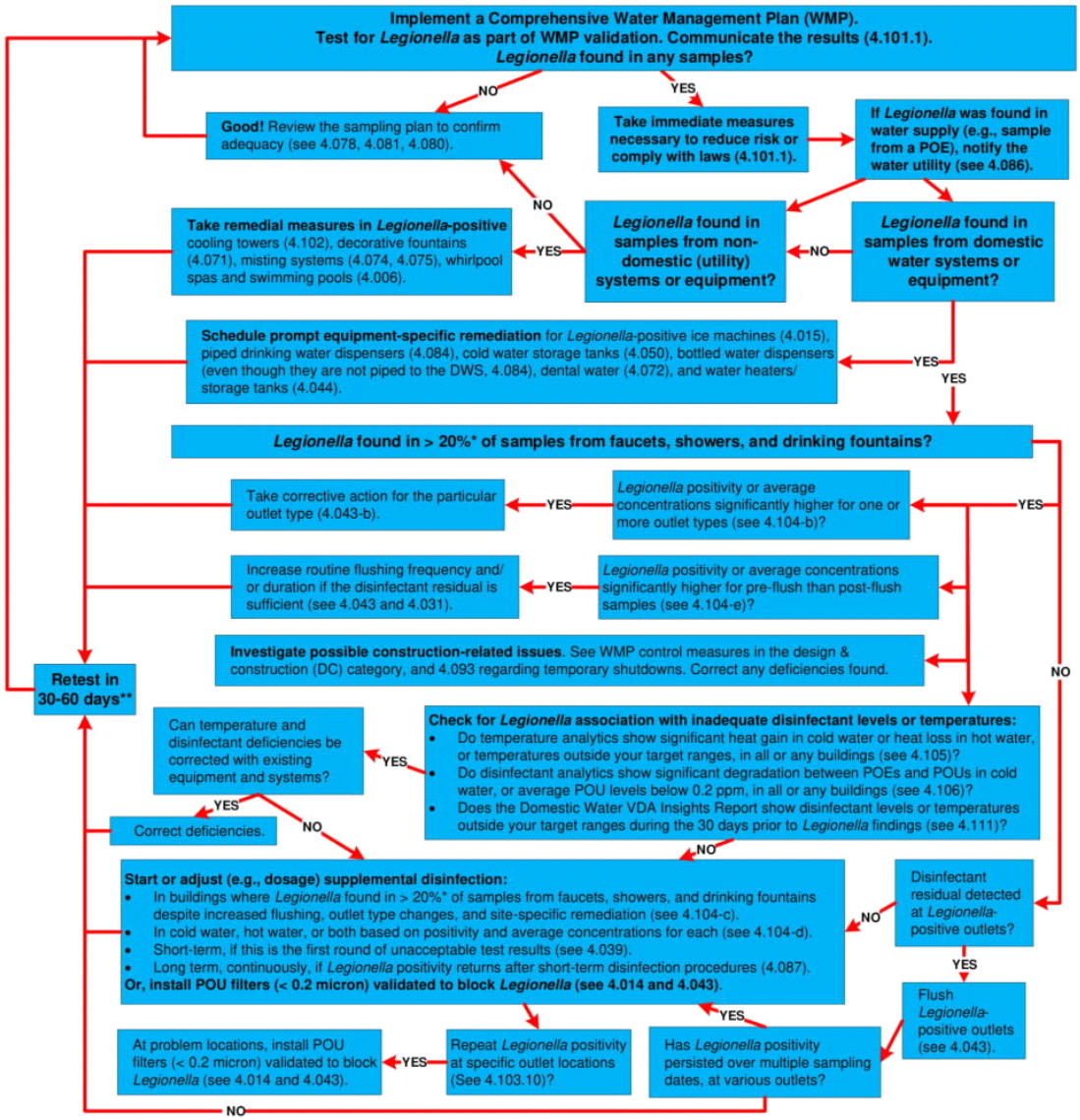
< 10 CFU/mL: Review the water treatment and maintenance program and consider adjustments. Continue treatment, maintenance, and monitoring.

10-100 CFU/mL: Within 24 hours, dose with a different biocide, increase concentrations of the existing biocide(s), or take other action to immediately reduce Legionella levels. Retest in 5-30 days and as required by the AHJ.

100-1000 CFU/mL: Within 24 hours, dose with a different biocide, increase concentrations of the existing biocide (s), perform online decontamination (e.g., circulate > 5 ppm free available halogen at an effective pH range for 5 hours. See Training Note 4.068), or take other action to immediately reduce Legionella levels. Retest in 5-7 days and as required by the AHJ.

> 1000 CFU/mL: Increase biocides within 24 hours. Within 48 hours, perform full system decontamination per applicable regulations and best practices (see Training Note 4.069). Retest in 5-7 days and as required by the AHJ.

If > 10 CFU/mL is regularly detected in routine sampling rounds, then adjust the water treatment and maintenance program for better Legionella control.



Roadmap for Responding to Legionella Environmental Test Results—Example

*20% is an example. No *Legionella* positivity or concentration threshold correlates directly with disease. The WMP team should decide upon thresholds.
**30-60 days is an example. Retesting < 30 days after a disinfection procedure will not indicate longer term *Legionella* control.

Responding to Disease

If a case of Legionnaires' disease--as defined by the CDC (https://www.cdc.gov/legionella/health-depts/surv-reporting/case-definitions.html)--is identified in a patient who has spent 2 or more days in the hospital prior to onset of illness, then the WMP team will follow this general approach (see LAMPS training notes in parentheses):

a. Protect patients from exposure to potentially contaminated water (4.041).

b. Report the disease to the health department as required.

c. Get outside help from the health department or a highly qualified consultant.

d. Conduct an epidemiologic investigation (4.008).

e. Collect environmental samples for Legionella culture. It may be necessary to collect more samples than what are collected routinely (e.g., swab as well as water samples from faucets and showers; more cold water samples than usual). Ask the laboratory to save isolates for subtyping (4.078-4.083). Follow CDC's sampling guidance--See https://www.cdc.gov/legionella/downloads/cdc-sampling-procedure.pdf.

f. While waiting for the environmental test results, disinfect any suspected sources:

water tanks and water heaters (4.010)
domestic water system (4.039)
cooling towers (4.068, 4.069)
decorative fountains (4.071)
hydrotherapy pools and swimming pools (4.006)
whirlpool bathtubs (4.088)

g. Collect environmental samples for Legionella culture again five to seven days after systems are disinfected.

h. Attempt to implicate the source of contamination based on the epidemiologic and environmental investigations.

i. Per CDC guidelines: Collect follow-up environmental samples at two-week intervals for three months. If Legionella are not detected during those three months, collect samples monthly for another three months. If Legionella are detected in one or more samples, reassess the control measures and modify them accordingly. Repeat disinfection procedures if necessary.

If an infection caused by a pathogen other than Legionella was possibly contracted from the building water, then the WMP team will follow the general approach outlined in a-h above as applicable for the associated pathogen, following CDC guidelines and the advice of experts. The hospital will test water systems and devices for the associated pathogen as necessary to identify and rule out sources and target remedial measures accordingly.

Buildings

Name	Year Built	Floors	Use
Bldg.1. A	0	6	Outpatient Clinics & Offices
Bldg.2. AB	0	8	Outpatient Clinics
Bldg.3. C	0	7	Labs on LL + 1st Floors, OR on 2nd Floor, Patient Rooms on 4th & 5th Floors, Equipment Rooms on 6th & 7th Floors
Bldg.4. D	2012	14	OR, ICU & CCU on 2nd Floor, Patient Rooms on other floors
Bldg.5. ED	0	8	Doctors offices, no patient rooms
Bldg.7. J	0	5	OR, Patient Rooms, Sterile Processing, NICU & PICU on 4th & 5th Floors
Bldg.8. J-WEST	0	5	Offices on 1st, 3rd & 4th Floors, Surgery on 2nd, Equipment Room on 5th Floor
Bldg.9. M	0	3	Residents Sleeping Quarters
Bldg.10. N	0	1	Facilities Maintenance Offices on LL, below Parking Garage
Bldg.11. PH (CEP)	0	4	Steam Plant, Chilled Water Plant, Generators
Bldg.12. R	0	5	Offices
Bldg.13. T	0	7	Patient Rooms
Bldg.14. W	0	7	Research Labs
Bldg.15. WA	0	7	Research Labs
Bldg.16. X	0	2	Outpatient Clinics
Bldg.18.LAC	2017	7	Outpatient Clinic
Bldg.19.WSC	2012	2	Outpatient Surgery
Bldg.20. LC-ED	2017	3	Outpatient Clinics & Offices
Bldg. 21 WB	2013	7	Research Labs
Bldg. 22 BHP	2020	9	Patient Care
Bldg. 23 WEP	2020	3	Utility Plant
Bldg. 24 CF/DC	2020	4	Conference Facility & Data Center

Public Water Supply

Water Company	Water Source	Disinfectant
PWS.1. City of Columbus	Surface Water	Chlorine

Description: The Dublin Road WTP obtains its water from the Griggs & O'Shaughnessy Reservoirs on the Scioto River while the Morse Road (HAP Cremean) WTP obtains its water from the Hoover Reservoir on Big Walnut Creek.

Overall Description: City water enters the campus from three (3) public water main taps, one on Livingston Ave., one on Mooberry Street, and one on 18th Street. The PWMT on Livingston Ave. is a 24" low pressure line supplied from the Dublin Road WTP. The PWMT on Mooberry Street is a 12" high pressure line supplied from the Morse Road WTP. The PWMT on 18th Street is supplied from the Morse Road WTP as well.

PWS.2. City of Westerville	Surface Water	Chlorine

Description: Alum Creek

Overall Description: City water is fed to the building from one line that taps into the city water main along Executive Campus Drive.

PWS.3. Del-Co Water Company	Surface Water	Chlorine

Description: Olentangy River & Alum Creek Reservoir

Overall Description: Water is fed to the north side of building from one line that taps into the main along Pacer Drive.

Public Water Main Taps for Domestic Water

PWMT Name	Location	Supplies Water For
PWMT.1. Morse Road WTP 12" - Mooberry Street Feed	Mooberry Street on North side of CEP	both nondomestic and domestic uses
PWMT.2. Morse Road WTP - 18th Street Feed	18th Street on East side of AB Building	both nondomestic and domestic uses
PWMT.3. Dublin Road WTP 24" - Livingston Ave. Feed	Livingston Ave. on South side of campus	both nondomestic and domestic uses
PWMT.4. Dublin Road WTP 24" - Livingston Ave. Feed	Livingston Ave. on South side of LAC	both nondomestic and domestic uses
PWMT.5. City of Westerville WTP 3" - Executive Campus Drive Feed	Executive Campus Drive	both nondomestic and domestic uses
PWMT.6. Del-Co Water Co. US Route 23 Feed	Pacer Drive on North side of LC-ED	both nondomestic and domestic uses
PWMT.7. Dublin Road WTP 24" - Livingston Ave. West of Parsons Ave.Feed	Livingston Ave. West of Parsons Ave.	both nondomestic and domestic uses
PWMT.8. Dublin Road WTP 24" Livingston Ave. @ Parsons Ave. Feed	Livingston Ave. @ Parsons Ave.	both nondomestic and domestic uses

Domestic Water Points of Building Entry

Name	Location	Water Source	Supplies Water To
POE.1.	Building|Bldg.11. PH (CEP)	PWMT|PWMT.1. Morse Road WTP 12" - Mooberry Street Feed	PH (CEP) A-N-R-X-M-W-WA-J-JW
POE.2.	Building|Bldg.2. AB	PWMT|PWMT.2. Morse Road WTP - 18th Street Feed	AB
POE.3.	Building|Bldg.13. T	PWMT|PWMT.3. Dublin Road WTP 24" - Livingston Ave. Feed	T & C
POE.4.	Building|Bldg.4. D	PWMT|PWMT.3. Dublin Road WTP 24" - Livingston Ave. Feed	D
POE.5.	Building|Bldg.5. ED	PWMT|PWMT.3. Dublin Road WTP 24" - Livingston Ave. Feed	ED
POE.6.	Building|Bldg.18.LAC	PWMT|PWMT.4. Dublin Road WTP 24" - Livingston Ave. Feed	LAC
POE.7.	Building|Bldg.19.WSC	PWMT|PWMT.5. City of Westerville WTP 3" - Executive Campus Drive Feed	WSC
POE.8.	Building|Bldg.20. LC-ED	PWMT|PWMT.6. Del-Co Water Co. US Route 23 Feed	LC-ED
POE.9.	Building|Bldg. 21 WB	PWMT|PWMT.8. Dublin Road WTP 24" Livingston Ave. @ Parsons Ave. Feed	WB-WEP-CF/DC
POE.10.	Building|Bldg. 22 BHP	PWMT|PWMT.7. Dublin Road WTP 24" - Livingston Ave. West of Parsons Ave.Feed	BHP

Fire Protection Systems

Name	Water Source	Backflow Prevention
FIRE.1. D Building Fire Protection	Storage Tank	Double Check Valve or Reduced Pressure Detector
Comments: Cold water storage tank is in D00300. This 30,000 gallon tank is backup if city water pressure is lost. Water is pumped to the storm sewer once per year and refilled with fresh city water.		
FIRE.2. All Remaining Building Fire Protection Systems for Main Campus Buildings	Tee Off Water Supply After POE	Double Check Valve or Reduced Pressure Detector
FIRE.3. LAC Building Fire Protection System	Dedicated Tap to the Public Water Main	Double Check Valve or Reduced Pressure Detector
FIRE.4. WSC Building Fire Protection System	Dedicated Tap to the Public Water Main	Double Check Valve or Reduced Pressure Detector
FIRE.5. LC-ED Building Fire Protection System	Dedicated Tap to the Public Water Main	Double Check Valve or Reduced Pressure Detector
FIRE.6.WB Building Fire Protection System	Dedicated Tap to the Public Water Main	Double Check Valve or Reduced Pressure Detector
FIRE.7.WEP Building Fire Protection System Comments: Water supplied from WB	Tee Off Water Supply After POE	Double Check Valve or Reduced Pressure Detector
FIRE.8.CF/DC Comments: Water supplied from WB	Tee Off Water Supply After POE	Double Check Valve or Reduced Pressure Detector
FIRE.9.BHP	Dedicated Tap to the Public Water Main	Double Check Valve or Reduced Pressure Detector

Irrigation Systems

Name	Water Source	Backflow Prevention	Months/Yr
IRR.1. AB, C, ED, T, W, & WA Irrigation Systems	tee off water supply after POE	double check valve or reduced pressure detector	8
IRR.2. D Irrigation System	storage tank	other type (see comments)	8

Comments: Underground concrete tank stores storm water runoff. City water makeup is added to tank if needed. The tank volume is estimated at 250,000 gallons.

IRR.3. LAC Irrigation System	tee off water supply after POE	double check valve or reduced pressure detector	5
IRR.4. WSC Irrigation System	tee off water supply after POE	double check valve or reduced pressure detector	0
IRR.5. LC-ED Irrigation System	tee off water supply after POE	double check valve or reduced pressure detector	5
IRR.6. WB-WEP-CF/DC-BHP	tee off water supply after POE	double check valve or reduced pressure detector	5

Cooling Tower Systems

CT Name	Location	Cells	Months/Yr	Recirc	Load
CT.1. CEP Cooling Tower	Roof of CEP	6	12	35,000 Gallons	6,750 Tons

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: PWMT|PWMT.1. Morse Road WTP 12" - Mooberry Street Feed

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed intermittently on a % of time basis to maintain a 0.2-1.0 ppm free chlorine residual continuously. Prominent AquaTrac controller controls chemical feed & bleed and can be accessed remotely by hospital's computers on the LAN. There is a side-stream media filter that filters water continuously. There are (3) 2250-Ton centrifugal chillers and (3) 6750 GPM condenser pumps. Drift eliminators are difficult to clean. The hospital plans to replace the drift eliminator panels as needed.

CT.2. AB Cooling Tower #1	Roof of AB Building	1	12		

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: PWMT|PWMT.2. Morse Road WTP - 18th Street Feed

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed intermittently on a % of time basis to maintain a 0.2-1.0 ppm free chlorine residual continuously. Prominent AquaTrac controller controls chemical feed & bleed and can be accessed remotely by hospital's computers on the LAN. Winter Operation: Either AB#1 or AB#2 cooling tower system is drained completely. Only (1) cooling tower operates as needed.

CT.3. AB Cooling Tower #2	Roof of AB Building	1	12		

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: PWMT|PWMT.2. Morse Road WTP - 18th Street Feed

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed intermittently on a % of time basis to maintain a 0.2-1.0 ppm free chlorine residual continuously. Prominent AquaTrac controller controls chemical feed & bleed and can be accessed remotely by hospital's computers on the LAN. Winter Operation: Either AB#1 or AB#2 cooling tower system is drained completely. Only (1) cooling tower operates as needed.

CT.4. C Cooling Tower	Roof of C Building	3	8 April-November

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: PWMT|PWMT.3. Dublin Road WTP 24" - Livingston Ave. Feed

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed intermittently on a % of time basis to maintain a 0.2-1.0 ppm free chlorine residual continuously. Prominent AquaTrac controller controls chemical feed & bleed and can be accessed remotely by hospital's computers on the LAN.

CT.5. D Cooling Tower #1	Roof of D Building	1	12

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: PWMT|PWMT.3. Dublin Road WTP 24" - Livingston Ave. Feed

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed intermittently on a % of time basis to maintain a 0.2-1.0 ppm free chlorine residual continuously. Prominent AquaTrac controller controls chemical feed & bleed and can be accessed remotely by hospital's computers on the LAN.

CT.6. D Cooling Tower #2	Roof of D Building	1	12

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: PWMT|PWMT.3. Dublin Road WTP 24" - Livingston Ave. Feed

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed intermittently on a % of time basis to maintain a 0.2-1.0 ppm free chlorine residual continuously. Prominent AquaTrac controller controls chemical feed & bleed and can be accessed remotely by hospital's computers on the LAN.

CT.7. ED Cooling Tower #1	Roof of ED Building	1	12

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: PWMT|PWMT.3. Dublin Road WTP 24" - Livingston Ave. Feed

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed intermittently on a % of time basis to maintain a 0.2-1.0 ppm free chlorine residual continuously. Prominent AquaTrac controller controls chemical feed & bleed and can be accessed remotely by hospital's computers on the LAN. Winter Operation: Either ED#1 or

ED#2 cooling tower system is drained completely. Only (1) cooling tower operates as needed.

CT.8. ED Cooling Tower #2	Roof of ED Building	1	12

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: PWMT|PWMT.3. Dublin Road WTP 24" - Livingston Ave. Feed

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed intermittently on a % of time basis to maintain a 0.2-1.0 ppm free chlorine residual continuously. Prominent AquaTrac controller controls chemical feed & bleed and can be accessed remotely by hospital's computers on the LAN. Winter Operation: Either ED#1 or ED#2 cooling tower system is drained completely. Only (1) cooling tower operates as needed.

CT.9. WA Cooling Tower	Roof of WA Building	3	8 April - November

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: PWMT|PWMT.1. Morse Road WTP 12" - Mooberry Street Feed

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed intermittently on a % of time basis to maintain a 0.2-1.0 ppm free chlorine residual continuously. Prominent AquaTrac controller controls chemical feed & bleed and can be accessed remotely by hospital's computers on the LAN.

CT.10. LAC Cooling Tower	Roof of LAC	3	9 April-December

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: PWMT|PWMT.4. Dublin Road WTP 24" - Livingston Ave. Feed

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed intermittently on a % of time basis to maintain a 0.2-1.0 ppm free chlorine residual (FCR) continuously. Prominent AquaTrac controller controls chemical feed & bleed.

CT.11. WB		2	12

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: POE|POE.9.

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed

intermittently on a % of time basis or proportional to makeup water usage to maintain a 0.2-1.0 ppm free chlorine residual (FCR) continuously. Prominent AquaTrac controller controls chemical feed & bleed.

CT.12. WEP	Roof of WEP	4	12	40,000 Gallons	3,750 Tons

Cooling Water For: HVAC

Backflow: double check valve or reduced pressure detector

Makeup Source: PWMT|PWMT.8. Dublin Road WTP 24" Livingston Ave. @ Parsons Ave. Feed

Comments: Corrosion/scale inhibitor is automatically fed proportional to makeup water usage. Sodium hypochlorite is fed intermittently on a % of time basis or proportional to makeup water usage to maintain a 0.2-1.0 ppm free chlorine residual (FCR) continuously. Prominent AquaTrac controller controls chemical feed & bleed.

Closed-Loop Systems

CLS Name	Heat Source	Heat For	Backflow
HHW.1. C Building HHW	natural gas	AHU Coils	double check valve or reduced pressure detector
HHW.2. WA Building HHW	natural gas	AHU Coils	double check valve or reduced pressure detector
HHW.3. All Other Main Campus HHW Loops	steam	AHU Coils	double check valve or reduced pressure detector
HHW.4. LAC Building HHW	natural gas	AHU Coils	double check valve or reduced pressure detector
HHW.5. WSC Building HHW	natural gas	AHU Coils	double check valve or reduced pressure detector
CLS.6. All West Campus CW & HHW Loops	HW heat exchangers or HW boilers, chilled water	AHU Coils	double check valve or reduced pressure detector

Central Domestic Hot Water Systems

DHW Name	Water Source	Location	Supplies To	Mixing Valve	Recirc Pumps
DHW.1. A DHW System	POE|POE.1.	Building|Bldg.1. A	Building A	no mixing valve	1 HWR pump
Heater Info: 1 Steam Semi-instantaneous HX					
Comments: HX in Rm A252					
DHW.2. AB DHW System	POE|POE.2.	Building|Bldg.2. AB	AB Building	no mixing valve	1 HWR pump
Heater Info: 1 Steam Semi-instantaneous HX					
Comments: HX in LL Equipment Room					
DHW.3. C DHW System	POE|POE.3.	Building|Bldg.3. C	C Building	no mixing valve	1 HWR pump
Heater Info: 2 Steam Semi-instantaneous HX					
Comments: HX in C6 Equipment Room					
DHW.4. D Low Zone DHW System	POE|POE.4.	Building|Bldg.4. D	D Building Lower Floors	no mixing valve	1 HWR pump
Heater Info: 2 Steam Semi-instantaneous HX					
Comments: HX in D00300					
DHW.5. D Mid Zone DHW System	POE|POE.4.	Building|	D Building Mid-Level Floors	no mixing valve	1 HWR pump
Heater Info: 2 Steam Semi-instantaneous HX					
Comments: HX in Rm D06					
DHW.6. High Zone DHW System	POE|POE.4.	Building|Bldg.4. D	D Building Upper Floors	no mixing valve	1 HWR pump
Heater Info: 2 Steam Semi-instantaneous HX					
Comments: HX in Rm D13300					
DHW.7. ED DHW System	POE|POE.5.	Building|Bldg.5. ED	ED Building	mixing valve	1 HWR pump
Heater Info: 1 Steam Semi-instantaneous HX					
Comments: HX & Mixing Valve in Rm ED008					
DHW.8. GH DHW System	POE|POE.2.	Building|Bldg.6. GH	GH Building	no mixing valve	1 HWR pump
Heater Info: 1 Steam Semi-instantaneous HX					
Comments: HX in Rm G001					
DHW.9. J DHW System	POE|POE.1.	Building|Bldg.7. J	J Building	no mixing valve	1 HWR pump
Heater Info: 1 Steam Semi-instantaneous HX					
Comments: HX in Rm J035					
DHW.10. J-West DHW System	POE|POE.1.	Building|Bldg.8. J-WEST	J-West Building	no mixing valve	1 HWR pump
Heater Info: 1 Steam Semi-instantaneous HX					
Comments: HX in Rm J0930					

DHW.11. M DHW System	POE|POE.1.	Building|Bldg.9. M	M Building	no mixing valve	1 HWR pump
Heater Info: 1 Steam Semi-instantaneous HX					
Comments: HX in Rm M005					
DHW.12. N DHW System	POE|POE.1.	Building|Bldg.10. N	N Building	mixing valve	1 HWR pump
Heater Info: Electric tank type water heater					
Comments: Water heater is in Rm N089					
DHW.13. PH (CEP) DHW System	POE|POE.1.	Building|Bldg.11. PH (CEP)	PH Building	no mixing valve	1 HWR pump
Heater Info: 1 Steam Semi-instantaneous HX					
Comments: HX on mezzanine					
DHW.14. R DHW System	POE|POE.1.	Building|Bldg.12. R	R Building	no mixing valve	1 HWR pump
Heater Info: 1 Steam Semi-instantaneous HX					
Comments: HX in Rm R0048					
DHW.15. T DHW System	POE|POE.3.	Building|Bldg.13. T	T Building	mixing valve	1 HWR pump
Heater Info: 1 Steam Semi-instantaneous HX					
Comments: HX in 3T Equipment Room					
DHW.16. W DHW System	POE|POE.1.	Building|Bldg.14. W	W Building	no mixing valve	1 HWR pump
Heater Info: 1 Steam Semi-instantaneous HX					
Comments: HX in Rm W008					
DHW.17. WA DHW System	POE|POE.1.	Building|Bldg.15. WA	WA Building	mixing valve	1 HWR pump
Heater Info: 2 Steam Semi-instantaneous HX					
Comments: HX in Rm WA1421, Mixing Valve in Rm 1420					
DHW.20. LAC DHW System	POE|POE.6.	Building|Bldg.18.LAC	LAC	mixing valve	1 HWR pump
Heater Info: 2 gas-fired hot water heaters					
DHW.21. WSC DHW System	POE|POE.7.	Building|Bldg.19.WSC	WSC	mixing valve	1 HWR pump
Heater Info: (2) Electric tank type water heater					
DHW.22. LC-ED DHW System	POE|POE.8.	Building|Bldg.20. LC-ED	LC-ED Building	mixing valve	no recirculation
Heater Info: 3 gas-fired tank type water heaters					
DHW.23. WB DHW System	POE|POE.9.	Building|Bldg. 21 WB	WB	mixing valve	1 HWR pump
Heater Info: Steam Semi-Instantaneous HXs					
DHW.24. WEP DHW System	POE|POE.9.	Building|Bldg. 23 WEP	WEP	mixing valve	1 HWR pump
Heater Info: Steam Semi-Instantaneous HXs					
DHW.25. CF/DC	POE|POE.9.	Building|Bldg. 24	CF/DC	mixing valve	1 HWR pump

DHW System CF/DC

Heater Info: Steam Semi-Instantaneous HXs

DHW.26. BHP DHW System POE|POE.10. Building|Bldg. 22 BHP BHP mixing valve 1 HWR pump

Heater Info: Steam Semi-Instantaneous HXs

Kitchen or Laundry Systems

KIT-LNDRY Name	Water Source	Location	Supplies To	# WHs	Recirc
KIT-LNDRY.1. D Kitchen HHW	POE|POE.4.	Building|Bldg.4. D	Building|Bldg.4. D	1	no recirculation
KIT-LNDRY.2. LAC Kitchen HHW	POE|POE.6.	Building|Bldg.18.LAC	Building|Bldg.18.LAC	1	no recirculation
KIT-LNDRY.6. BHP Kitchen HHW	POE|POE.10.	Building|Bldg. 22 BHP	Building|Bldg. 22 BHP	2	recirculation

Points of Domestic Water Use (POU)

Bldg.1. A	dishwashers drinking fountains (cold only) emergency showers supplied with cold and hot mixed eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic refrigerator ice makers shower heads (SHD) shower hoses and wands (SHH) toilets
Bldg.2. AB	drinking fountains (cold only) eyewash stations supplied with cold only eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines refrigerator ice makers shower heads (SHD) shower hoses and wands (SHH) sterilizers/autoclaves toilets
Bldg.3. C	dishwashers drinking fountains (cold only) emergency showers supplied with cold water only emergency showers supplied with cold and hot mixed eyewash stations supplied with cold only eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines refrigerator ice makers shower heads (SHD) shower hoses and wands (SHH) toilets
Bldg.4. D	dialysis portable machines dishwashers drinking fountains (cold only) emergency showers supplied with cold water only emergency showers supplied with cold and hot mixed eyewash stations supplied with cold only eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines refrigerator ice makers shower heads (SHD) shower hoses and wands (SHH) toilets
Bldg.5. ED	chemical dispensers (e.g., in janitor closets) coffee machines piped to the DCWS dishwashers drinking fountains (cold only)

	eyewash stations supplied with cold only eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines toilets
Bldg.7. J	drinking fountains (cold only) emergency showers supplied with cold water only emergency showers supplied with cold and hot mixed eyewash stations supplied with cold only eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines shower heads (SHD) shower hoses and wands (SHH) sterilizers/autoclaves toilets
Bldg.8. J-WEST	drinking fountains (cold only) emergency showers supplied with cold water only emergency showers supplied with cold and hot mixed endoscope washers eyewash stations supplied with cold only eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines shower heads (SHD) shower hoses and wands (SHH) toilets
Bldg.9. M	chemical dispensers (e.g., in janitor closets) coffee machines piped to the DCWS drinking fountains (cold only) faucets - manual faucets - electronic/automatic ice machines toilets
Bldg.10. N	faucets - manual ice machines toilets
Bldg.11. PH (CEP)	drinking fountains (cold only) emergency showers supplied with cold water only emergency showers supplied with cold and hot mixed eyewash stations supplied with cold only eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines refrigerator ice makers shower heads (SHD) shower hoses and wands (SHH) toilets

Bldg.12. R	chemical dispensers (e.g., in janitor closets) coffee machines piped to the DCWS drinking fountains (cold only) emergency showers supplied with cold water only emergency showers supplied with cold and hot mixed eyewash stations supplied with cold only eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines toilets
Bldg.13. T	dialysis portable machines dishwashers drinking fountains (cold only) endoscope washers eyewash stations supplied with cold only eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines refrigerator ice makers shower heads (SHD) shower hoses and wands (SHH) sterilizers/autoclaves toilets
Bldg.14. W	chemical dispensers (e.g., in janitor closets) coffee machines piped to the DCWS drinking fountains (cold only) emergency showers supplied with cold water only emergency showers supplied with cold and hot mixed eyewash stations supplied with cold only eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines toilets
Bldg.15. WA	chemical dispensers (e.g., in janitor closets) coffee machines piped to the DCWS drinking fountains (cold only) emergency showers supplied with cold water only emergency showers supplied with cold and hot mixed eyewash stations supplied with cold only eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines sterilizers/autoclaves toilets
Bldg.18.LAC	chemical dispensers (e.g., in janitor closets) coffee machines piped to the DCWS dental water devices dishwashers drinking fountains (cold only)

	emergency showers supplied with cold water only emergency showers supplied with cold and hot mixed eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines shower heads (SHD) sterilizers/autoclaves toilets x-ray film processing machines
Bldg.19.WSC	chemical dispensers (e.g., in janitor closets) coffee machines piped to the DCWS dishwashers drinking fountains (cold only) eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines shower heads (SHD) sterilizers/autoclaves toilets water coolers piped to the DWS x-ray film processing machines
Bldg.20. LC-ED	chemical dispensers (e.g., in janitor closets) coffee machines piped to the DCWS drinking fountains (cold only) emergency showers supplied with cold and hot mixed eyewash stations supplied with cold only faucets - manual faucets - electronic/automatic hot water dispensers (e.g., for tea) ice machines shower heads (SHD) shower hoses and wands (SHH) toilets
Bldg. 21 WB	chemical dispensers (e.g., in janitor closets) coffee machines piped to the DCWS drinking fountains (cold only) emergency showers supplied with cold and hot mixed eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines toilets
Bldg. 22 BHP	chemical dispensers (e.g., in janitor closets) clothes washers coffee machines piped to the DCWS dishwashers drinking fountains (cold only) eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines shower heads (SHD) soda machines piped to the DWS

	toilets
Bldg. 23 WEP	chemical dispensers (e.g., in janitor closets) drinking fountains (cold only) emergency showers supplied with cold and hot mixed eyewash stations supplied with cold and hot mixed faucets - manual faucets - electronic/automatic ice machines shower heads (SHD) shower hoses and wands (SHH) toilets
Bldg. 24 CF/DC	chemical dispensers (e.g., in janitor closets) coffee machines piped to the DCWS drinking fountains (cold only) faucets - manual faucets - electronic/automatic ice machines toilets

Domestic Water POU filters (POUFLTR)

Bldg.1. A	Filters on faucets or on lines to faucets filters on lines to ice machines POUFLTR Comments: Small carbon block filters are installed on ice machines and kitchenettes
Bldg.2. AB	Filters on faucets or on lines to faucets filters on lines to ice machines POUFLTR Comments: Small carbon block filters are installed on ice machines and kitchenettes
Bldg.5. ED	Filters on faucets or on lines to faucets filters on lines to ice machines POUFLTR Comments: Small carbon block filters are installed on ice machines and kitchenettes
Bldg.13. T	Filters on faucets or on lines to faucets filters on lines to ice machines POUFLTR Comments: Small carbon block filters are installed on ice machines and kitchenettes
Bldg.18.LAC	filters on lines to drinking fountains filters on lines to ice machines filters on lines to sterilizers
Bldg.19.WSC	filters on lines to coffee makers filters on lines to ice machines filters on lines to piped water coolers/dispensers filters on lines to sterilizers
Bldg.20. LC-ED	filters on lines to coffee makers filters on lines to ice machines
Bldg. 21 WB	filters on lines to ice machines filters on lines to refrigerator icemakers
Bldg. 22 BHP	filters on lines to coffee makers filters on lines to ice machines filters on lines to refrigerator icemakers
Bldg. 23 WEP	filters on lines to ice machines filters on lines to refrigerator icemakers

Bldg. 24 CF/DC	filters on lines to coffee makers filters on lines to ice machines filters on lines to refrigerator icemakers

Softeners

SOFT Name	# Softeners	Location	Water Source	Supplies For
SOFT.1. CEP Boiler Softener System	2	Building	POE|POE.1.	Steam Boiler System
SOFT.2. D Building Softener System	2	Building	POE|POE.4.	Kitchen Dish Washer Only
SOFT.3. J Building Softener System	1	Building	POE|POE.1.	Sterile Processing
Comments: Located in Rm J035				
SOFT.4. C Building Softener System	1	Building	POE|POE.3.	Lab High Purity Water System-7th Floor
SOFT.5. Wexner Softener System	2	Building	POE|POE.1.	Lab High Purity Water System
Comments: Softener system is in Rm W008.				
SOFT.6. LAC Sterile Processing	4	Building	POE|POE.6.	Sterile Processing
Comments: (2) softener systems, one is upstream of RO water system (rinse water for washer-disinfectors) while the other softens hot water for washer-disinfectors				
SOFT.7. WSC Softener System	2	Building	POE|POE.7.	Domestic cold & hot water
SOFT.8. Humidifier Softener	1	Building	POE|POE.8.	Humidification System
SOFT.9. WB	2	Building	POE|POE.9.	Boilers, HPWS
SOFT.10. WEP	1	Building	POE|POE.9.	Boilers
SOFT.11. BHP Softener System	1	Building	POE|POE.10.	Kitchen

Steam Humidifiers in HVAC Ducts

HUMIDSTM Name	Location
HUMIDSTM.1. Steam Humidification	A, C, D, J, J-West, T, W, & WA
Comments: Steam humidification in AHUs	
HUMIDSTM.2. Steam Humidification	LC-ED 1st Floor and Lab on 2nd Floor
HUMIDSTM.3. CF/DC	Data Center Rooms

Cold Water Humidifiers

HUMIDWTR Name	Location	# Humidifiers	Water Source	Areas
HUMIDWTR.1. LAC Cold Water Humidifiers	Other|	1	POE|POE.6.	Sterile Processing
HUMIDWTR.2. WSC Cold Water Humidifiers	Other|	2	POE|POE.7.	Operating Rooms 1-4

Piping Network for Dialysis Connections

Name	Water Source	Buildings	Backflow Prevention
DIALLOOP.1. T-6th Floor, Rm T6001	POE|POE.3.	T	double check valve or reduced pressure detector

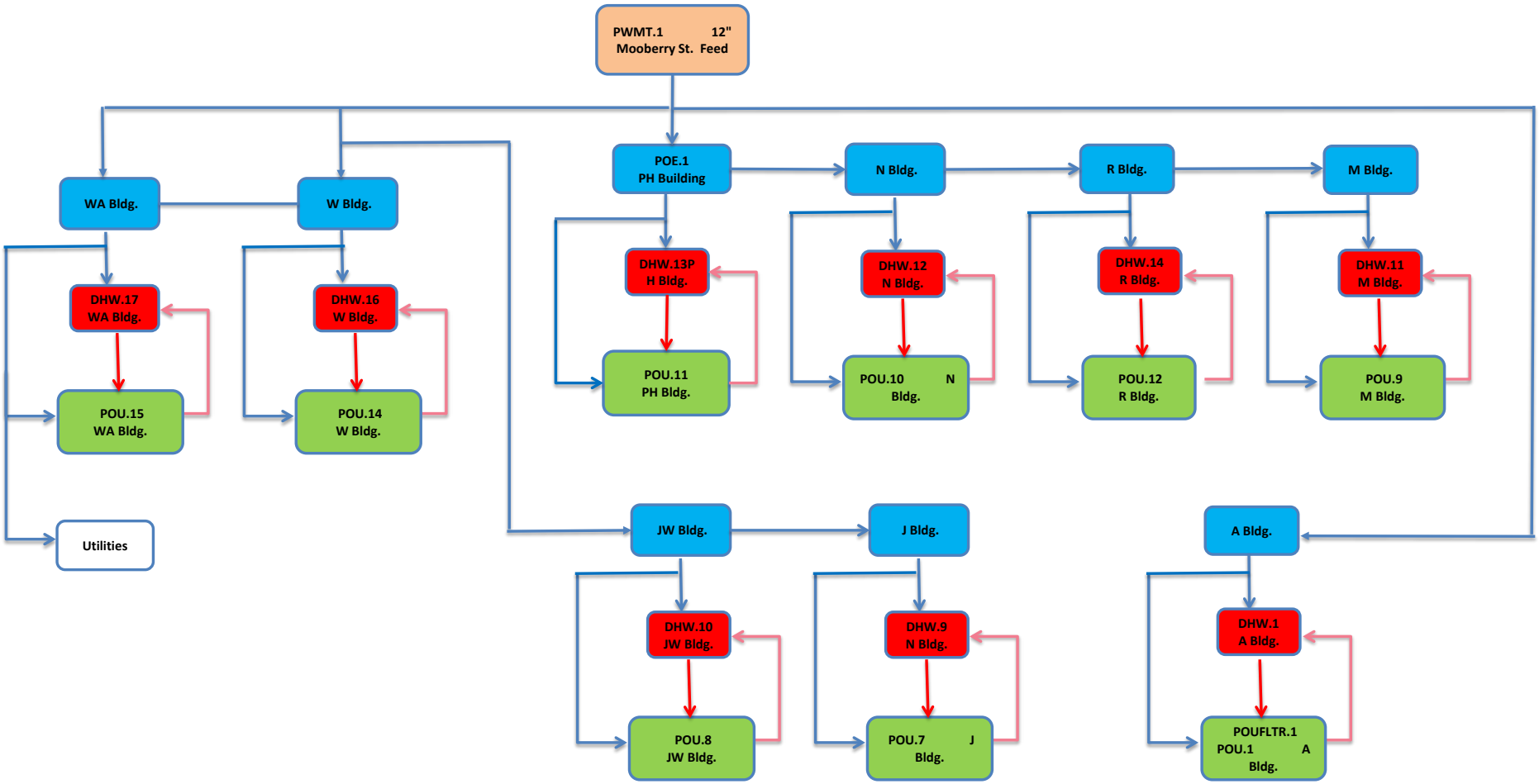
Dialysis Water Treatment Systems

DIALTRMT Name	Water Source	Location	Area
DIALTRMT.1. T-6th Floor, Rm T6001	POE|POE.3.	Building|Bldg.13. T	

Potable Flow Diagram

All colored systems shown in this flow diagram are CLs.

POE.1 PH (CEP) BUILDING

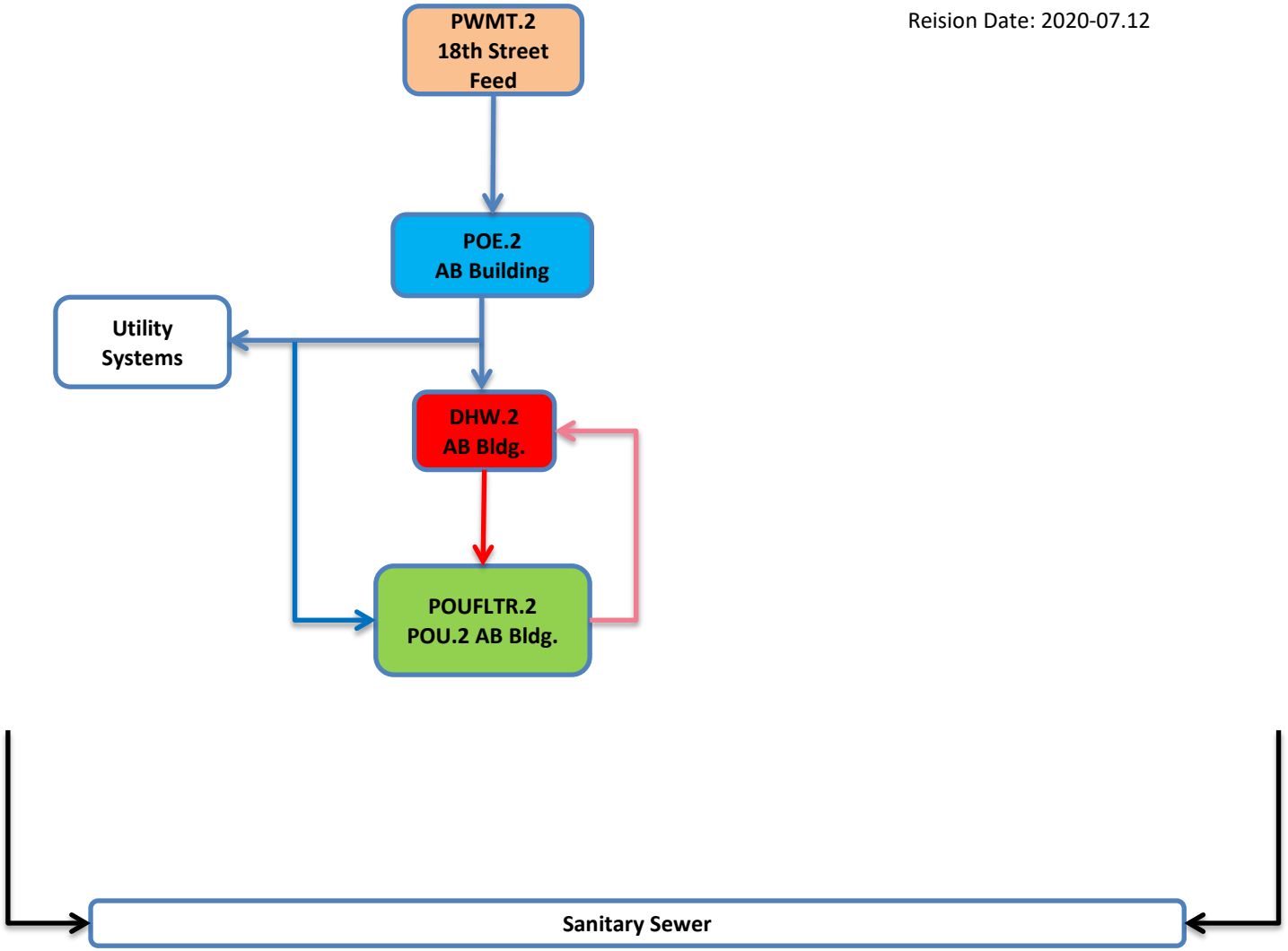


Potable Flow Diagram

All colored systems shown in this flow diagram are CLs.

POE.2 AB BUILDING

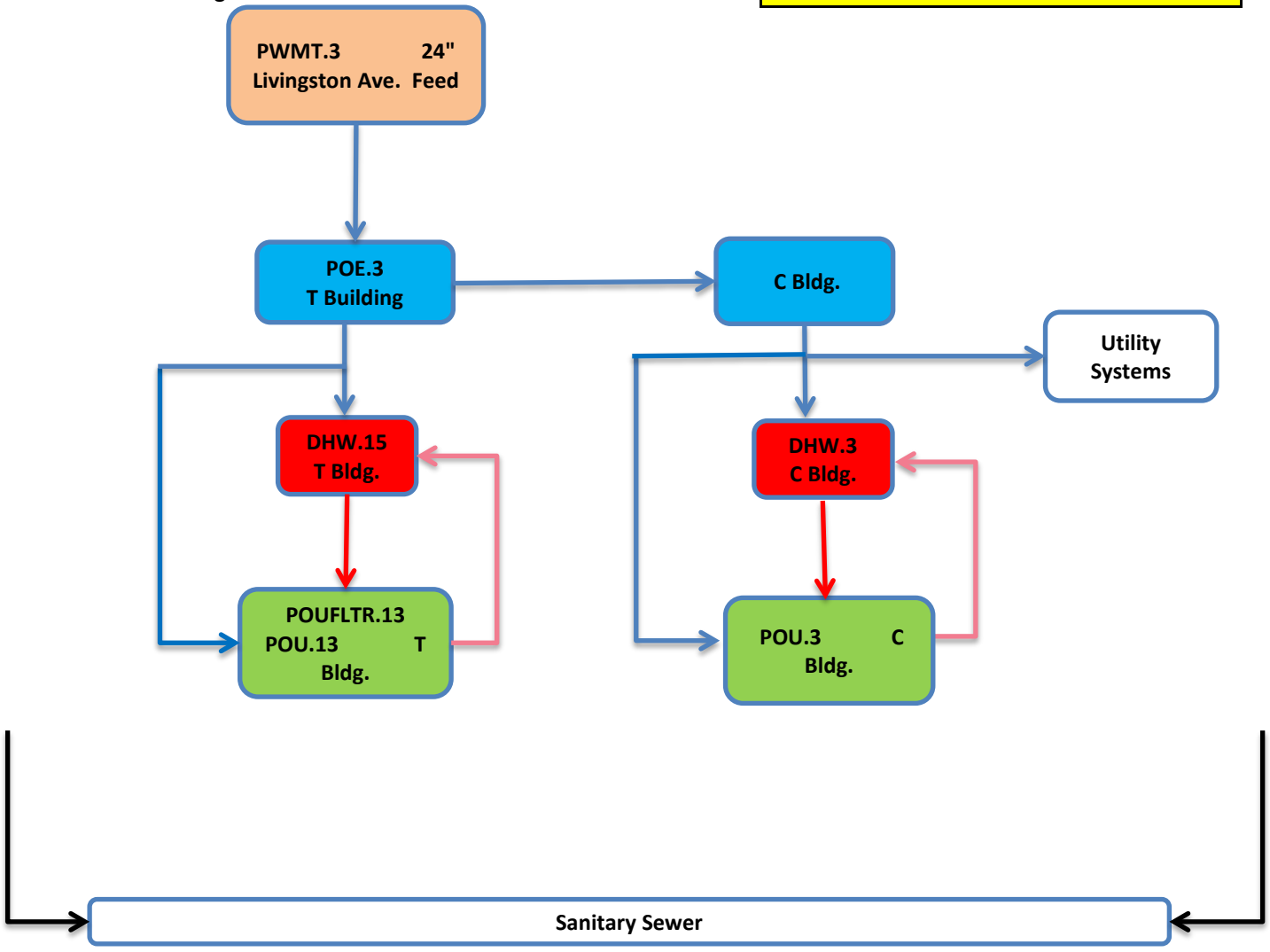
Reision Date: 2020-07.12



Potable Flow Diagram

All colored systems shown in this flow diagram are CLs.

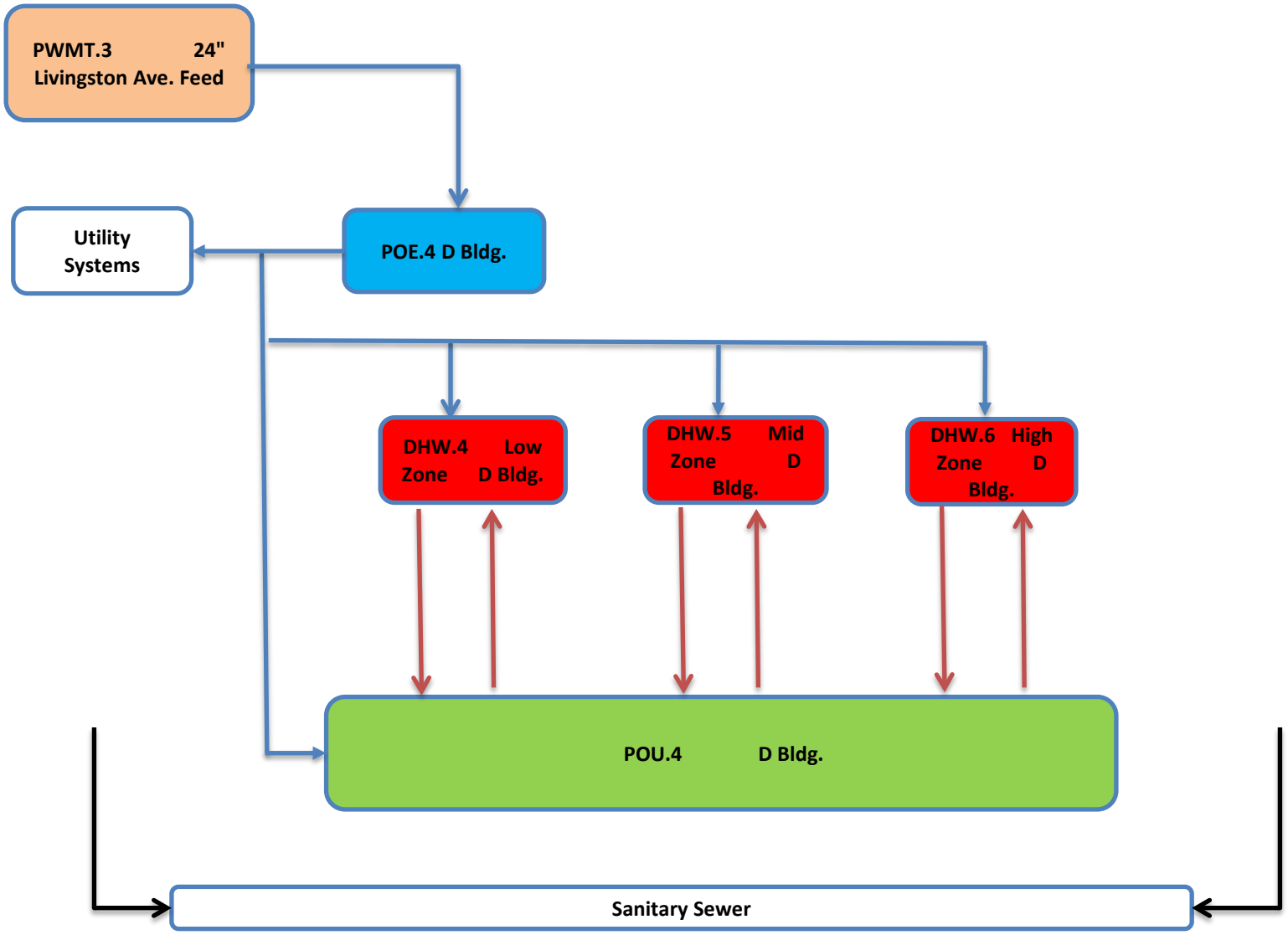
POE.3 T BUILDING



Potable Flow Diagram

All colored systems shown in this flow diagram are CLs.

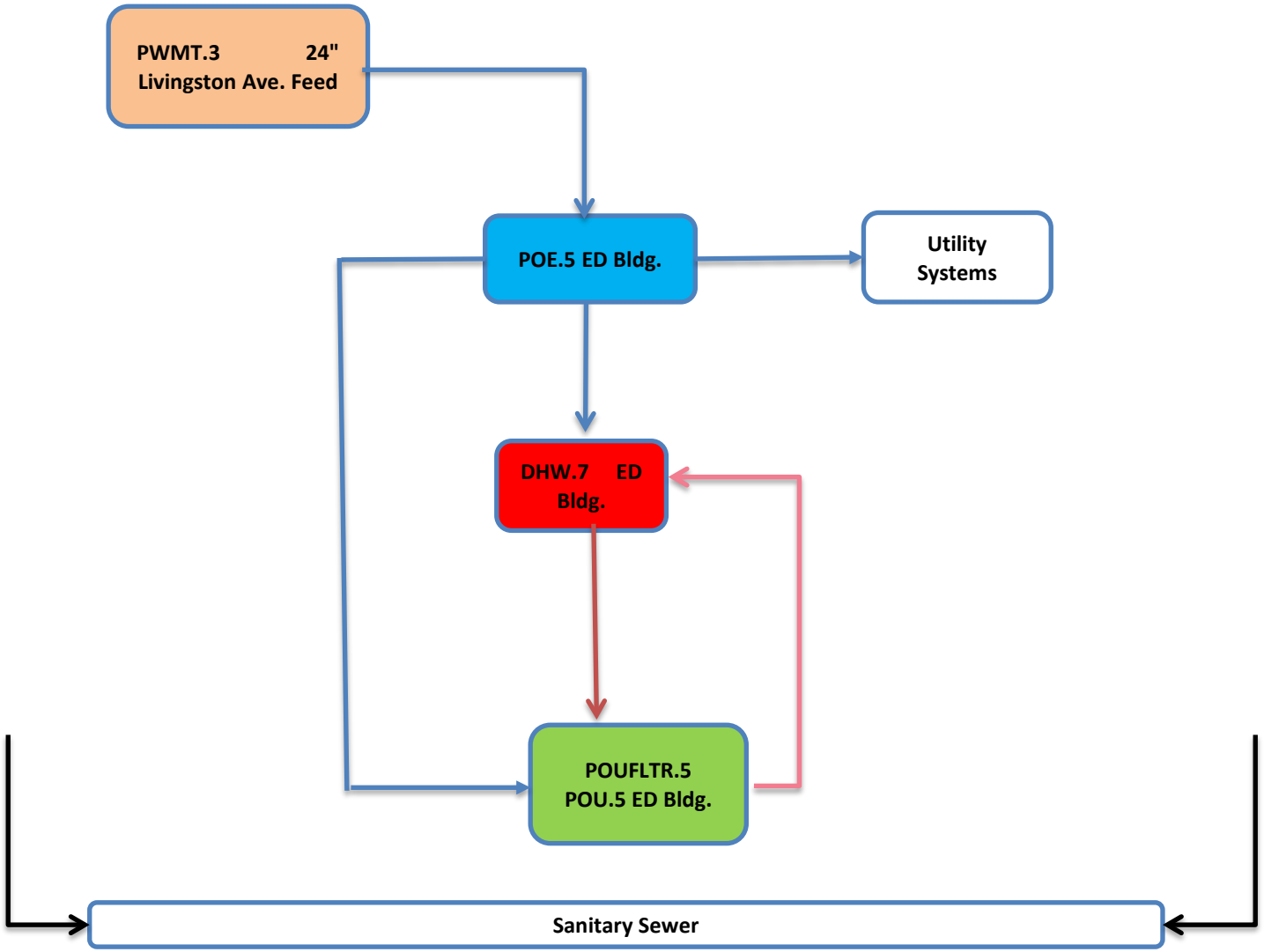
POE.4 D BUILDING



Potable Flow Diagram

All colored systems shown in this flow diagram are CLs.

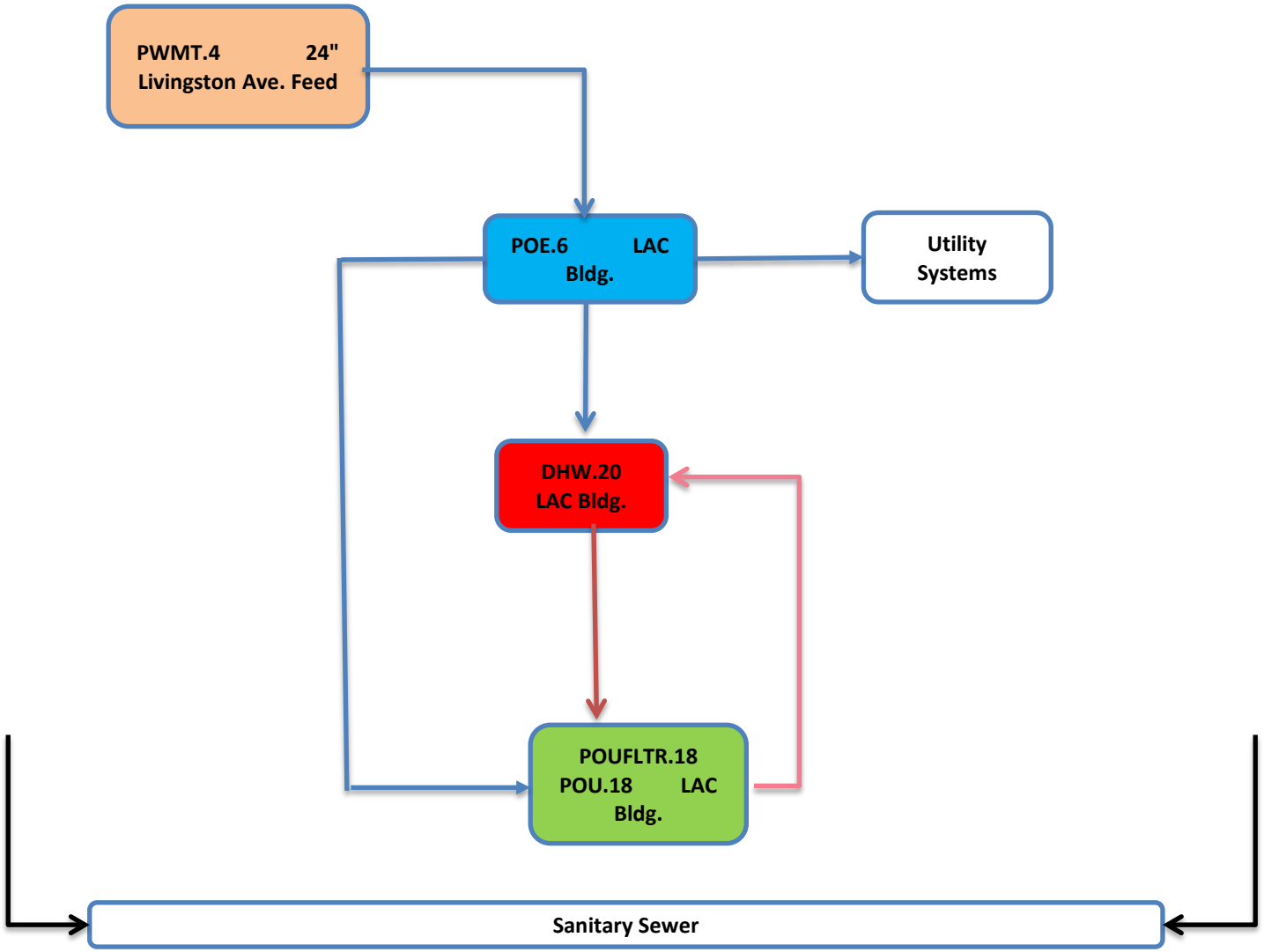
POE.5 ED BUILDING



Potable Flow Diagram

All colored systems shown in this flow diagram are CLs.

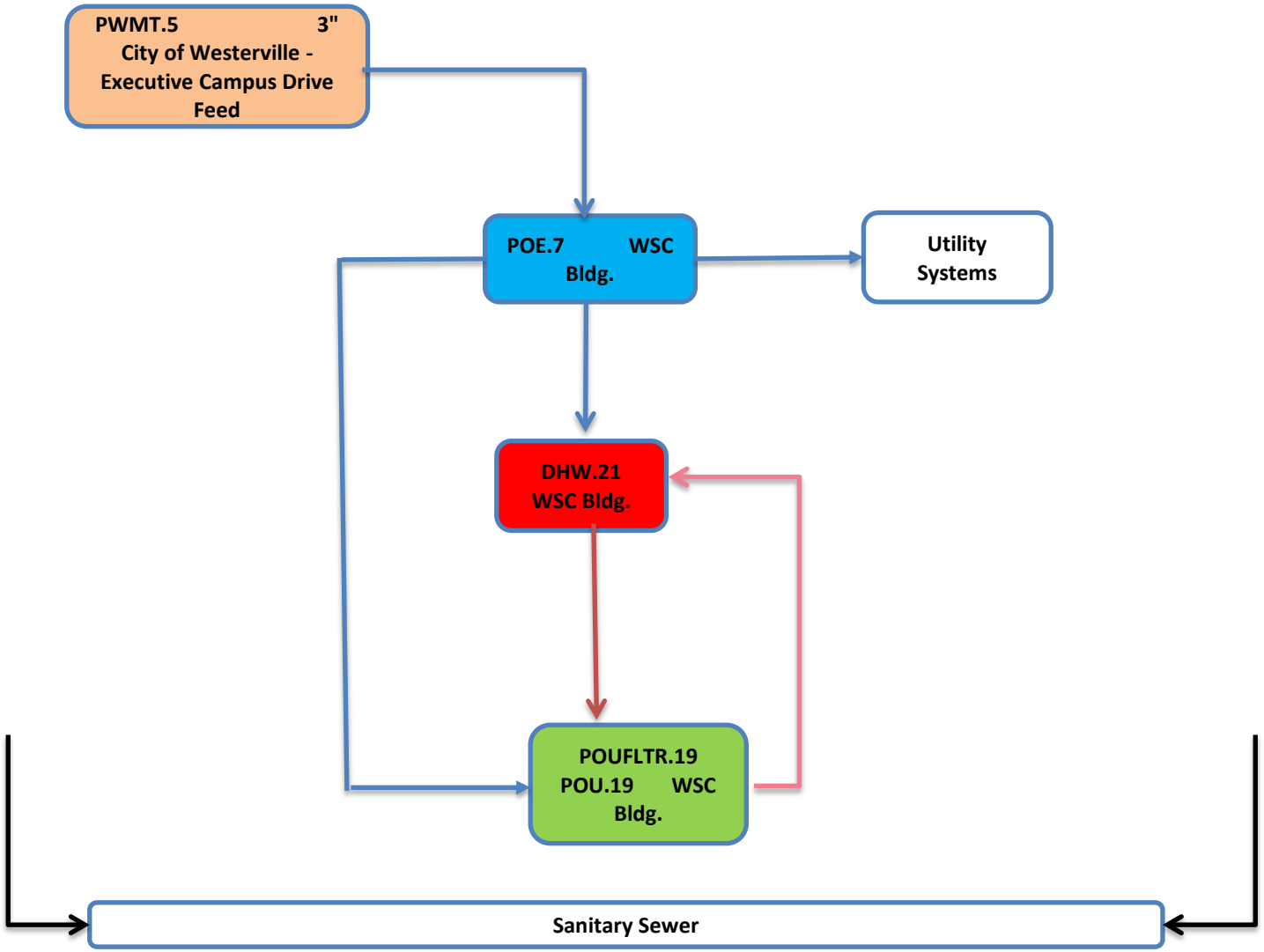
POE.6 LAC BUILDING



Potable Flow Diagram

All colored systems shown in this flow diagram are CLs.

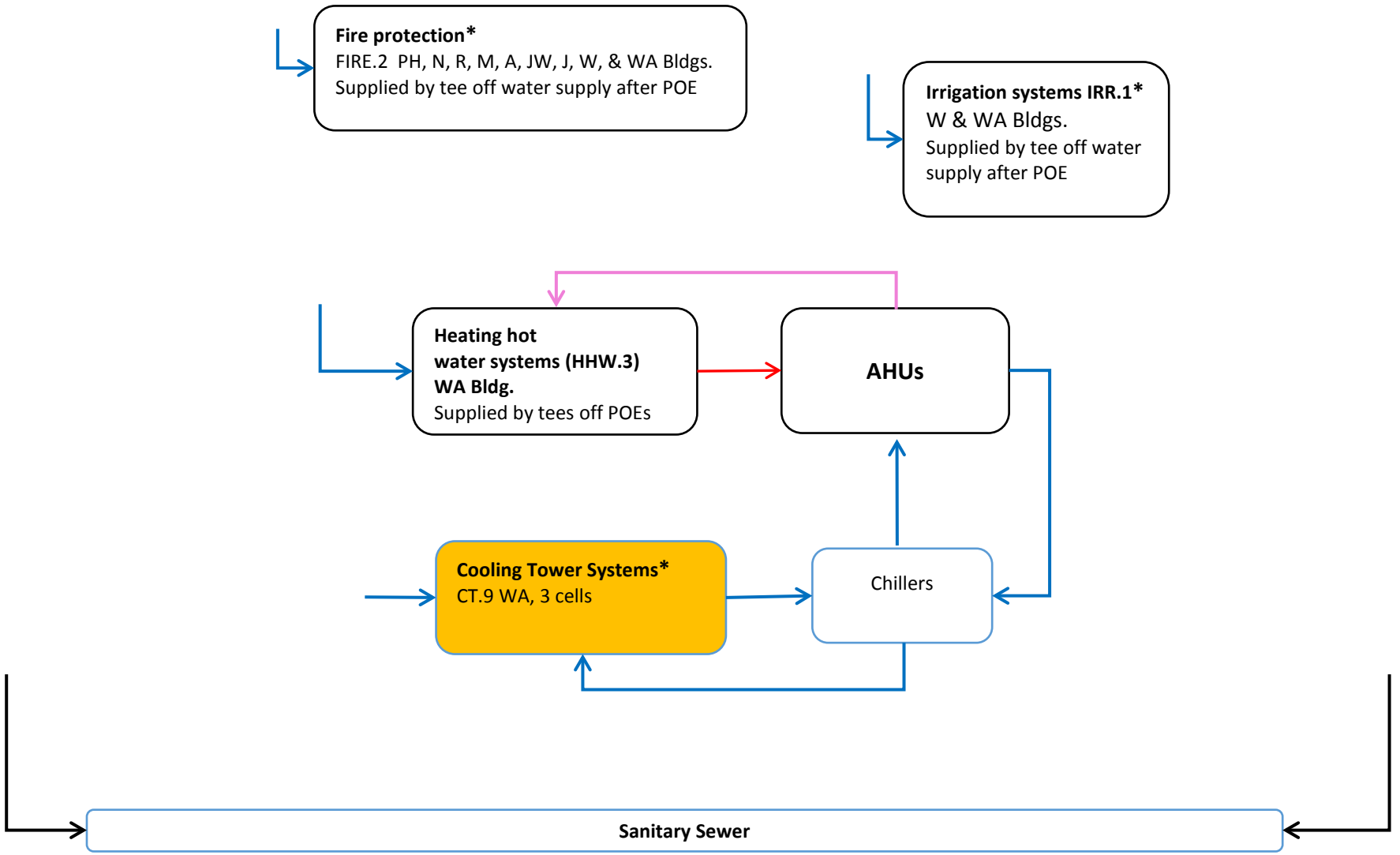
POE.7 WSC BUILDING



Utility Flow Diagram

The colored systems shown in this flow diagram are CLs.

POE.1 PH BUILDING

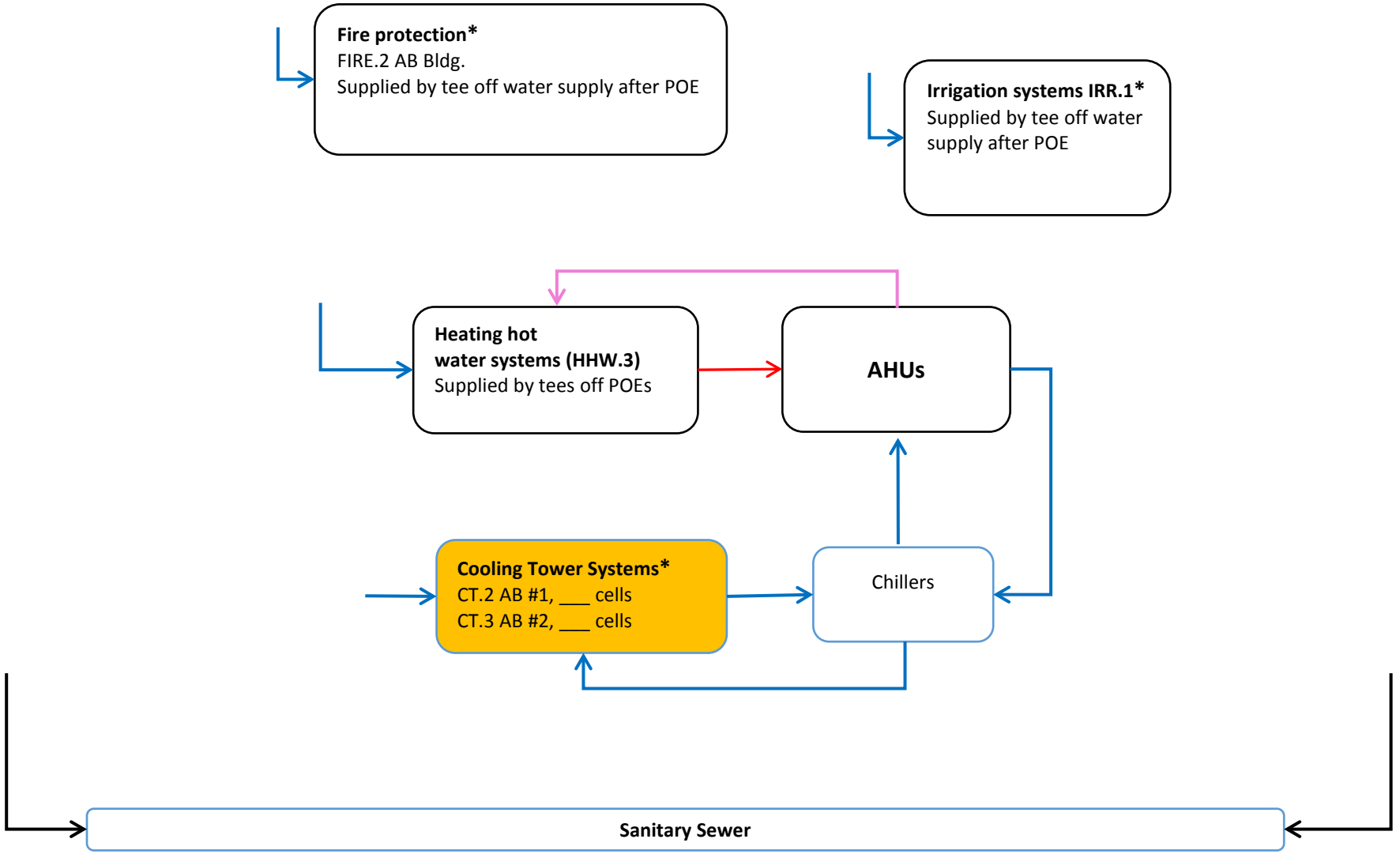


*** A cross connection survey will confirm the existence of, or need for, backflow prevention devices on the lines supplying these systems.**

Utility Flow Diagram

The colored systems shown in this flow diagram are CLs.

POE.2 AB BUILDING

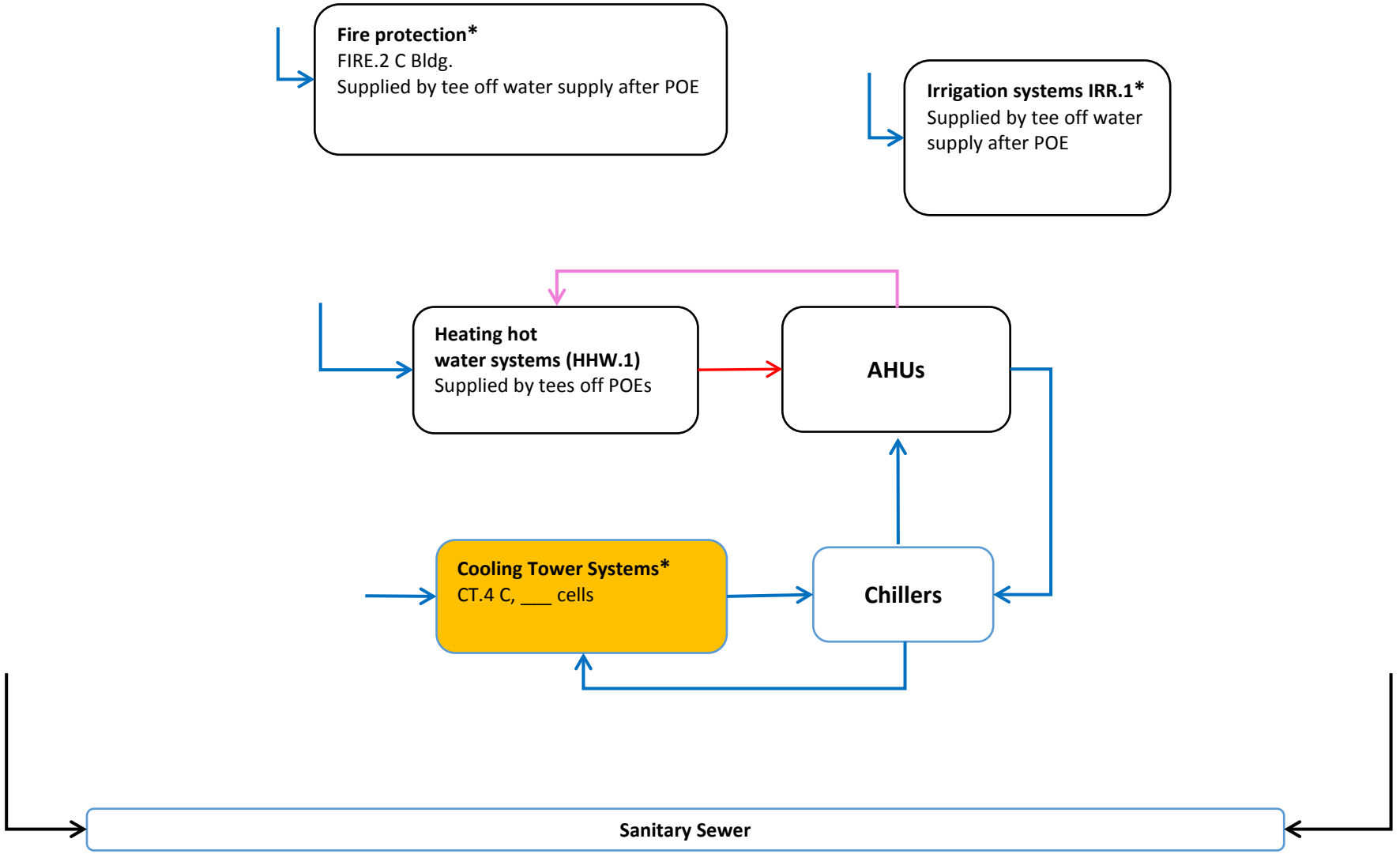


*** A cross connection survey will confirm the existence of, or need for, backflow prevention devices on the lines supplying these systems.**

Utility Flow Diagram

The colored systems shown in this flow diagram are CLs.

POE.3 C BUILDING

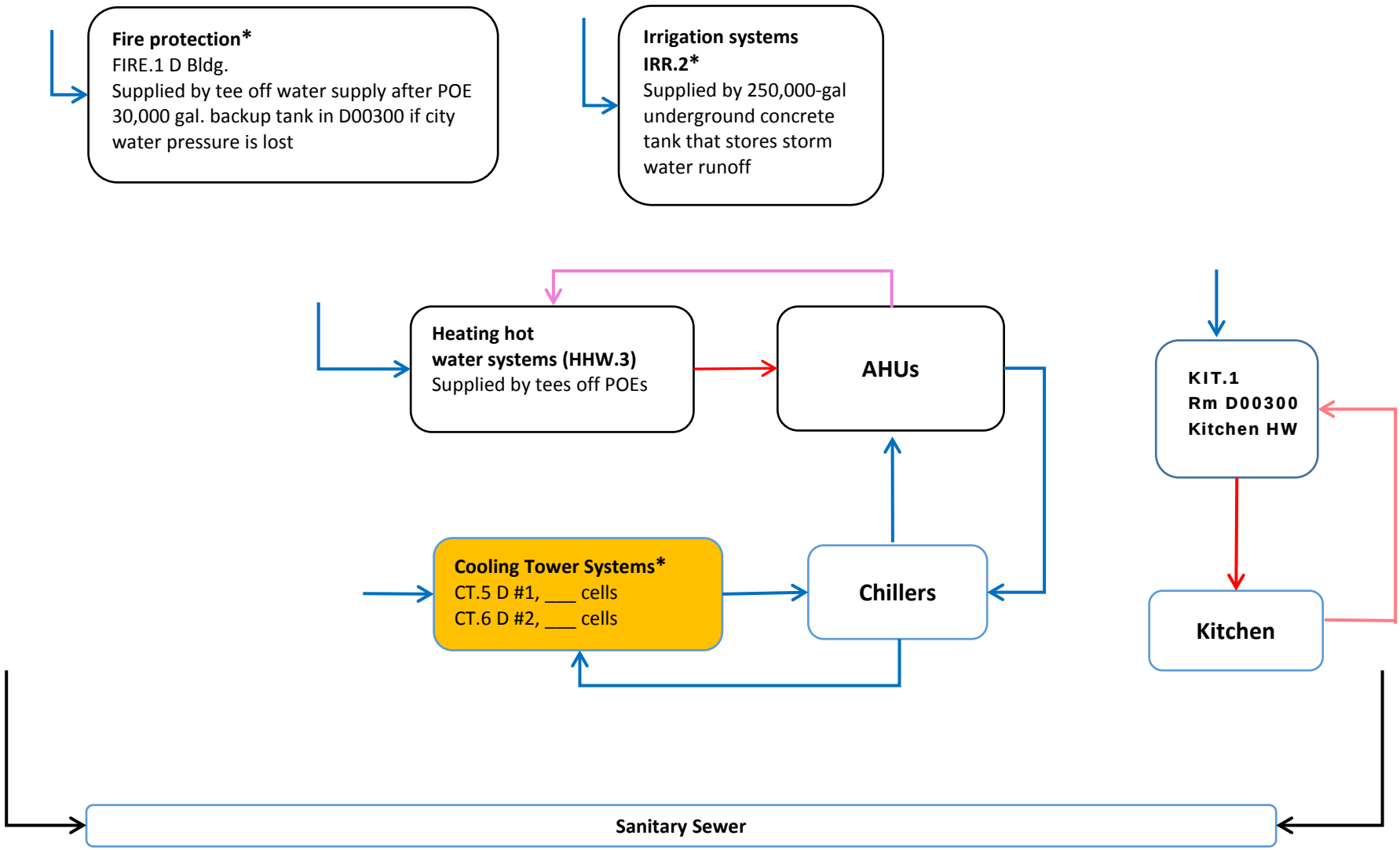


*** A cross connection survey will confirm the existence of, or need for, backflow prevention devices on the lines supplying these systems.**

Utility Flow Diagram

The colored systems shown in this flow diagram are CLs.

POE.4 D BUILDING

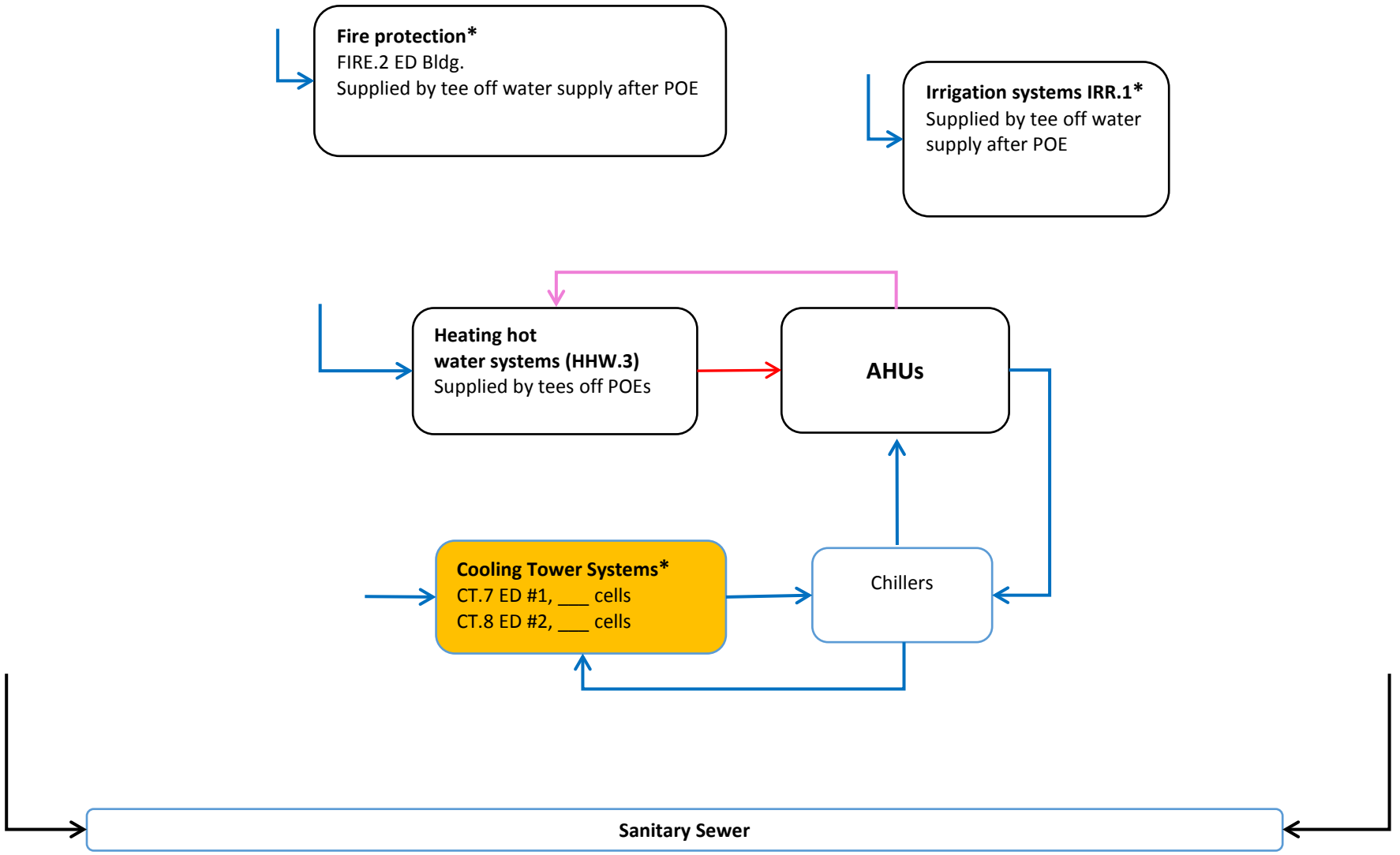


*** A cross connection survey will confirm the existence of, or need for, backflow prevention devices on the lines supplying these systems.**

Utility Flow Diagram

The colored systems shown in this flow diagram are CLs.

POE.5 ED BUILDING

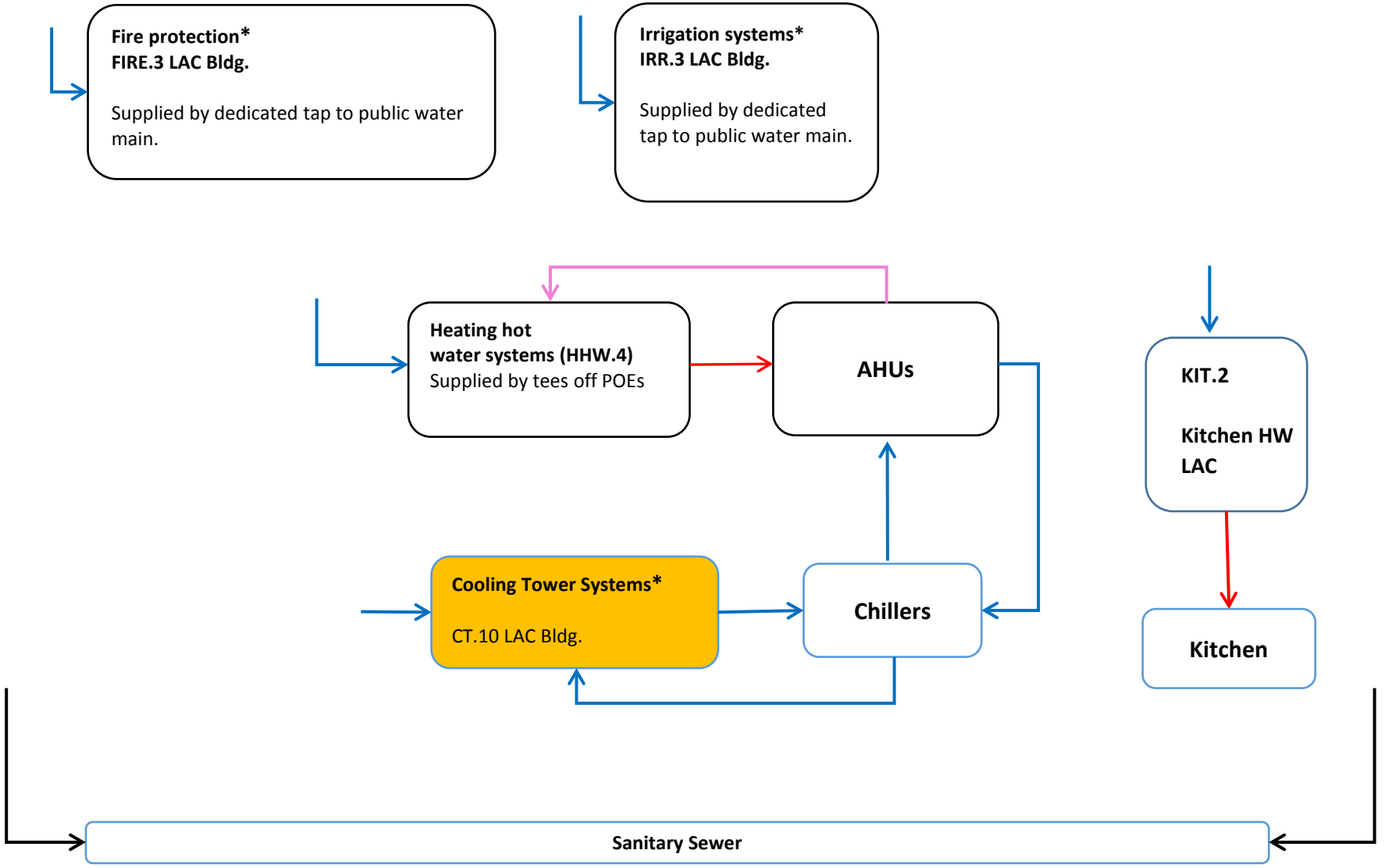


*** A cross connection survey will confirm the existence of, or need for, backflow prevention devices on the lines supplying these systems.**

Utility Flow Diagram

The colored systems shown in this flow diagram are CLs.

POE.6 LAC BUILDING

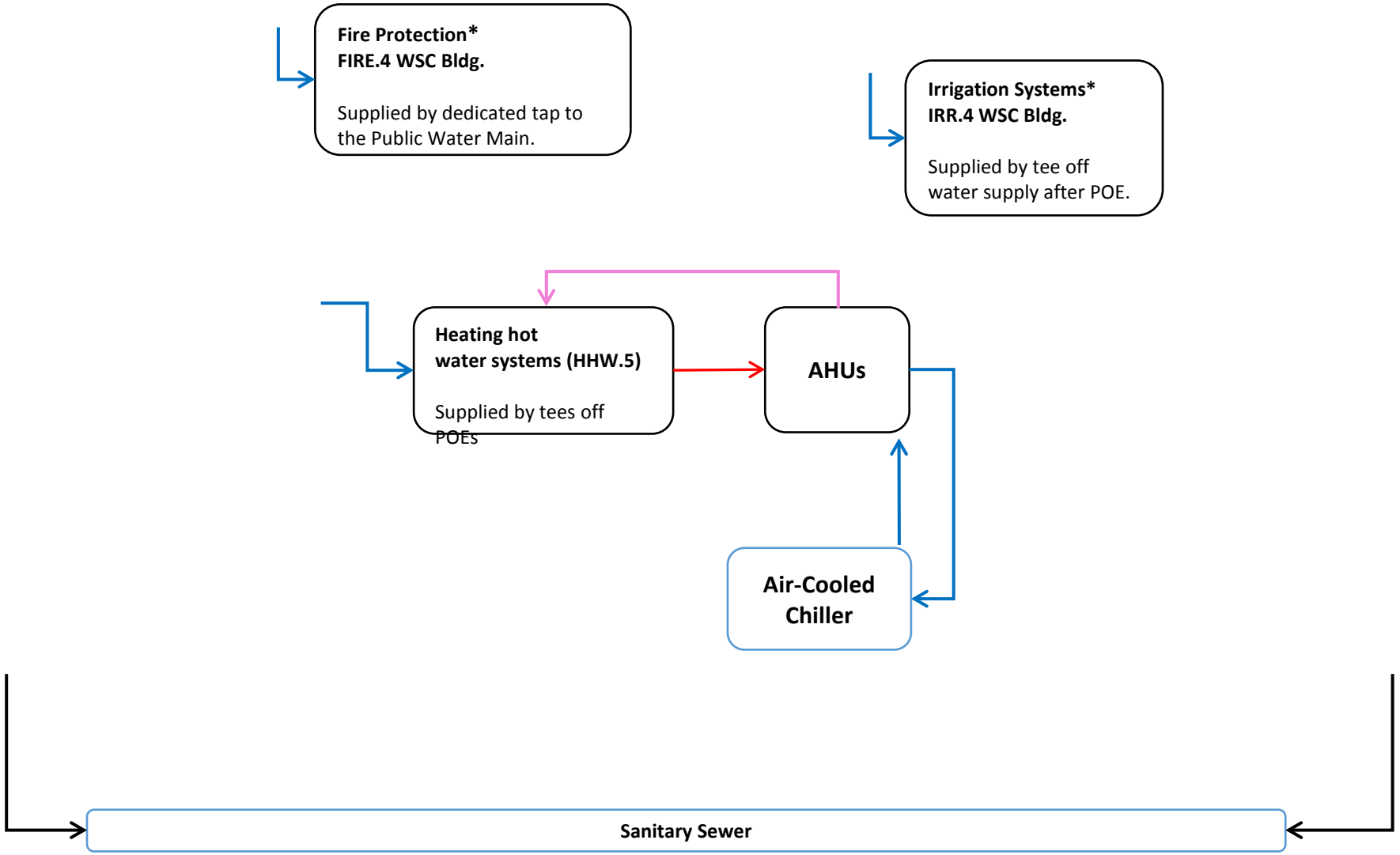


*** A cross connection survey will confirm the existence of, or need for, backflow prevention devices on the lines supplying these systems.**

Utility Flow Diagram

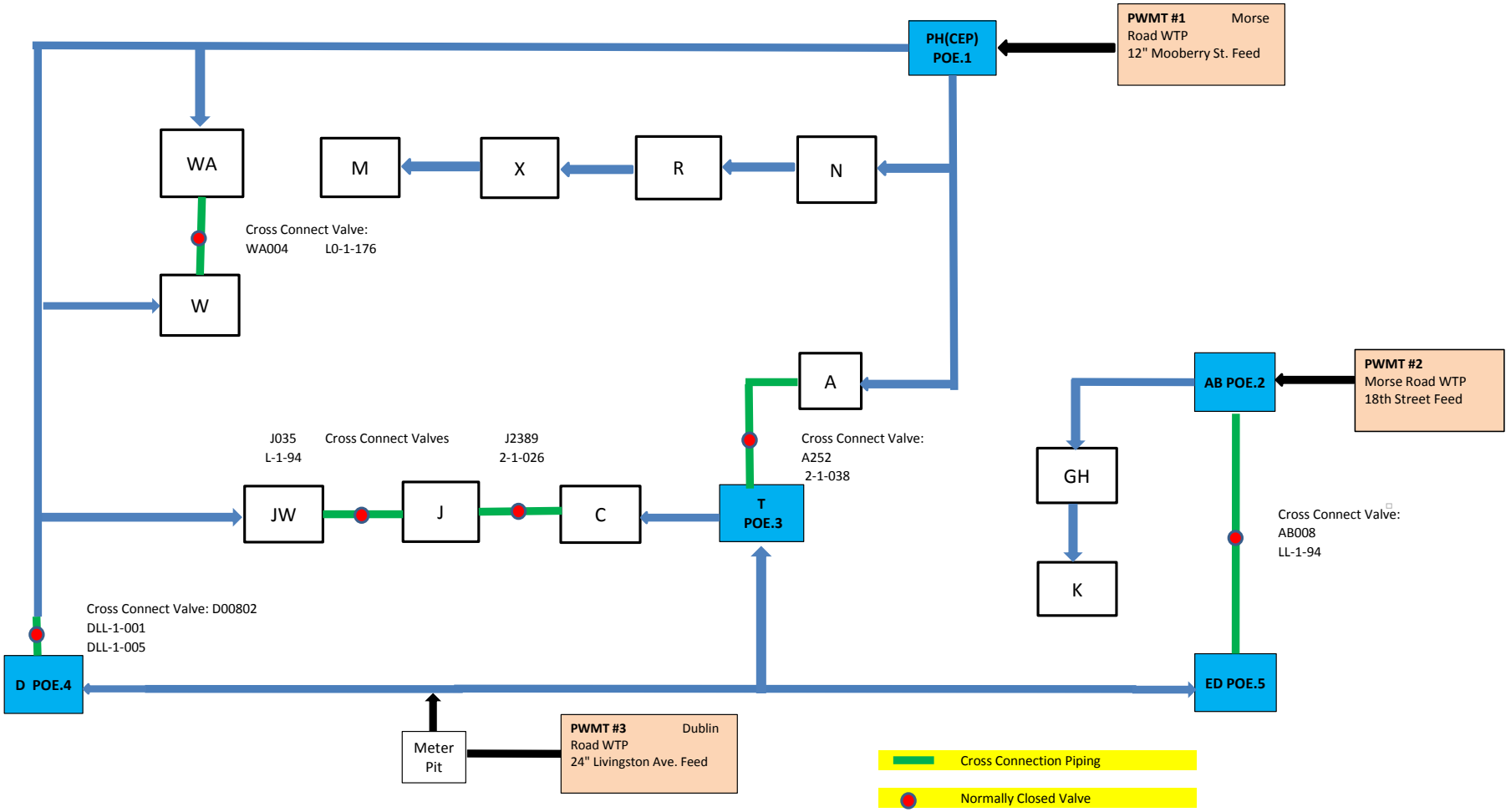
The colored systems shown in this flow diagram are CLs.

POE.7 WSC BUILDING



*** A cross connection survey will confirm the existence of, or need for, backflow prevention devices on the lines supplying these systems.**

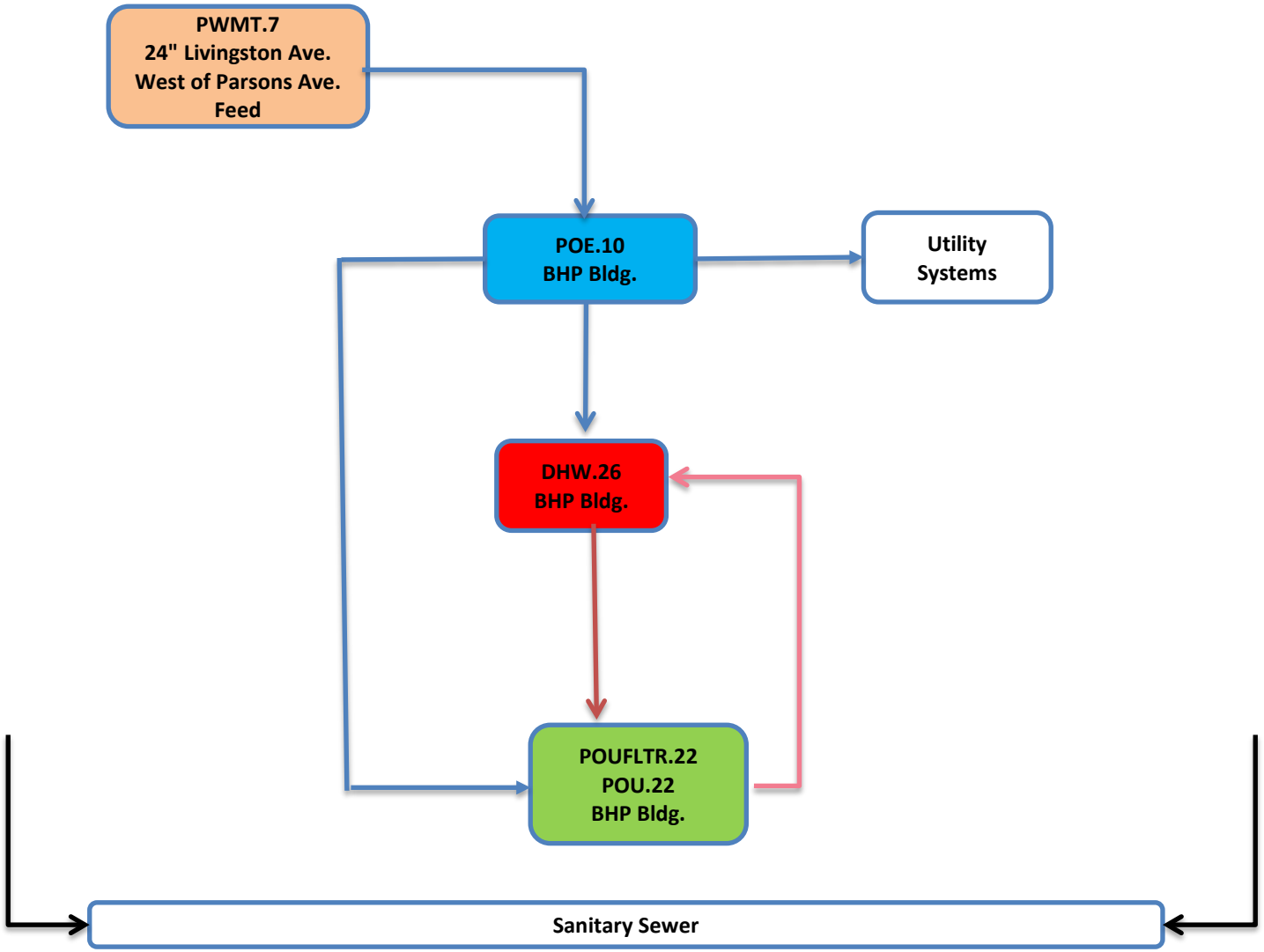
Nationwide Children's Potable Flow Diagram



Potable Flow Diagram

All colored systems shown in this flow diagram are CLs.

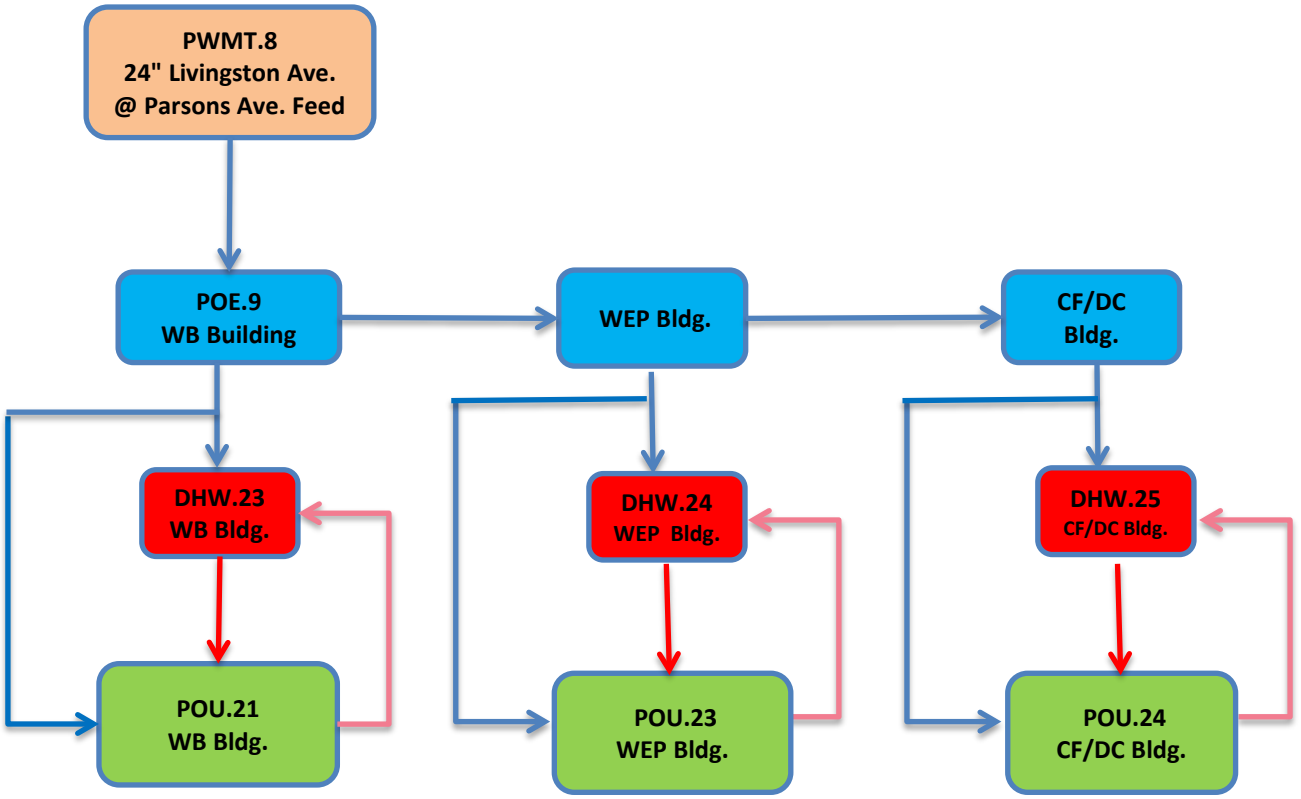
POE.10 BHP BUILDING



Potable Flow Diagram

All colored systems shown in this flow diagram are CLs.

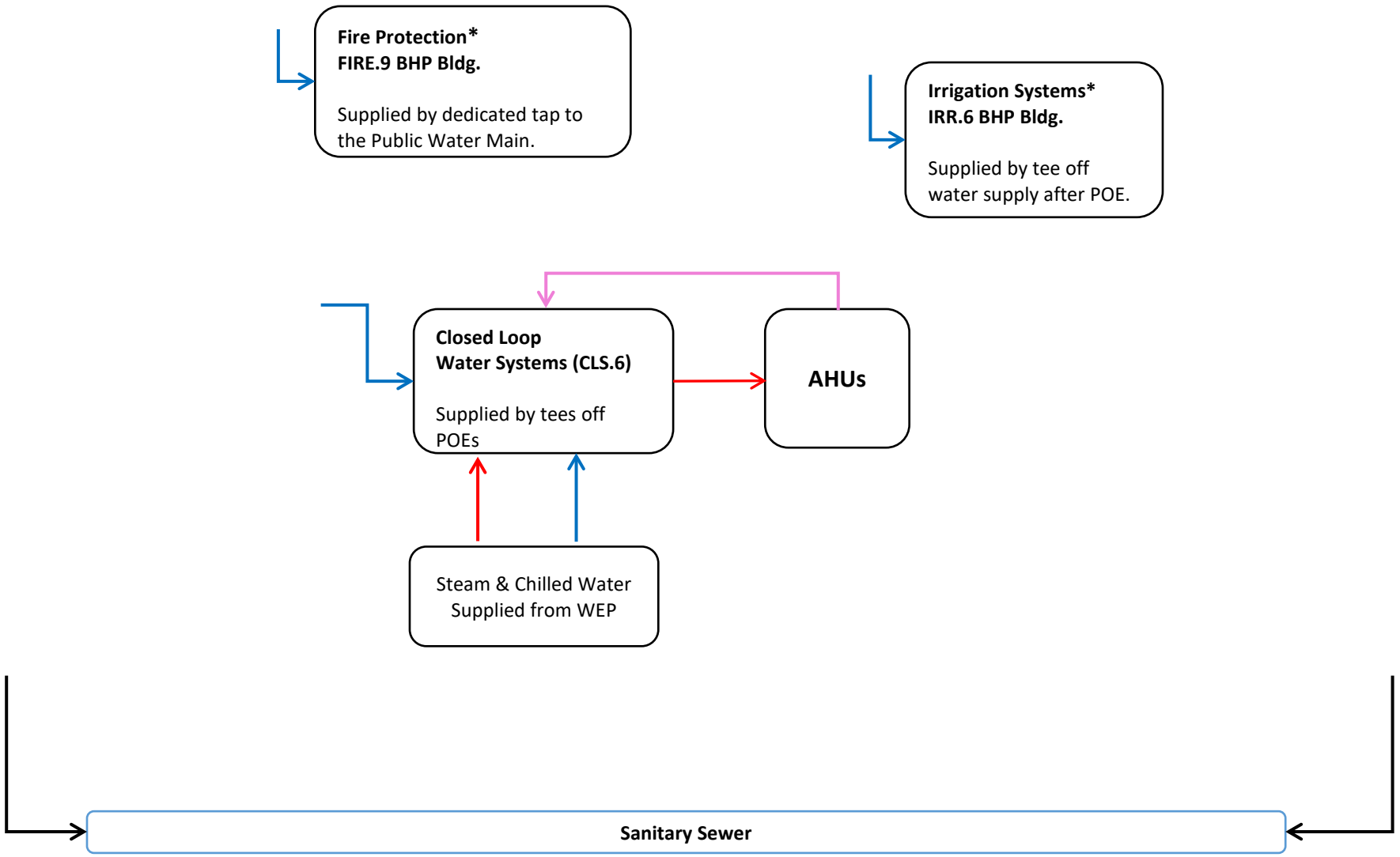
POE.9 WB BUILDING



Utility Flow Diagram

The colored systems shown in this flow diagram are CLs.

POE.10 BHP BUILDING

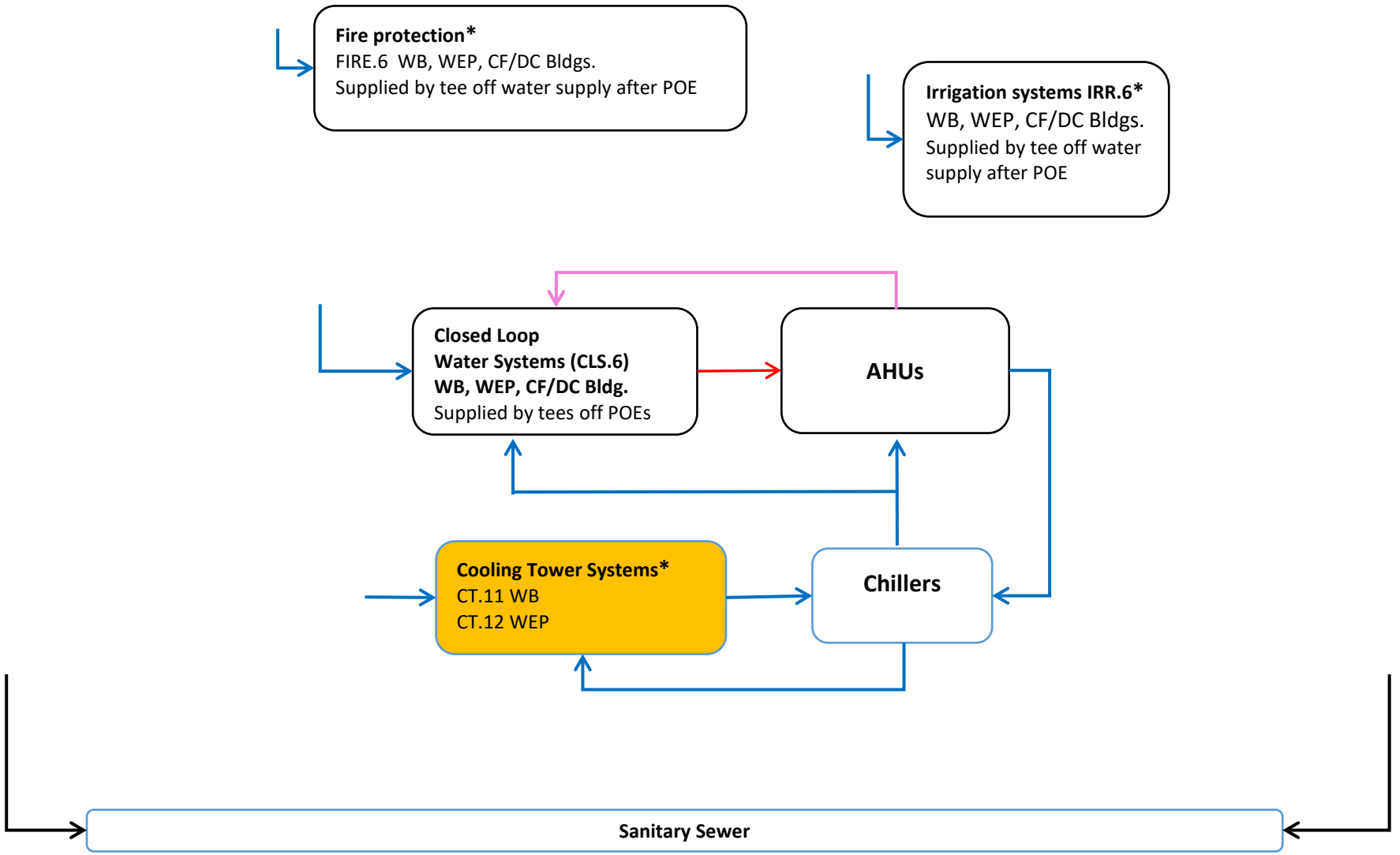


*** A cross connection survey will confirm the existence of, or need for, backflow prevention devices on the lines supplying these systems.**

Utility Flow Diagram

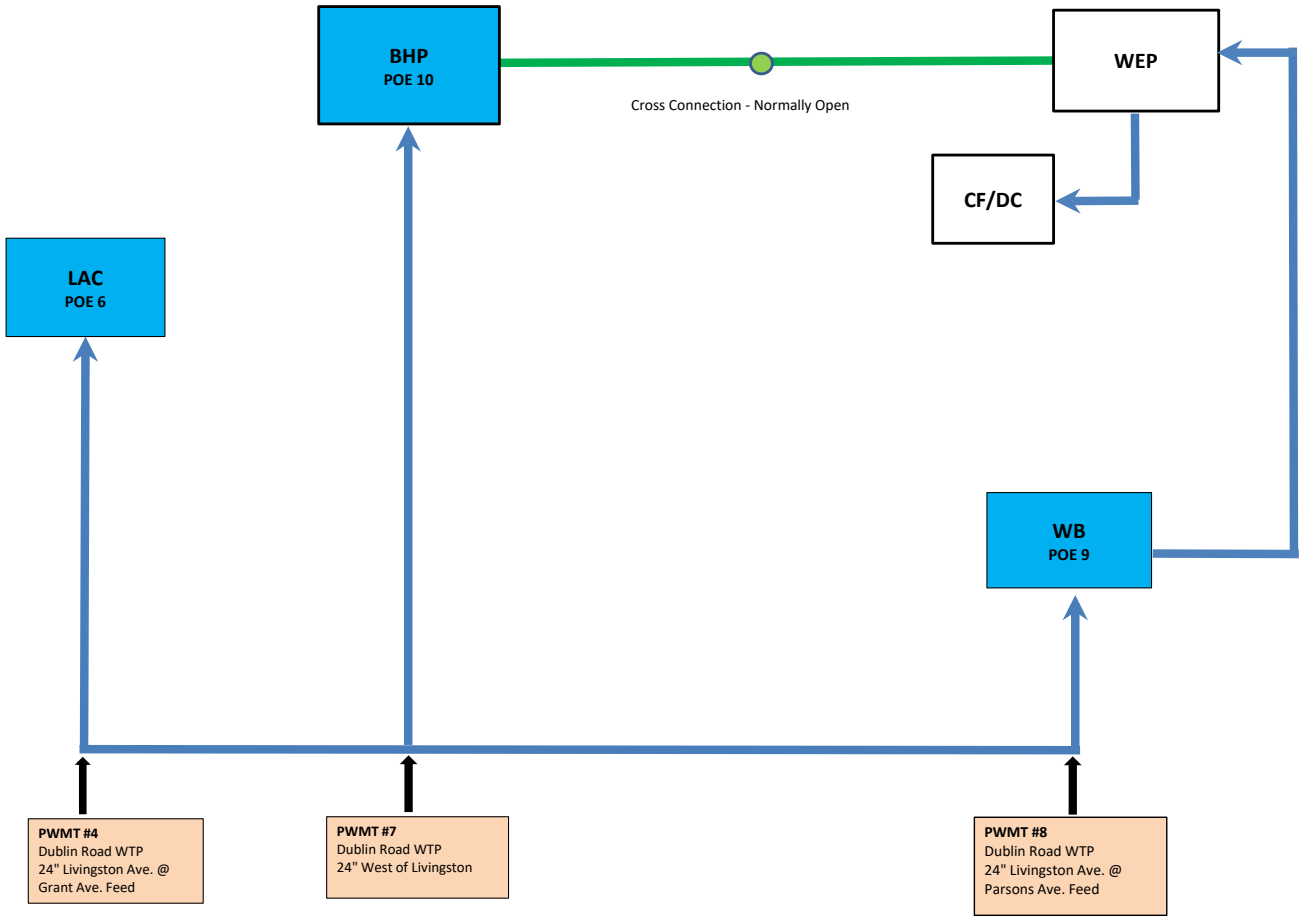
The colored systems shown in this flow diagram are CLs.

POE.9 WB BUILDING

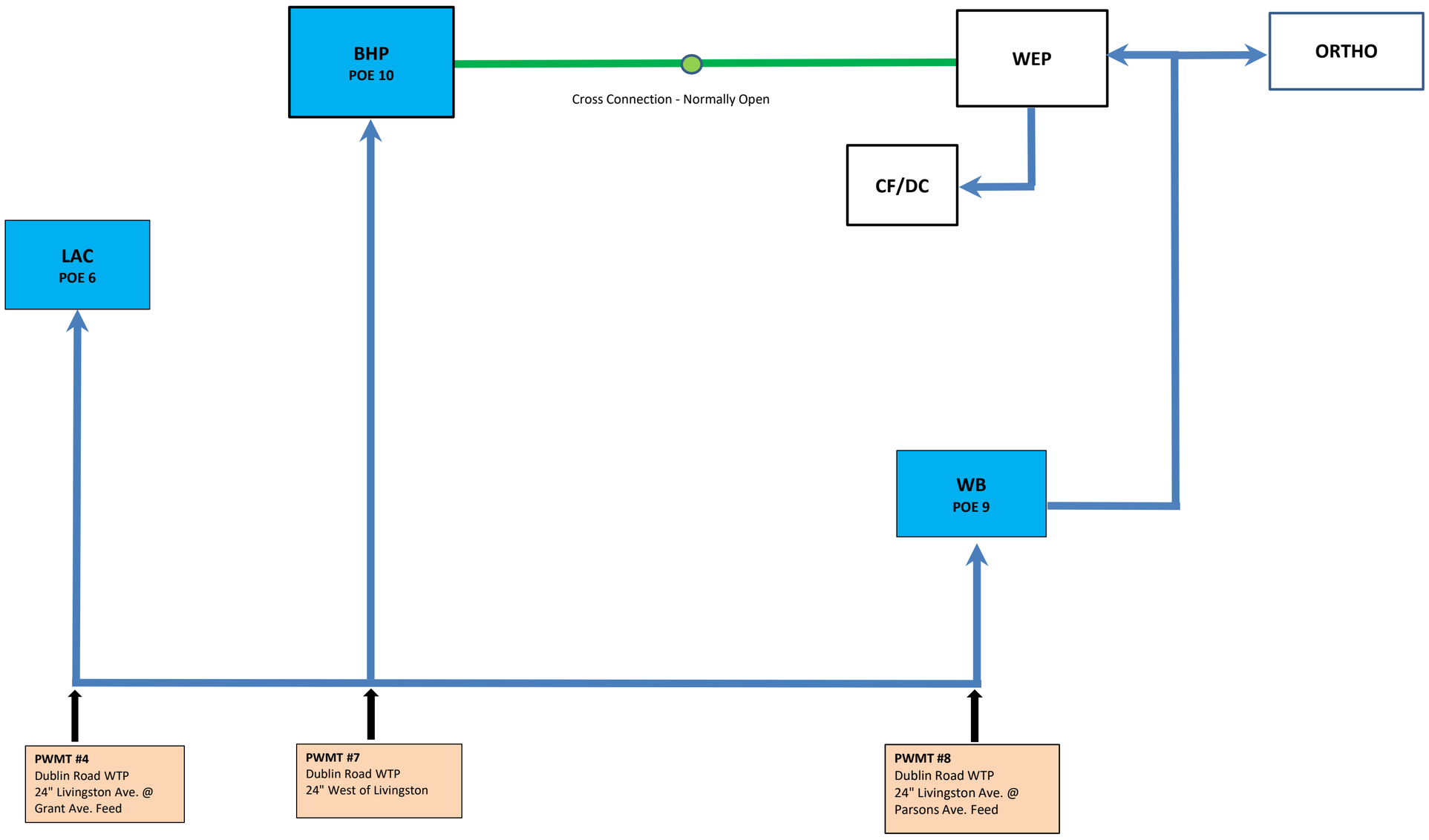


*** A cross connection survey will confirm the existence of, or need for, backflow prevention devices on the lines supplying these systems.**

Nationwide Children's Hospital - West Campus
Potable Water Flow Diagram



Nationwide Children's Hospital - West Campus
Potable Water Flow Diagram



Risk Assessment Per Hazard Analysis

This risk assessment report is based on a hazard analysis of the building water systems. Although the WMP may include control measures for pathogens other than Legionella, Legionella is the hazard by which the water systems are evaluated for risk because Legionella has been studied far more than any other pathogen in building water systems, providing more reliable data and information on which to base decisions. Per ASHRAE 188 and the CDC toolkit, Legionella risk is based primarily on water system types rather than on the condition of a system or its test results at a point in time. For more information on the risk assessment and mitigation strategy, see the WMP "Overview."

In the table, system names are listed for water system types identified in the site survey and briefly described in the WMP "Water Systems" section and a flow diagram. System types not identified on the property are labeled "N/A." The 3rd table column designates whether the system/device presents a significant potential for Legionella growth and transmission and the 4th column designates whether it is a control location (CL). A CL is a point at which Legionella control can and should be applied.

Water System	System Names	Significant Risk?	Control Location?	Reasoning
PWMT	PWMT.1. Morse Road WTP 12" - Mooberry Street Feed PWMT.2. Morse Road WTP - 18th Street Feed PWMT.3. Dublin Road WTP 24" - Livingston Ave. Feed PWMT.4. Dublin Road WTP 24" - Livingston Ave. Feed PWMT.5. City of Westerville WTP 3" - Executive Campus Drive Feed PWMT.6. Del-Co Water Co. US Route 23 Feed PWMT.7. Dublin Road WTP 24" - Livingston Ave. West of Parsons Ave.Feed PWMT.8. Dublin Road WTP 24" Livingston Ave. @ Parsons Ave. Feed	Yes	No	Public water main taps (PWMTs) supplying water for any potable uses are CLs because conditions that promote Legionella growth at PWMTs will affect exposure to Legionella at points of domestic water use (POUs). However, control measures are limited to points in the system at which the building owner has authority and responsibility. Public water main taps only for nonpotable uses (e.g., fire protection) are not CLs.
CWT	N/A	Yes	Yes	Legionella growth in domestic cold water storage tanks (CWTs) can affect exposure at POUs. Tanks storing water only for systems that are non-domestic and not control locations (e.g. fire protection) do not present a significant risk and are not control locations.
POE	POE.1. POE.2. POE.3. POE.4. POE.5. POE.6. POE.7. POE.8.	Yes	Yes	Conditions that promote Legionella growth at domestic water points of building entry (POEs) can affect exposure at POUs.

	POE.9. POE.10.			
FIRE	FIRE.1. D Building Fire Protection FIRE.2. All Remaining Building Fire Protection Systems for Main Campus Buildings FIRE.3. LAC Building Fire Protection System FIRE.4. WSC Building Fire Protection System FIRE.5. LC-ED Building Fire Protection System FIRE.6.WB Building Fire Protection System FIRE.7.WEP Building Fire Protection System FIRE.8.CF/DC FIRE.9.BHP	No	No	The potential for Legionella exposure is low for fire protection systems (FIRE).
IRR	IRR.1. AB, C, ED, T, W, & WA Irrigation Systems IRR.2. D Irrigation System IRR.3. LAC Irrigation System IRR.4. WSC Irrigation System IRR.5. LC-ED Irrigation System IRR.6. WB-WEP-CF/DC-BHP	Yes	Yes	The potential for Legionella exposure from irrigation systems (IRR) is relatively low and Legionnaires' disease associated with IRRs has not been reported in scientific literature, so IRRs are typically not CLs. However, IRR systems considered by the team to present a significant Legionella risk, either because of the water supply (e.g., reclaimed water or other non-potable water) or potential transmission (e.g., near people indoors or by walkways), should be listed as CLs.
CT	CT.1. CEP Cooling Tower CT.2. AB Cooling Tower #1 CT.3. AB Cooling Tower #2 CT.4. C Cooling Tower CT.5. D Cooling Tower #1 CT.6. D Cooling Tower #2 CT.7. ED Cooling Tower #1 CT.8. ED Cooling Tower #2 CT.9. WA Cooling Tower	Yes	Yes	Cooling tower systems (CTs) present the potential for Legionella growth and exposure.

	CT.10. LAC Cooling Tower CT.11. WB CT.12. WEP			
CLS	HHW.1. C Building HHW HHW.2. WA Building HHW HHW.3. All Other Main Campus HHW Loops HHW.4. LAC Building HHW HHW.5. WSC Building HHW CLS.6. All West Campus CW & HHW Loops	No	No	The potential for Legionella growth and exposure is low for heating hot water systems (HHW) that supply hot water for heating coils or other closed-loop systems but not for domestic water.
DHW	DHW.1. A DHW System DHW.2. AB DHW System DHW.3. C DHW System DHW.4. D Low Zone DHW System DHW.5. D Mid Zone DHW System DHW.6. High Zone DHW System DHW.7. ED DHW System DHW.8. GH DHW System DHW.9. J DHW System DHW.10. J-West DHW System DHW.11. M DHW System DHW.12. N DHW System DHW.13. PH (CEP) DHW System DHW.14. R DHW System DHW.15. T DHW System DHW.16. W DHW System DHW.17. WA DHW System DHW.20. LAC DHW System DHW.21. WSC DHW System DHW.22. LC-ED DHW System DHW.23. WB DHW System DHW.24. WEP DHW System DHW.25. CF/DC DHW System	Yes	Yes	Legionella growth in central domestic water heating systems (DHWs) will affect exposure at POUs.

	DHW.26. BHP DHW System			
KIT-LNDRY	KIT-LNDRY.1. D Kitchen HHW KIT-LNDRY.2. LAC Kitchen HHW KIT-LNDRY.6. BHP Kitchen HHW	No	No	Potential for Legionella growth is low in central hot water systems that provide hot water at or above 140 degrees F (60 degrees C) for large kitchens or laundries (KIT-LNDRYs). Potential for exposure is also low since the water is used primarily for dishwashers or clothes washing machines.
BWD	N/A	Yes	Yes	Bottled water dispensers (BWDs) present the potential for Legionella growth and exposure.
POU	N/A	Yes	Yes	In general, points of domestic water use (POUs) are control locations because of potential exposure and the opportunity to apply control measures, although control measures are not necessary at some devices (e.g., toilets; dishwashers).
POUFLTR	N/A	Yes	Yes	Legionella can grow on filters at or near POUs (POUFLTRs), for example, carbon filters on lines supplying water to ice machines. Legionella can also be released from filters into water, potentially contaminating other parts of the domestic water system and affecting exposure at POUs.
SOFT	SOFT.1. CEP Boiler Softener System SOFT.2. D Building Softener System SOFT.3. J Building Softener System SOFT.4. C Building Softener System SOFT.5. Wexner Softener System SOFT.6. LAC Sterile Processing SOFT.7. WSC Softener System SOFT.8. Humidifier Softener SOFT.9. WB SOFT.10. WEP SOFT.11. BHP Softener System	No	No	Although studies have not shown softeners to present a significant Legionella hazard, softeners providing soft water for domestic hot or cold systems are designated a CL because dirty softeners can provide a habitat for Legionella that would be distributed to the domestic water system, and Legionella control measures can be applied at softeners. Softeners treating water supplied to cool mist humidifiers (HUMIDWTRs), cooling towers, or other CLs, are also CLs. Softeners treating water supplied only for boilers, steam humidifiers, or other non-domestic, non-aerosolizing (e.g., closed loop) water uses do not present a significant risk and are not CLs.
HUMIDSTM	HUMIDSTM.1. Steam Humidification HUMIDSTM.2. Steam	No	No	Steam humidifiers in HVAC ducts (HUMIDSTM) present a very low potential for Legionella

	Humidification HUMIDSTM.3. CF/DC			growth because of high temperature. There's also little potential of exposure because steam rather than mist is generated.
DIALTRMT	DIALTRMT.1. T-6th Floor, Rm T6001	No	No	A dialysis central water treatment system (DIALTRMT) presents little potential for Legionella exposure since the only points of water use are dialysis connections. Maintenance of dialysis treatment systems is important but handled separately, not as part of this WMP.
DIALLOOP	DIALLOOP.1. T-6th Floor, Rm T6001	No	No	A piping network supplying water only to dialysis connections in patient or resident rooms (DIALLOOP) presents little potential for Legionella exposure since the only points of water use are portable dialysis machines which are subject to AAMI-required tests but not part of this WMP.

Control Measures

Control Measure Number: CT01	Category: Cooling Tower Maintenance
Keywords:	cooling towers, stagnation
Status:	
Control Measure:	Minimize stagnation in the cooling tower system in part by circulating water through off-line cooling towers, chillers, heat exchangers (e.g., flat plate), and condenser pumps.
Locations:	CTs
Monitoring:	Weekly check the frequency of condenser pump operation and ensure adequate circulation through the entire system.
Frequency of control measure task:	Every 7 Days
Frequency of compliance verification:	Every 3 Months
Limits:	In equipment that is off but not drained ("laid up"), at least a fraction of system water must be circulated continuously. Water must be circulated through all condensing system equipment for 15+ minutes during a biocide feed at least once every 3 days.
Corrective Action:	Correct noncompliance
Suggested Training:	4.055, 4.064
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	This control measure applies to "winter operation" of "D" and "PH" cooling tower water systems. All other cooling tower water systems are drained in the winter (Dec-Mar).

Control Measures

Control Measure Number: CT02	Category: Cooling Tower Maintenance
Keywords:	cooling towers, basin cleaning
Status:	
Control Measure:	Keep cooling tower basins free of buildup.
Locations:	CTs
Monitoring:	Inspect for dirt or sediment build-up. Measure depth and note color.
Frequency of control measure task:	Every 30 Days
Frequency of compliance verification:	Every 6 Months
Limits:	Buildup must be < 1/2 inch (1 cm).
Corrective Action:	Report depth and color of buildup to the water treatment vendor. Clean basin if depth > 1/2 inch or if deposits are green. If buildup is repeatedly > 1/2 inch, consider side stream filtration with sweeper jets.
Suggested Training:	4.055, 4.056a, 4.066, 4.067
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	This is performed weekly per Task Code 16226, Cooling Tower Checks.

Control Measures

Control Measure Number: CT03	Category: Cooling Tower Maintenance
Keywords:	cooling towers, full cleaning
Status:	
Control Measure:	Clean and flush cooling tower systems at least twice yearly.
Locations:	CTs
Monitoring:	Document cleaning dates and procedure.
Frequency of control measure task:	Every 180 Days
Frequency of compliance verification:	Every 6 Months
Limits:	Online hyperchlorination followed by cleaning of basin, sump, fill, nozzles, surfaces, strainers, drift eliminator, louvers, make-up water holding tank, and other key components per the manufacturer's recommendations and recommendations by ASHRAE or CTI.
Corrective Action:	Redo procedure if not performed per specifications.
Suggested Training:	4.056
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	Each cooling tower water system should be cleaned and disinfected with sodium hypochlorite in the Fall and prior to startup in the Spring. Enough sodium hypochlorite should be added to develop and maintain a 5 ppm free chlorine residual in the cooling tower water for a minimum of (6) hours.

Control Measures

Control Measure Number: CT04	Category: Cooling Tower Maintenance
Keywords:	cooling towers, drift eliminators
Status:	
Control Measure:	Maintain efficient drift eliminators.
Locations:	CTs
Monitoring:	Check drift eliminators monthly for damage, fit, and excessive scale and algae.
Frequency of control measure task:	Every 7 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Must be well fitted. No holes. No gaps allowing bypassing around casing. No excessive scale or algae.
Corrective Action:	Repair, re-fit, or replace.
Suggested Training:	4.055, 4.060
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: CT05	Category: Cooling Tower Maintenance
Keywords:	cooling towers, filter and separator maintenance
Status:	
Control Measure:	Operate and maintain cooling tower filters and separators per manufacturer recommendations.
Locations:	CTs
Monitoring:	Review operating manuals yearly to ensure recommended procedures are scheduled. Log dates and procedures performed. Inspect equipment per manufacturer's recommended frequency.
Frequency of control measure task:	Every 0 Days Other Desc: per manufacturer recommendations
Frequency of compliance verification:	Every 1 Years
Limits:	Manufacturer recommended operating and maintenance procedures must be followed and logged.
Corrective Action:	Update procedures or correct non-compliance as applicable.
Suggested Training:	4.066
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	PH, WB, WEP, LAC cooling tower water systems have side-stream filter systems.

Control Measures

Control Measure Number: CT06	Category: Cooling Tower Maintenance
Keywords:	cooling towers, nozzles
Status:	
Control Measure:	Maintain good water flow through hot deck and nozzles.
Locations:	CTs
Monitoring:	Check for debris and clogging monthly.
Frequency of control measure task:	Every 90 Days
Frequency of compliance verification:	Every 1 Years
Limits:	No debris or clogs.
Corrective Action:	Unclog and clean.
Suggested Training:	4.055
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	This is performed weekly per Task Code 16226, Cooling Tower Checks.

Control Measures

Control Measure Number: CT08	Category: Cooling Tower Maintenance
Keywords:	cooling towers, strainers
Status:	
Control Measure:	Flush water from condenser system strainers often enough that discharge has minimal sediment and discoloration, at least quarterly.
Locations:	CTs
Monitoring:	Identify each condensing system strainer. Log the dates each is opened. Review yearly to ensure scheduling.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Procedure must be scheduled. Discharge must have minimal discoloration.
Corrective Action:	Investigate and correct noncompliance if procedure not performed. Increase flushing frequency if discharge contains significant sludge or is discolored for several seconds.
Suggested Training:	4.055
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: CT09	Category: Cooling Tower Maintenance
Keywords:	cooling towers, microbial control, treatment evaluation and planning
Status:	
Control Measure:	Periodically update the cooling water treatment program to control the growth and transmission of Legionella, amoebae, protozoa, and other microbes.
Locations:	CTs
Monitoring:	At least once yearly have the water treatment vendor's service engineer evaluate and optimize the water treatment program based on applicable regulations and compatibility with the cooling tower design, materials, installation, operation, and maintenance--with objectives to minimize microbial growth and the release of aerosols. Document the water treatment plan.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	The water treatment plan must: State the water treatment program objectives, including the control of Legionella and other microbes. Describe the optimum program (e.g., equipment; chemical levels; feeding) to achieve the objectives. Describe how performance will be measured including monitoring per CT10. Assure microbial treatment is applied daily, automatically, unless justification of less frequent treatment is explained for the cooling tower system in the water system information section. Assure compliance with applicable regulations pertaining to chemicals used and the person who applies them (see Limits for CT10).
Corrective Action:	Must make adjustments for subpar performance or noncompliance.
Suggested Training:	4.062, 4.063
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: CT10	Category: Cooling Tower Maintenance
Keywords:	cooling towers, microbial control, water treatment
Status:	
Control Measure:	Treat cooling tower water to continuously control Legionella, amoebae, protozoa, and other microbes without violating regulations, including regulations pertaining to biocides.
Locations:	CTs
Monitoring:	1) Perform conductivity, inhibitor, and free chlorine tests on samples of all operating cooling tower water systems at least three (3) times per week. Record test results. 2) Run total bacteria dip slide tests monthly on samples of all operating cooling tower water systems. 3) Test samples of all operating cooling tower water systems for Legionella in May and August. Test sample (s) of water from the cooling tower basin or water returning to the cooling tower from the load (e.g., chiller).
Frequency of control measure task:	Every 7 Days
Frequency of compliance verification:	Every 3 Months
Limits:	1. Chemical applications must comply with program specifications (see CT09) including automatic daily biocide applications unless applying manually, less than daily, can be justified. Must comply with all product label instructions, regulations pertaining to approved biocides (e.g., per the US EPA). 2. Water quality indicators must be within the limits set by the program per CT09. 3. Total bacteria counts must be < 10,000 cfu/ml with no major spike in levels. Note: Total bacteria counts do not indicate Legionella control. Legionella testing is performed separately as part of the WMP validation. 4. Legionella must be < 10 cfu/ml.
Corrective Action:	Correct any non-compliance with chemical application. Make adjustments to bring water quality indicators within limits. Regarding total bacteria counts and Legionella results: TBCT 10,000 - 100,000 cfu/ml or Legionella 10-100 cfu/ml: Within 24 hours, dose with a different biocide, increase concentrations of the existing biocide(s), or take other action to immediately reduce Legionella levels.* TBCT 100,000 - 1,000,000 cfu/ml or Legionella 100-1000 cfu/ml: Within 24 hours, dose with a different biocide, increase concentrations of the existing biocide(s), perform online decontamination (e.g., circulate > 5 ppm free available halogen at an effective pH range for six hours), or take other action to immediately reduce Legionella levels.* TBCT > 1,000,000 CFU/ml or Legionella > 1000 cfu/ml: Increase biocides within 24 hours. Within 48 hours, perform full system decontamination per applicable regulations or best practices. See the Cooling Technology Institute "Emergency Disinfection" procedure outlined on page 7 of "Legionellosis Guideline: Best Practices for Control of Legionella" (available at cti.org) and latest ASHRAE recommendations. C If > 10 cfu/ml is regularly detected in routine sampling rounds, then adjust the water treatment and maintenance program for better Legionella control. Communication regarding the implementation of the corrective actions must be initiated by the verification person listed for this control measure, or the person he or she appoints. Record corrective actions and maintain the records.
Suggested Training:	4.055, 4.062, 4.063, 4.067, 4.068
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	

Due Date for Next Verification or Performance:

Comments:

Control Measures

Control Measure Number: CT13	Category: Cooling Tower Maintenance
Keywords:	cooling towers, start-up and shutdown
Status:	
Control Measure:	Shut down and start up cooling tower systems per manufacturer instructions, ASHRAE recommendations, and applicable regulations.
Locations:	CTs
Monitoring:	Document startup and shutdown procedures including biocides used, concentrations, and duration.
Frequency of control measure task:	Every 180 Days Other Desc: per occurence
Frequency of compliance verification:	Every 1 Years
Limits:	Must follow manufacturer and ASHRAE recommended shut down procedures. Cooling towers shut down for a season must be completely drained and protected from offline contamination.
Corrective Action:	Repeat or correct procedures that are not performed per the limits. Respond to Legionella test results per CT10 and the validation section.
Suggested Training:	4.057
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	Water treatment vendor to provide "written" startup and shutdown procedures.

Control Measures

Control Measure Number: CT212-NY	Category: Cooling Tower Maintenance
Keywords:	cooling towers, remedial disinfection
Status:	
Control Measure:	Perform remedial (while in operation) or emergency (full shutdown) disinfection if indicated by test results or other conditions.
Locations:	CTs
Monitoring:	Record disinfectant levels and hold times.
Frequency of control measure task:	Every 0 Days Other Desc: per occurence
Frequency of compliance verification:	Every 1 Years
Limits:	Per disinfection procedure specs set by the Team and water treatment vendor based on regulations, CTI, ASHRAE, or other basis for best practice. Assure compliance with applicable regulations pertaining to chemicals used and the person who applies them (see Limits for CT10).
Corrective Action:	Repeat procedure if not performed per specs or if follow-up test results are unsatisfactory.
Suggested Training:	4.062, 4.068, 4.069
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: CT215-NY	Category: Cooling Tower Maintenance
Keywords:	cooling towers, inspections by outside expert
Status:	
Control Measure:	Water treatment vendor shall inspect and report prior to startup following shutdown (whether shut down for the season or for maintenance), and at least once every 90 days during operation for: (a) Visual observation of organic material, biofilm, algae, and other contaminants, (b) General condition of basin, fill, and drift eliminator, and (c) Proper functioning of water make-up connections and control, conductivity control, and dosing equipment including chemical pumps. (d) Adherence to other cooling tower control measures, based on documentation.
Locations:	CTs
Monitoring:	Obtain report of inspection.
Frequency of control measure task:	Every 90 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Inspection must be conducted prior to start up following shutdown (whether shut down for the season or for maintenance) and at least once every 90 days during operation, and include all the elements listed, with a report of any deficiencies.
Corrective Action:	Redo inspection.
Suggested Training:	
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	This control measure to be performed by the water treatment vendor's service representative.

Control Measures

Control Measure Number: CT216-NY	Category: Cooling Tower Maintenance
Keywords:	cooling towers, emergency Legionella testing
Status:	
Control Measure:	Have the cooling tower water tested for Legionella immediately after informed of a case of Legionnaires' disease possibly associated with the cooling tower.
Locations:	CTs
Monitoring:	Check for applicable laws yearly.
Frequency of control measure task:	Every 0 Days
	Other Desc: per occurence
Frequency of compliance verification:	Every 1 Years
Limits:	Must collect sample within 48 hours after the event or notification.
Corrective Action:	Correct non-compliance if sampling not performed. See Confirmation section about responding to Legionella test results for cooling tower samples.
Suggested Training:	
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: CT217-NY	Category: Cooling Tower Maintenance
Keywords:	cooling towers, risk assessment
Status:	
Control Measure:	Water treatment vendor shall perform a risk management assessment to identify risk factors for Legionella proliferation and revise other cooling tower control measures as appropriate based on the findings.
Locations:	CTs
Monitoring:	Physically inspect the cooling tower to assess risk.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Identify stagnation due to the design or operation of the system, operational or accessibility, or other barriers to cleaning and disinfection procedures, potential sources of organic contamination, other factors contributing to microbial growth, components receiving direct sun exposure, location of closest building windows and air intakes and windows, and other factors that might contribute to Legionella growth or transmission.
Corrective Action:	Redo the assessment if all listed conditions were not considered. Revise other cooling tower control measures as appropriate based on the assessment findings.
Suggested Training:	
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC01	Category: Design and Construction
Keywords:	design & construction--access
Status:	
Control Measure:	Ensure access to equipment (e.g., cooling towers, domestic water heaters, waterhammer arrestors, water storage tanks, domestic water expansion tanks) requiring maintenance for Legionella control.
Locations:	CTs, DHWs, POUDHWs, POUs
Monitoring:	Check equipment selection specs and drawings at design stage and in field during construction stage.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must have panels/doors, as applicable, and space for easy access.
Corrective Action:	Correct in field as necessary.
Suggested Training:	C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC02	Category: Design and Construction
Keywords:	design & construction--domestic water design, backflow prevention
Status:	
Control Measure:	Install backflow preventers (BFPs) to comply with codes and best practices.
Locations:	PWMTs, POEs, POUs
Monitoring:	Confirm on drawings at design stage and in field at construction stage.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Per code requirements and best practices.
Corrective Action:	Add BFPs.
Suggested Training:	4.011, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC04	Category: Design and Construction
Keywords:	design & construction--cooling towers, sun shield
Status:	
Control Measure:	Consider shielding cooling tower basins and other wet surfaces from sunlight to prevent algae growth.
Locations:	CTs
Monitoring:	Confirm consideration and decision in project notes during the design phase.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Review must be performed prior to completion of design stage.
Corrective Action:	Plan more aggressive water treatment as necessary to control algae if wet surfaces exposed to sunlight.
Suggested Training:	C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC05	Category: Design and Construction
Keywords:	design & construction--cooling towers, location
Status:	
Control Measure:	Locate cooling towers as far as reasonably possible from kitchen exhaust, overhanging tree limbs, plants, and other sources of organic matter.
Locations:	CTs
Monitoring:	Review on drawings at design stage and in field during construction stage. Document the review in the project notes.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Approximate distances from sources of organic contamination must be documented.
Corrective Action:	Plan more aggressive water treatment as necessary to control microbes if cooling water affected by organic contamination.
Suggested Training:	C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC06	Category: Design and Construction
Keywords:	design & construction--cooling towers, location
Status:	
Control Measure:	Locate cooling towers away from operable windows, HVAC intakes, and areas frequented by people--at least 75 feet (23 meters) if feasible.
Locations:	CTs
Monitoring:	Check drawings during design stage. Note closest outdoor air intakes, operable windows, parking lots, break areas, sidewalks, and other areas frequented by people. Document the review in the project notes.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	At least 75 feet (23 meters) if feasible. Review and documentation must be completed in design stage.
Corrective Action:	Plan for water treatment program that is especially aggressive against microbes. Consider relocating intakes.
Suggested Training:	4.061, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC07	Category: Design and Construction
Keywords:	design & construction--cooling towers, pipe lengths
Status:	
Control Measure:	Keep cooling tower system pipe lengths as short as possible to minimize biofilms.
Locations:	CTs
Monitoring:	Review on drawings at design stage and in field during construction stage. Document the review in the project notes.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Review of pipe lengths must be documented.
Corrective Action:	Plan especially aggressive water treatment against biofilms if pipe lengths are longer than necessary.
Suggested Training:	4.059, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC08	Category: Design and Construction
Keywords:	design & construction--cooling towers, small ones
Status:	
Control Measure:	Consider alternatives to small (< 150 tons) cooling towers.
Locations:	CTs
Monitoring:	Review energy and other cost differences during the planning stage. Document the review in the project notes.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Perform review prior to completion of design stage
Corrective Action:	Ensure water treatment and maintenance is performed per the cooling tower maintenance section of this WMP for any small as well as larger cooling towers.
Suggested Training:	4.058, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC09	Category: Design and Construction
Keywords:	design & construction--cooling towers, drift eliminators
Status:	
Control Measure:	Ensure cooling towers have high-efficiency drift eliminators.
Locations:	CTs
Monitoring:	Check specs and equipment selection during specification and purchasing stages.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Highest efficiency drift eliminator offered by manufacturer unless lower efficiency can be justified based on cooling tower location or other factors.
Corrective Action:	Replace drift eliminator or plan for water treatment program that is especially aggressive against microbes.
Suggested Training:	4.060, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC10	Category: Design and Construction
Keywords:	design & construction--domestic water design, crossover lines
Status:	
Control Measure:	Avoid crossover lines.
Locations:	POEs, DHWs
Monitoring:	Check specifications and drawings during planning and design stages.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	No crossover lines unless design provides significant flow through them.
Corrective Action:	Install valves and taps so that crossover lines can be isolated and flushed to a drain.
Suggested Training:	4.027, C322, C327
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC12	Category: Design and Construction
Keywords:	design & construction--decorative fountains, design
Status:	
Control Measure:	Decorative fountain features that promote bacteria growth (e.g., lights; plants) and transmission (e.g., spray)are prohibited.
Locations:	DECFNTs
Monitoring:	Check specs and equipment selection during planning and purchasing stages. Document the review in the project notes.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must omit such features.
Corrective Action:	Shut down the fountain, remove the bacteria-promoting features, or plan for monthly Legionella testing to confirm Legionella control.
Suggested Training:	4.071, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC13	Category: Design and Construction
Keywords:	design & construction--domestic water design, complexity
Status:	
Control Measure:	Avoid unnecessary domestic water piping, valves, fittings, piped equipment, and fixtures (to minimize volume and surface area).
Locations:	POEs, DHWs, POUs, POUDHWs
Monitoring:	Discuss the importance of simplicity for Legionella prevention with plumbing engineer during design and spec stages. Document the conversation in the project notes.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must justify any optional equipment, fixtures, and piping.
Corrective Action:	Remove optional equipment or plan for Legionella testing (see Validation section) four or more times yearly to confirm Legionella control.
Suggested Training:	4.049, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC14	Category: Design and Construction
Keywords:	design & construction--domestic water design, heat loss and gain
Status:	
Control Measure:	Avoid heat loss in domestic hot piping and heat gain in domestic cold piping.
Locations:	POEs, DHWs, POUs
Monitoring:	Check design for location of potential hot-cold crossover (e.g., janitor sinks) and for proximity of cold lines to outside walls and other heat sources. Also locate cold water storage tanks away from heat sources. Document the review in the project notes.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must note cold line heat sources and justify any noncompliance.
Corrective Action:	Change the design or justify the deviation.
Suggested Training:	4.050, C301, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC15	Category: Design and Construction
Keywords:	design & construction--domestic water design, minimizing stagnation
Status:	
Control Measure:	Avoid long pipe runs to domestic water fixtures. In general, design the domestic water system to minimize stagnation. All new domestic feeds for DCW, DHW, and DHWR shall have tee's installed after the main feed ball valves. These tee's will be used to inject chlorine for disinfection in the future. Any area that has been filled and unoccupied for 7 days or more shall be flushed and tested for chlorine per WMP.DC-28 & DC-39 Flush points may need to be installed or auto flush faucets. DHWR lines will stay connected and circulated during construction and new builds.
Locations:	POEs, DHWs, POUs, POUDHWs
Monitoring:	Discuss objective of minimizing stagnation for Legionella control with plumbing engineer during planning and design stages. Document the conversation in the project notes.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must discuss Legionella and stagnation with plumbing engineer prior to finalizing design.
Corrective Action:	Correct factors promoting stagnation or plan for Legionella testing no less than four times yearly to confirm Legionella control.
Suggested Training:	4.049, C322, C327
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC17	Category: Design and Construction
Keywords:	design & construction--domestic water design, central filters
Status:	
Control Measure:	Do not use carbon filtration on the incoming water supply (POE) or the domestic hot water systems (DHWs). Review any type of any central filter for its potential impact on Legionella.
Locations:	POEFLTRs
Monitoring:	Check drawings and specifications during design and planning stages. Check in field during construction. Document review in project notes.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	No carbon filters on cold or hot supply. Consult Legionella specialist regarding potential impact of any other filter type on Legionella growth.
Corrective Action:	Remove filter.
Suggested Training:	4.026, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	Hospital does not use carbon filters on cold or hot supply.

Control Measures

Control Measure Number: DC19	Category: Design and Construction
Keywords:	design & construction--domestic water design, expansion tanks
Status:	OKAY
Control Measure:	Do not install expansion tanks unless necessary. For necessary expansion tanks: (a) To minimize the accumulation of debris, install vertically on the ground or above the pipe, rather than inverted or horizontal. (b) To minimize stagnation, consider a flow through type that regularly rinses the vessel with fresh water. (c) Include a drain valve for flushing and sampling. (d) If feasible, install on the cold water system in a cool location.
Locations:	POE, DHW, POUDHW
Monitoring:	Discuss with plumbing engineer during the design stage. Check specs. Check installation during construction.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years Other Desc: per project
Limits:	Must comply or justify any deviations.
Corrective Action:	Correct noncompliance.
Suggested Training:	4.092, C322
Date Compliance Last Verified:	1/28/2022
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	1/28/2023
Comments:	

Control Measures

Control Measure Number: DC20	Category: Design and Construction
Keywords:	design & construction--domestic water design, materials
Status:	
Control Measure:	For plumbing materials, prefer copper over steel and plastic for resistance to Legionella and biofilm. Avoid rubber washers and gaskets. Minimize rubber hoses.
Locations:	POEs, DHWs, POUs, POUDHWs
Monitoring:	Check specifications and equipment selection. Document the review in the project notes.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must justify any deviations.
Corrective Action:	Correct noncompliance or justify deviations.
Suggested Training:	4.046, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC21	Category: Design and Construction
Keywords:	design & construction--domestic water design, water hammer
Status:	
Control Measure:	Prefer water hammer arrestors (with minimal Legionella-promoting factors) over air chambers.
Locations:	POEs, DHWs, POUs
Monitoring:	Check specs and equipment selection. Document review in project notes.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must justify any deviations.
Corrective Action:	Correct noncompliance or justify deviations.
Suggested Training:	4.048, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC22	Category: Design and Construction
Keywords:	design & construction--domestic water design, redundancy
Status:	
Control Measure:	Minimize stagnation associated with redundancy. Do not install redundant water heaters, pumps, or piping unless necessary and frequent rotation planned.
Locations:	POEs, DHWs
Monitoring:	Discuss with plumbing engineer during design stage. Check drawings.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must justify any redundant equipment and plan for rotation at least weekly, preferably daily.
Corrective Action:	Remove redundancy from design or plan to rotate equipment at least weekly.
Suggested Training:	4.019, 4.021, 4.024, 4.025, C322, C327
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC24	Category: Design and Construction
Keywords:	design & construction--domestic water design, softeners
Status:	
Control Measure:	Softeners: Unless the water supply is very hard, design the system so that each softener is off only while regenerating instead of with redundancy. If feasible, design for softeners to be offline no longer than 24 hours
Locations:	SOFTs
Monitoring:	Discuss with plumbing engineer during design and specification stages. Check drawings. Document discussion in project notes.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	No softeners offline longer than 24 hours without justification.
Corrective Action:	Correct noncompliance or justify deviations.
Suggested Training:	4.029, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	Domestic water is not softened.

Control Measures

Control Measure Number: DC25	Category: Design and Construction
Keywords:	design & construction--domestic water design, water heaters
Status:	
Control Measure:	In selecting water heaters, prefer instantaneous water heaters or semi-instantaneous heat exchangers over hot water storage tanks or tank-type water heaters.
Locations:	DHWs
Monitoring:	Discuss with plumbing engineer during design stage. Check specs and equipment selection.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must justify any deviations.
Corrective Action:	If tanks installed, design for 140 degrees F (60 degrees C) storage temperature (see DC26), < 24 hour water retention, and internal circulation.
Suggested Training:	4.044, C301, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC26	Category: Design and Construction
Keywords:	design & construction--domestic water design, master mixing valves
Status:	
Control Measure:	Use thermostatic mixing valves (TMVs) downstream of large (relative to demand) tank-type water heaters and hot water storage tanks larger than 80 gallons so that water can be stored at 140 degrees F (60 degrees C) or higher but delivered at a scalding-safe temperature.
Locations:	DHWs
Monitoring:	Discuss with plumbing engineer during the design stage. Check drawings. Document the review and discussion.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must use TMV or document justification for deviation.
Corrective Action:	Install TMV or continuous chemical disinfection system, or plan for Legionella testing no less than four times yearly (per validation section).
Suggested Training:	4.045, C301, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC27	Category: Design and Construction
Keywords:	design & construction--domestic water design, water heaters in parallel
Status:	
Control Measure:	Design piping for water heaters and hot water tanks serving the same loop (i.e., operating in parallel) so that each has approximately equal use and flow.
Locations:	DHWs
Monitoring:	Discuss with plumbing engineer during design stage.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Each water heater must have approximately equal use and flow.
Corrective Action:	Change the piping or take other measures to minimize stagnation in the heaters and tanks.
Suggested Training:	4.053, C301, C322, C327
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC28	Category: Design and Construction
Keywords:	design & construction--domestic water design, recirculation and balancing
Status:	
Control Measure:	Ensure sufficient hot water re-circulation and balancing. During construction, the contractor shall be responsible for ensuring that water is not stagnant in any pipes. Filled areas will need to be flushed weekly and logged with location, date, and chlorine levels of the domestic cold and/or hot water systems. Testing and flushing activities performed by the contractor to ensure free chlorine residuals of >0.5 mg/L per NCH Water Management Plan shall be documented and turned over to NCH weekly. DHWR lines will stay connected and circulated during construction and new builds.
Locations:	DHWs
Monitoring:	Discuss hot water return (HWR) pump sizing, balancing valve selection, and initial balancing with plumbing engineer during the planning, design, specification stages and with the plumbing contractor during the contracting, construction, and commissioning stages. Document the discussion in the project notes. Obtain a balancing report upon completion.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	HWR pumps for flow rate of approx 5 fps (1.5 lps) and valves for proficient balancing must be considered by engineers. System must be balanced on startup. Performance must match design spec or be justified.
Corrective Action:	Replace equipment or justify deviation. Balance the system.
Suggested Training:	4.009, 4.052, C301, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC31	Category: Design and Construction
Keywords:	design & construction--misting systems
Status:	
Control Measure:	Do not install misters for comfort (e.g., patio misters) anywhere on a healthcare facility campus, even in employee break areas, or in other areas frequented by high risk persons. For all facilities, do not install misters unless the facilities maintenance department has the means and commitment to maintain them for microbial control.
Locations:	MIST
Monitoring:	Check drawings and specs and in field during construction.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Project manager must check plans and final construction to ensure compliance.
Corrective Action:	Remove the mister.
Suggested Training:	4.075, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC35	Category: Design and Construction
Keywords:	design & construction--humidification
Status:	
Control Measure:	If in-duct humidification is needed in areas occupied by high risk persons, prefer "clean" steam rather than water mist types. Consider this for all buildings, particularly if the facilities department does not have the means and commitment to strictly maintain water humidifiers per manufacturer recommendations and best practices.
Locations:	HUMIDWTR
Monitoring:	Discuss with engineer during planning stage. Check drawings and specs.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Use steam or justify deviation.
Corrective Action:	Specify strict maintenance procedures, including documentation, if water humidifiers are installed.
Suggested Training:	4.070, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	Hospital uses only steam for humidification.

Control Measures

Control Measure Number: DC36	Category: Design and Construction
Keywords:	design & construction--plumbing construction
Status:	
Control Measure:	Inspect plumbing contractors' work to ensure the following: (a) Keep pipes clean and capped until installation. (b) Ream all pipe ends to remove burrs. (c) Apply pipe compound only to male threads. (d) Remove piping installed for leak testing. (e) Remove leftover piping (e.g., dead legs), cutting and capping where they teed into the main, if feasible, or at the last accessible point of flow.
Locations:	POEs DHWs POUs
Monitoring:	Conduct and document inspections.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must comply with each measure or justify deviations.
Corrective Action:	Correct noncompliance or justify deviations.
Suggested Training:	4.054, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC37	Category: Design and Construction
Keywords:	design & construction--water supply during construction
Status:	
Control Measure:	For the construction site water supply, do not use water from an occupied building unless a backflow preventer (BFP) is installed just downstream of the occupied building (to prevent contamination of the occupied building). Remove the line as appropriate upon completion of the project. DHWR lines within and downstream of the project boundaries shall stay connected and circulate during the entire length of the project. Document all testing dates and results as part of the project requirements.
Locations:	POEs
Monitoring:	Confirm on drawings, in specs, and in field during construction. Confirm removal of any temporary line after project completion.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	BFP must be installed if water is supplied from an occupied building. Line must be removed after construction if not used for the new building.
Corrective Action:	Install BFP or supply from a different source. Remove temporary lines after project completion.
Suggested Training:	4.011, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC38	Category: Design and Construction
Keywords:	design & construction--domestic water startup and disinfection
Status:	
Control Measure:	Disinfect the DWS a minimum of 72 hours prior to beneficial occupancy (i.e., occupied for the purpose for which it was constructed). In buildings to be occupied by persons at increased risk of waterborne illness, use continuous disinfection from the pre-occupancy hyperchlorination through the time the building is substantially occupied. Consider this for other buildings as well, case by case, based in part on regulations pertaining to domestic water disinfection.
Locations:	POEs, DHWs, POUs
Monitoring:	List procedures in specs. Document disinfectant levels and flushing procedures.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Disinfection procedure must meet the requirements of AWWA/ANSI C651 ("Disinfecting Water Mains"), AWWA/ANSI C652 ("Disinfection of Water Storage Facilities"), ANSI/ASHRAE 188-2015, and applicable codes.
Corrective Action:	Repeat procedures as necessary.
Suggested Training:	4.037, 4.093, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC39	Category: Design and Construction
Keywords:	design & construction--domestic water startup and disinfection
Status:	
Control Measure:	After the system is filled with water, flush all outlets weekly. After the system is disinfected, continue flushing weekly in unoccupied or unfinished areas if the building is partially occupied or is to be finished or occupied in phases. During construction, the contractor shall be responsible for ensuring that water is not stagnant in any pipes. Filled areas will need to be flushed weekly and logged with location, date, and chlorine levels of the domestic cold and/or hot water systems. Testing and flushing activities performed by the contractor to ensure free chlorine residuals of >0.5 mg/L per NCH Water Management Plan shall be documented and turned over to NCH weekly. Options for flushing can be auto flush faucets approved by NCH (as manufactured by Sloan Bluetooth). Until the systems are filled, the DCW and DHW will remain at the main with no dead legs in closed position. No returns can be capped for any measure of time, no dead legs. Return lines MUST be in service at all times.
Locations:	POEs, DHWs, POUs
Monitoring:	Log flush dates.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Use or run all outlets for 2+ minutes at least every two weeks.
Corrective Action:	Repeat flushing procedure. Disinfect the entire system again if more than 20% of outlets are not used for over 30 days.
Suggested Training:	4.031, 4.037, 4.093, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC40	Category: Design and Construction
Keywords:	design & construction--final documents and performance
Status:	
Control Measure:	Require designer or contractor to ensure the final project drawings and documents include items "a" through "l" in ANSI/ASHRAE 188-2015 Section 8.2.1 for applicable equipment and systems and confirm performance of the same criteria.
Locations:	All applicable CLs
Monitoring:	Include the requirements in the designer's or contractor's contract. Obtain written confirmation from designer or contractor that the items were included in the documents and performed.
Frequency of control measure task:	Every 0 Days Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Must either obtain written confirmation from designer or contractor that items "a" through "l" were included in the documents and performed or or justify any noncompliance.
Corrective Action:	Correct or justify noncompliance.
Suggested Training:	
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC41	Category: Design and Construction
Keywords:	design & construction--windows
Status:	
Control Measure:	For hospitals, make patient room windows inoperable by patients, in part to prevent intake of Legionella-contaminated mist from cooling towers.
Locations:	CTs
Monitoring:	Confirm during planning and design stage.
Frequency of control measure task:	Every 0 Days
	Other Desc: per project
Frequency of compliance verification:	Every 1 Years
Limits:	Windows must be inoperable by patients.
Corrective Action:	Change window specs, install mechanism to prevent patients from opening them, or justify deviation.
Suggested Training:	4.061, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DC42	Category: Design and Construction
Keywords:	design & construction--domestic water design, minimizing stagnation
Status:	
Control Measure:	On backup feeds, crossover lines, bypasses, and other lines normally closed to water flow-through, install a valve and a drain line just upstream of that valve at both ends of the line (or only at the downstream end if the upstream end is the public water main) to allow it to be thoroughly flushed to a drain prior to opening a valve that releases water from the line to points of use within the building.
Locations:	POEs, DHWs
Monitoring:	Check drawings during the design phase. Check in the field during construction.
Frequency of control measure task:	Every 0 Days
	Other Desc: per occurence
Frequency of compliance verification:	Every 1 Years
Limits:	Must have valve(s) and drain necessary to flush line to waste prior to opening valve that releases water from the line to points of use within the building.
Corrective Action:	Add valve(s) and drain to the line.
Suggested Training:	4.023, 4.024, 4.027, C322
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DWM01	Category: Domestic Water System Maintenance
Keywords:	stagnation, dead legs, abandoned piping
Status:	
Control Measure:	Remove or routinely flush accessible piping that is no longer used.
Locations:	POEs, DHWs, POUDHWs, POUs
Monitoring:	Conduct survey for abandoned piping yearly and ensure all applicable piping is scheduled for removal or monthly flushing.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Remove easily accessible dead piping > 2 feet or 5 pipe diameters in length, whichever is greater. Or, monthly flush the dead piping for 30 seconds or long enough to remove 10 pipe volumes, whichever is longer.
Corrective Action:	Either remove the piping or begin monthly flushing.
Suggested Training:	4.022, C327
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	Survey is performed prior to new equipment installation per Design & Construction guidelines.

Control Measures

Control Measure Number: DWM03	Category: Domestic Water System Maintenance
Keywords:	cross connection control, backflow prevention
Status:	
Control Measure:	Ensure testing of backflow prevention devices to protect the domestic water system from cross contamination.
Locations:	POEs, POUs, DHWs
Monitoring:	Have a certified backflow specialist test each backflow device.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Test methods and results must meet specifications and codes.
Corrective Action:	Repair or replace BFPs that fail the test.
Suggested Training:	4.011
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	The Plumbing Shop has (5) licensed backflow specialists that test backflow prevention devices.

Control Measures

Control Measure Number: DWM06m	Category: Domestic Water System Maintenance
Keywords:	disinfection, chlorine testing
Status:	
Control Measure:	Monitor disinfectant level in the water supply and distal faucets.
Locations:	POUs
Monitoring:	Test with DPD or similar method.
Frequency of control measure task:	Every 90 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Record at least five readings quarterly. Take one of the incoming water supply. Take the other four from faucets--hot and cold water at two faucets, one of which is located near the end point of the system.
Corrective Action:	Re-initiate quarterly readings if they have not been taken. There is no corrective action for the level detected in the incoming water supply because the facility has no control over the public water supply treatment. The purpose is to gather the data since it could be useful in managing the water systems, particularly in making decisions about remediation or adjusting an existing treatment system. Investigate possible causes and solutions for an excessive disinfectant loss between the point of entry and points of use.
Suggested Training:	4.030
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	Chlorine tests are performed on POU samples collected from critcal care areas, surgery, BMT, NICUs, & PICUs.

Control Measures

Control Measure Number: DWM09	Category: Domestic Water System Maintenance
Keywords:	stagnation, crossover lines
Status:	
Control Measure:	Minimize flow of stagnant water from crossover lines into the system.
Locations:	POEs, DHWs, POUs
Monitoring:	If crossover line can be isolated and flushed to a drain: Affix sign advising to flush to drain before opening. Open/flush for 30+ sec or long enough to empty line > four times, whichever is longer.
Frequency of control measure task:	Every 30 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Sign must be affixed to line if applicable. Flushing must be scheduled. Flushes must be 30 seconds or long enough to empty line > 4 times, whichever is longer.
Corrective Action:	Disinfect the crossover line if flushing not performed per schedule.
Suggested Training:	4.027, C327
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DWM10h	Category: Domestic Water System Maintenance
Keywords:	disinfection, readiness
Status:	
Control Measure:	In buildings occupied by patients, maintain pump, taps, and other equipment to chlorinate hot and cold domestic water in case necessary.
Locations:	POEs, DHWs
Monitoring:	Confirm water treatment vendor's capability of performing domestic water disinfection.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Must have necessary taps, pumps, and controls in place for disinfection, and vendor identified.
Corrective Action:	As applicable, install or repair taps, pumps, and other equipment, and identify vendor to provide treatment chemicals and services.
Suggested Training:	4.036, 4.039
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	Water treatment vendor has chemical metering pumps and chlorine bleach needed for domestic water disinfection.

Control Measures

Control Measure Number: DWM12	Category: Domestic Water System Maintenance
Keywords:	stagnation, emergency showers
Status:	
Control Measure:	Flush emergency showers monthly.
Locations:	POUs
Monitoring:	Ensure monthly flushing is scheduled. Log flush dates.
Frequency of control measure task:	Every 30 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Must flush monthly or more frequently if required or recommended by manufacturer, ANSI, OSHA, or ASHRAE.
Corrective Action:	Correct noncompliance
Suggested Training:	4.012
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DWM13	Category: Domestic Water System Maintenance
Keywords:	stagnation, eyewash stations
Status:	
Control Measure:	Flush piped eyewash stations weekly.
Locations:	POUs
Monitoring:	Log flush dates and flush durations.
Frequency of control measure task:	Every 7 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Must flush weekly for duration meeting or exceeding that required or recommended by manufacturer, ANSI, and OSHA.
Corrective Action:	Correct noncompliance
Suggested Training:	4.012
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	Each department is responsible for this control measure.

Control Measures

Control Measure Number: DWM15	Category: Domestic Water System Maintenance
Keywords:	filters at or near points of use
Status:	
Control Measure:	Maintain and replace any filters used per manufacturer recommendations. The use of carbon filters are prohibited, consult Water Management Committee or Engineering Services with questions.
Locations:	POUFLTR
Monitoring:	Ensure filter maintenance procedures are scheduled.
Frequency of control measure task:	Every 90 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Filters used must be maintained and replaced per manufacturer's recommendations, at a minimum.
Corrective Action:	Remove or replace filters as necessary. Correct performance problem. Communicate procedures to those responsible.
Suggested Training:	4.014, 4.015
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DWM16	Category: Domestic Water System Maintenance
Keywords:	flushing after minor plumbing repairs
Status:	
Control Measure:	Flush fixtures downstream of minor plumbing work for at least 5 minutes before returning the outlet to service.
Locations:	POUs
Monitoring:	Include the flushing procedure in the work order given to the contractor or employee performing the work and require that person to log the flush date and time for each fixture affected.
Frequency of control measure task:	Every 0 Days Other Desc: per occurrence
Frequency of compliance verification:	Every 1 Years
Limits:	Flushing must be logged for each project.
Corrective Action:	Investigate and correct noncompliance.
Suggested Training:	4.042
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DWM17h	Category: Domestic Water System Maintenance
Keywords:	stagnation, flushing
Status:	
Control Measure:	Run hot and cold outlets and flush toilets as necessary to ensure each is used > 2 minutes at least twice weekly, including outlets in unoccupied rooms, areas closed but not drained, and rooms (or showers) used for storage. In patient areas, flush at low flow (pencil diameter) to minimize transmission. [11/14/15]
Locations:	POUs
Monitoring:	Quarterly review flushing program based on occupancy, revise as necessary, and communicate flushing requirements with applicable staff members. Conduct random inspections to ensure flushing performed per program.
Frequency of control measure task:	Every 0 Days Other Desc: AS Needed
Frequency of compliance verification:	Every 1 Years
Limits:	Flush time or regular use must be > 2 minutes twice weekly at both hot and cold outlets. In patient areas, flush at low flow (pencil diameter) to minimize the risk of transmission.
Corrective Action:	Reiterate necessity and procedure to employees responsible for flushing.
Suggested Training:	4.031, C327
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	Does Environmental Services perform this control measure?

Control Measures

Control Measure Number: DWM19	Category: Domestic Water System Maintenance
Keywords:	stagnation, temperature, hot water return pump operation
Status:	
Control Measure:	Ensure online hot water return (HWR) pumps are operational and set to run 24/7.
Locations:	DWHs
Monitoring:	Check the HWR pumps to make sure they are running.
Frequency of control measure task:	Every 30 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Must be running.
Corrective Action:	Reset or repair pump as necessary.
Suggested Training:	4.019, C327
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DWM21	Category: Domestic Water System Maintenance
Keywords:	ice machines - cleaning
Status:	
Control Measure:	Clean and disinfect ice machines 2 times a year.
Locations:	POUs
Monitoring:	Upon installation of all ice machines, identify them by number and location, and ensure cleaning is scheduled.
Frequency of control measure task:	Every 180 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Must be cleaned per manufacturer's instructions at least twice yearly.
Corrective Action:	As necessary, reiterate the schedule and procedures with applicable employees, update the cleaning procedures per manufacturer instructions, take uncleaned ice machines out of service, or update scheduling.
Suggested Training:	4.015
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DWM24	Category: Domestic Water System Maintenance
Keywords:	pressure reducing valves, check valves, backflow preventers, other major valves near POE
Status:	
Control Measure:	To minimize debris, clean and service backflow preventers per manufacturer recommendations and best practices.
Locations:	POEs
Monitoring:	Yearly review manufacturer recommendations and best practices for backflow preventers and then schedule maintenance procedures.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Per manufacturer recommendations and best practices.
Corrective Action:	Correct noncompliance.
Suggested Training:	4.018
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DWM29	Category: Domestic Water System Maintenance
Keywords:	softeners
Status:	
Control Measure:	Maintain, clean, and disinfect domestic water softeners per manufacturer recommendations.
Locations:	SOFT
Monitoring:	Yearly review operating manual and ensure procedures are either scheduled (if done in-house) or included in vendor service agreement.
Frequency of control measure task:	Every 0 Days Other Desc: per manufacturer recommendations
Frequency of compliance verification:	Every 1 Years
Limits:	Manufacturer's recommendations
Corrective Action:	Schedule the procedures, add the requirement to the vendor service contract, or investigate and correct noncompliance as applicable.
Suggested Training:	4.029
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	Softener systems provide water for utilities. There are no domestic water softeners.

Control Measures

Control Measure Number: DWM31	Category: Domestic Water System Maintenance
Keywords:	strainers, Y-type
Status:	
Control Measure:	Open Y-type strainers (e.g., on backflow preventer or pressure reducing valve lines) often enough that discharge has minimal discoloration, at least monthly.
Locations:	POEs, DHWs
Monitoring:	Identify each Y-type strainer. Ensure procedure is scheduled. Log the dates each is opened.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Procedure must be scheduled. Discharge must have minimal discoloration.
Corrective Action:	Investigate and correct noncompliance if procedure not performed. Increase flush frequency if discharge contains significant sludge or is discolored for several seconds.
Suggested Training:	4.017
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DWM34b	Category: Domestic Water System Maintenance
Keywords:	temperatures at hot outlets
Status:	
Control Measure:	Maintain target hot water temperatures in target range and detect problems that reduce hot water temperatures at some outlets.
Locations:	DHWs, POUDHWs, POUs
Monitoring:	Record hot water temperatures at a few faucets (e.g., 3% of faucets) monthly. For each measurement, record the number of seconds it took to reach the peak temperature. Log temperature complaints.
Frequency of control measure task:	Every 30 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Must reach target temperature range in < 2 minutes.
Corrective Action:	Adjust water heaters and mixing valve settings as applicable. Investigate further if necessary.
Suggested Training:	4.009, C301
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DWM36h	Category: Domestic Water System Maintenance
Keywords:	temperatures at TMV outlets
Status:	
Control Measure:	Maintain master thermostatic mixing valve (TMV) outlet temps within target range.
Locations:	DHWs
Monitoring:	Record TMV outlet temperature gauge readings daily.
Frequency of control measure task:	Every 30 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Must be within 5 degrees F of design temperature.
Corrective Action:	Check TMV and repair or adjust as necessary.
Suggested Training:	4.009, C301
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	TMV outlet temps are monitored by BAS.

Control Measures

Control Measure Number: DWM38h	Category: Domestic Water System Maintenance
Keywords:	temperatures in water heaters (WH) and hot water storage tanks (HWT)
Status:	
Control Measure:	Maintain water heater (WH) and hot water storage tank (HWT) outlet temperatures within the target range.
Locations:	DHWs
Monitoring:	Record WH and HWT outlet temperature gauge readings daily.
Frequency of control measure task:	Every 30 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Must be within 5 degrees F of design temperature.
Corrective Action:	Check WH and controls; repair or adjust as necessary.
Suggested Training:	4.009, C301
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	BAS monitors temperatures.

Control Measures

Control Measure Number: DWM41	Category: Domestic Water System Maintenance
Keywords:	water heaters-rotation
Status:	
Control Measure:	Alternate redundant water heaters at least once monthly (preferably daily) if both/all do not operate continuously.
Locations:	DHWs
Monitoring:	Review heater operation and rotation schedule quarterly. If redundant water heaters do not operate 24/7, log manual rotation weekly or set automated rotation (e.g., in building automation system) for daily.
Frequency of control measure task:	Every 30 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Redundant heaters must be rotated at least monthly if they do not run 24/7.
Corrective Action:	As applicable, change automated control settings, update manual rotation schedule, enforce manual alternating, remove a heater, drain offline heaters, or run all heaters continuously.
Suggested Training:	4.021, C327
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: DWM43b	Category: Domestic Water System Maintenance
Keywords:	water heaters-purging
Status:	
Control Measure:	Monthly purge some water from the drain of all water heaters and storage tanks, to flush sediment from the bottom section. Flush storage tanks and tank-type water heaters > 30 sec or until discharge is clear, whichever is longer.
Locations:	DHWs
Monitoring:	Schedule the procedure. Log flush dates for each heater/tank.
Frequency of control measure task:	Every 30 Days
Frequency of compliance verification:	Every 3 Months
Limits:	Must be scheduled. Flushes must be per schedule and minimum duration.
Corrective Action:	Correct non-compliance if procedure not being performed. Increase purging frequency if purged water is discolored for several seconds.
Suggested Training:	
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: HUMIDWTR01	Category: Humidifier Maintenance
Keywords:	humidifier maintenance
Status:	
Control Measure:	Follow manufacturer's instructions and applicable ASHRAE recommendations (see ASHRAE 12-2000 section 8.5 and ANSI/ASHRAE 188-2015 section 7.5) including those for start-up and shutdown, siting, cleaning, maintenance, and disinfection.
Locations:	HUMIDWTR
Monitoring:	Review manufacturer's instructions and ASHRAE recommendations (e.g., ASHRAE 12-2000 section 8.5 and ANSI/ASHRAE 188-2015 section 7.5) and ensure applicable maintenance procedures are scheduled. Log dates and maintenance procedures performed.
Frequency of control measure task:	Every 0 Days Other Desc: per manufacturer recommendations
Frequency of compliance verification:	Every 3 Months
Limits:	Applicable maintenance procedures recommended by manufacturer and ASHRAE (per ASHRAE 12-2000 section 8.5 and ANSI/ASHRAE 188-2015 section 7.5) must be scheduled and performed.
Corrective Action:	Drain the system and keep it drained until the system is in compliance.
Suggested Training:	4.070
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: HUMIDWTR02	Category: Humidifier Maintenance
Keywords:	humidifier maintenance
Status:	
Control Measure:	Keep the unit leak-free and clean.
Locations:	HUMIDWTR
Monitoring:	Inspect for dirt, slime buildup, and leaks weekly or per manufacturer's recommendations, whichever is more frequent.
Frequency of control measure task:	Every 7 Days
Frequency of compliance verification:	Every 3 Months
Limits:	No leaks. No visible dirt or slime.
Corrective Action:	Drain the system and keep it drained until in compliance.
Suggested Training:	4.070
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP02h	Category: Infection Prevention Policies
Keywords:	infection prevention--bath toys
Status:	
Control Measure:	Prohibit water-containing bath toys (associated with Pseudomonas).
Locations:	POUs
Monitoring:	The prevention measure is part of NCH policy which all areas are expected to follow. Policies are reviewed every three years and as needed. Compliance is monitored through routine rounding.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	No water-containing bath toys.
Corrective Action:	Remove the bath toys and reaffirm policy.
Suggested Training:	
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP03	Category: Infection Prevention Policies
Keywords:	infection prevention --misters
Status:	
Control Measure:	Do not allow misters for human comfort (e.g., patio misters) anywhere on the campus, even in employee break areas.
Locations:	POUs
Monitoring:	Compliance is monitored through routine rounding.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	No misters allowed.
Corrective Action:	Remove it.
Suggested Training:	4.075
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP04	Category: Infection Prevention Policies
Keywords:	infection prevention--instruments, patient care devices
Status:	
Control Measure:	Protect patient-care devices and instruments from inadvertent tap water contamination.
Locations:	POUs
Monitoring:	The prevention measure is part of NCH policy which all areas are expected to follow. Policies are reviewed every three years and as needed. Compliance is monitored through routine rounding.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Best practices per CDC.
Corrective Action:	Correct noncompliance.
Suggested Training:	4.004
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP05	Category: Infection Prevention Policies
Keywords:	infection prevention--bronchoscopes and endoscopes
Status:	
Control Measure:	Follow manufacturerâ€™s recommendations/instructions for use (IFUs) for bronchoscopes and endoscopes
Locations:	POUs
Monitoring:	The prevention measure is part of NCH policy which all areas are expected to follow. Policies are reviewed every three years and as needed. Compliance is monitored through routine rounding. Competency is documented annually.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Must review, list, and communicate procedures yearly and document performance.
Corrective Action:	Correct noncompliance.
Suggested Training:	4.076
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP06	Category: Infection Prevention Policies
Keywords:	infection prevention--carpet cleaning equipment
Status:	
Control Measure:	Do not allow water to remain in carpet cleaning equipment for extended periods. Drain after each use.
Locations:	POUs
Monitoring:	Carpet cleaning services are contracted out annually. Confirm contracts and applicable procedures with Environmental Services (EVS) yearly.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Water to remain in equipment < 24 hours.
Corrective Action:	Correct noncompliance.
Suggested Training:	
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP07	Category: Infection Prevention Policies
Keywords:	infection prevention--dental water lines
Status:	
Control Measure:	Follow manufacturerâ€™s recommendations/IFUs for all dental equipment. Follow the latest recommendations for dental procedures.
Locations:	POUs
Monitoring:	Every dental waterline must be minimally tested every three months and results are sent to Epidemiology.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Best practices for disinfection must be performed. TBC test results must be below ADA recommended maximum.
Corrective Action:	Correct non-performance of procedures. Adjust disinfection and maintenance practices if TBC counts exceed ADA recommended maximum.
Suggested Training:	4.072
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP08	Category: Infection Prevention Policies
Keywords:	infection prevention--dialysis treatment systems
Status:	
Control Measure:	Follow the latest guidelines and recommendations for maintaining dialysis equipment. Follow manufacturerâ€™s recommendations/IFUs.
Locations:	POUs
Monitoring:	Dialysis cleaning/testing logs and dialysis water checks are completed monthly. Results are checked by Epidemiology.
Frequency of control measure task:	Every 0 Days Other Desc: per AAMI guidelines
Frequency of compliance verification:	Every 1 Years
Limits:	AAMI recommended testing and procedures must be performed and results must be within recommended limits.
Corrective Action:	Correct non-performance of procedures. Make necessary equipment and procedure changes to bring test results within recommended ranges.
Suggested Training:	4.073
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP10	Category: Infection Prevention Policies
Keywords:	infection prevention--fish tanks
Status:	
Control Measure:	Maintenance service is contracted to a company specializing in this process.
Locations:	POUs
Monitoring:	Compliance is monitored through routine rounding.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Must follow CDC guidelines.
Corrective Action:	Correct noncompliance.
Suggested Training:	4.077
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP11	Category: Infection Prevention Policies
Keywords:	infection prevention--holy water
Status:	
Control Measure:	Refrain from using holy water in wounds and burns. Minimize splashing.
Locations:	POUs
Monitoring:	Verify annually with Pastoral Care.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	No splashing. No use in open wounds or near burn patients.
Corrective Action:	Correct non-compliance.
Suggested Training:	
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP12h	Category: Infection Prevention Policies
Keywords:	infection prevention--humidifiers
Status:	
Control Measure:	Do not provide room air humidifiers that emit mist. If patients bring their own, manufacturerâ€™s recommendations (IFUs) should be followed.
Locations:	POUs
Monitoring:	Compliance is monitored through routine rounding.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Must comply with CDC recommendations. Must communicate policies to staff yearly. Must affix sign to humidifiers brought by patients.
Corrective Action:	Remove humidifiers. Reiterate policies.
Suggested Training:	4.003
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP15h	Category: Infection Prevention Policies
Keywords:	infection prevention--whirlpool bathtubs, hydrotherapy tubs, birthing tubs
Status:	
Control Measure:	Follow manufacturerâ€™s recommendations/IFUs for all hydrotherapy tubs, whirlpool bathtubs, etc.
Locations:	POUs
Monitoring:	Compliance is monitored through routine rounding.
Frequency of control measure task:	Every 0 Days
	Other Desc: per manufacturer recommendations
Frequency of compliance verification:	Every 1 Years
Limits:	Manufacturer's recommendations and APIC and CDC guidelines must be communicated to applicable staff members and performed.
Corrective Action:	Discontinue use until non-compliance corrected.
Suggested Training:	4.005, 4.007, 4.088
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP16	Category: Infection Prevention Policies
Keywords:	infection prevention--respiratory care
Status:	
Control Measure:	Follow the latest guidelines and recommendations for respiratory equipment. Use only sterile water. Do not use tap water.
Locations:	POUs
Monitoring:	Compliance is monitored through routine rounding.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Best practices per CDC.
Corrective Action:	Correct non-compliance and reiterate policies.
Suggested Training:	4.002
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP17	Category: Infection Prevention Policies
Keywords:	infection prevention--wound irrigation
Status:	
Control Measure:	Irrigate wounds with saline solution or sterile water. Do not use tap water.
Locations:	POUs
Monitoring:	The prevention measure is part of NCH policy which all areas are expected to follow. Policies are reviewed every three years and as needed. Compliance is monitored through routine rounding.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Best practices per CDC.
Corrective Action:	Correct non-compliance and reiterate policies.
Suggested Training:	
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Control Measures

Control Measure Number: IP18h	Category: Infection Prevention Policies
Keywords:	infection prevention--heater-cooler units
Status:	
Control Measure:	Implement best practices for reducing risk of infections associated with heater-cooler units including following the manufacturerâ€™s instructions for use (IFUs).
Locations:	POUs
Monitoring:	The prevention measure is part of NCH policy which all areas are expected to follow. Policies are reviewed every three years and as needed. Compliance is monitored through routine rounding.
Frequency of control measure task:	Every 365 Days
Frequency of compliance verification:	Every 1 Years
Limits:	Best practices per CDC and FDA. Manufacturer's instructions.
Corrective Action:	Correct noncompliance.
Suggested Training:	4.097
Date Compliance Last Verified:	
Documentation Notes:	
Documentation Files in LAMPS:	
Verification Person:	
Due Date for Next Verification or Performance:	
Comments:	

Team Added Information