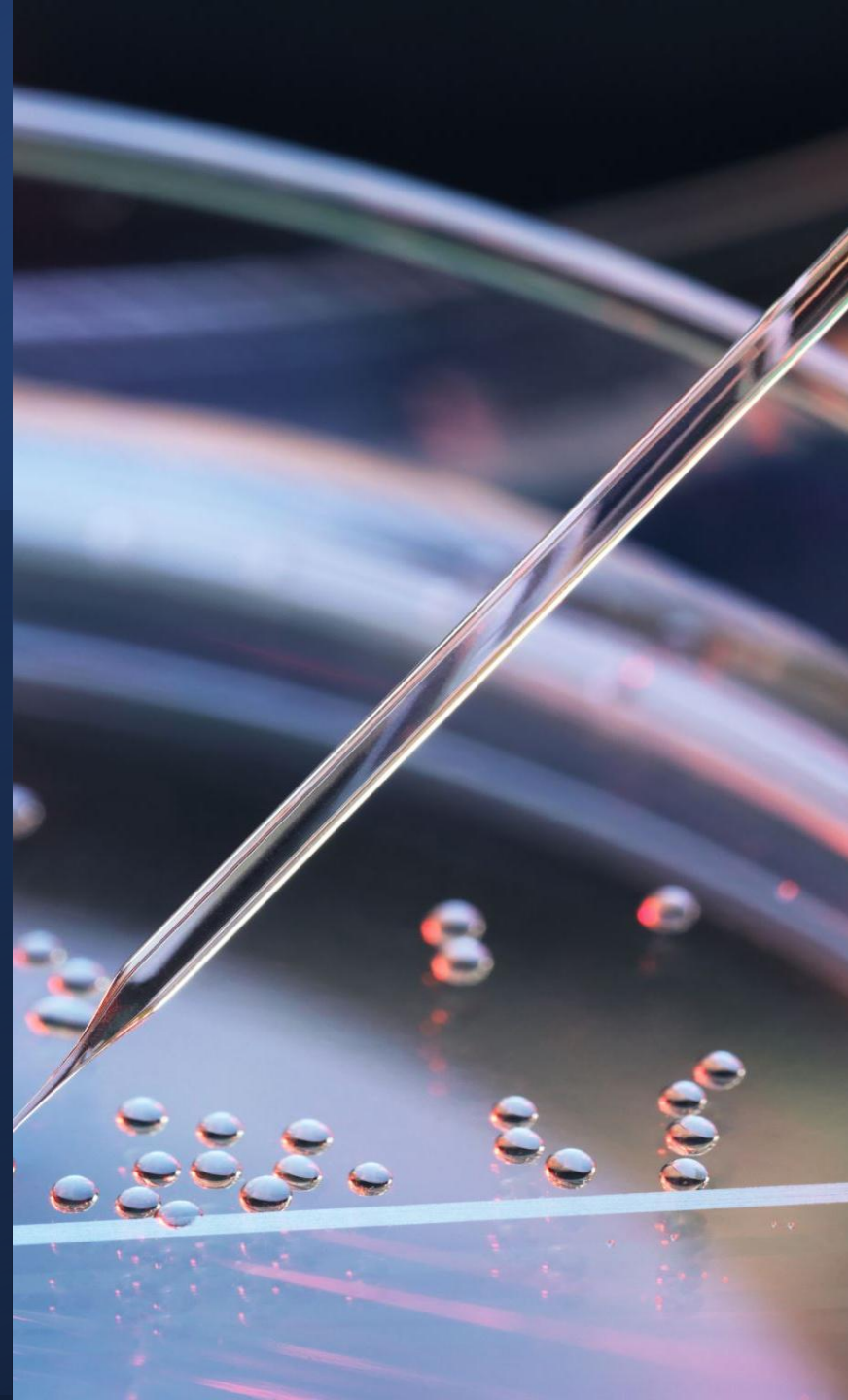


SNHD *Legionella* Program



SNHD Investigates Two Types of Cases

- Residential
- Travel Associated

Residential Investigations

- SNHD investigates local confirmed cases of Legionnaires' Disease.
- Samples are taken at the patients' residences
 - Single Family Homes
 - Condos
 - Apartments
 - AIRBNBs
 - etc.
- Samples may also be taken at other potential exposures sites
 - Job site – Dry wall manufacturing
 - Medical Facilities – Dialysis center
 - Recreation – Day spa
- Education is provided to the patient and family regarding *Legionella* and prevention measures.

Residential Investigation Procedures

- Cases are received by SNHD Disease Surveillance and Control's (DSC) and forwarded to the EH *Legionella* Team.
- EH *Legionella* Team contacts the patient or family member and offers no-cost residential sampling. Residential questionnaire is completed.
- Samples are collected at most water fixtures in the residence and taken to a contracted ELITE lab for analysis;
- No samples are taken at the water heater due to potential damage to the water heater.
- When lab results are received, SNHD emails the results to the patient and discuss them over the phone.

Residential Investigations Procedures

- When positive results are received, SNHD makes recommendations on preventative measures that the patient can take to reduce *Legionella* presence in their water systems:
 - Routine flushing of all fixtures
 - Routine water heater maintenance
 - Cleaning or replacing water fixtures
- Follow-up sampling may also be conducted

Factory Worker Investigation

- Portable misting units in factory
- Misting units placed close to employees
- Misting units tested positive at 90 cfu/ml
- Recommendation: Take units out of service; clean and maintain
- Factory took units out of service permanently and replaced with new units



Travel- Associated Investigations

- SNHD conducts single case investigations of Legionnaires' Disease where the patient stayed at a public accommodation in Clark County during the incubation period.
- Lab-confirmed cases of Legionnaires' Disease are reported to local health departments, who report the cases to the CDC.
- CDC notifies SNHD of the confirmed cases.
- Acute Communicable Disease Control (ACDC) reaches out to the local health departments to obtain patient information.
- EH *Legionella* Team reaches out to the facility to conduct the investigation.

Legionella Environmental Assessment Form (LEAF)

- CDC *Legionella* Homepage
<https://www.cdc.gov/legionella/index.html>
- *Legionella* Environmental Assessment Form
<https://www.cdc.gov/legionella/downloads/legionella-environmental-assessment-p.pdf>

Centers for Disease Control and Prevention
Legionella Environmental Assessment Form

HOW TO USE THIS FORM

This form enables public health officials to gain a thorough understanding of a facility's water systems and aerosolizing devices and assists facility management with minimizing the risk of Legionnaires' disease. It can be used along with epidemiologic information to determine whether to conduct *Legionella* environmental sampling and to develop a sampling plan. In addition, findings from this environmental assessment can be used to develop a water management program (WMP) by identifying areas at risk for *Legionella* growth and spread. The assessment should be performed on site by an epidemiologist or environmental health specialist with knowledge of the ecology of *Legionella*, building water systems, and water treatment; this includes public health professionals familiar with CDC resources such as the [Legionella Environmental Assessment Form Marking Guide](#), [Toolkit for Controlling Legionella in Common Sources of Exposure](#), and [PreventIt.D](#). The LEAF Marking Guide walks the user through this form by providing instructions and additional considerations for the questions by adding further context and discussing relevant risk factors for *Legionella* growth and spread that users may find helpful.

Complete the form in as much detail as possible.

- The content in the "Facility Characteristics" and "Water Supply Source" sections will be applicable to every assessment.
- Do not leave questions blank; if a question does not apply, write "N/A." If a question applies but cannot be answered, explain why.
- Where applicable, specify the units of measurement being used (e.g., ppm).
- Take pictures and attach them to the form to visually support the written findings. Pictures should be taken of any significant findings in implicated mechanical components and water treatment systems.
- It may take several hours to complete the form.

Complete the **device-specific appendices** that pertain to the facility being assessed after completing the relevant portions of the main form.

Keep the following **key factors** that contribute to *Legionella* growth in mind as you complete the form:

Sediment and Biofilm – Mineral buildup in a system supports *Legionella* growth and consumes disinfectant residual. Microorganisms and the slime they secrete make up biofilms that stick to and grow on any continually moist surface. Biofilms provide a stable growth surface and an environment with nutrients for many types of germs, including *Legionella*.

Temperature – *Legionella* generally grow well between 77°F and 113°F. The optimal growth range for *Legionella* is between 85°F and 108°F. Growth slows between 113°F and 120°F, and *Legionella* begin to die above 120°F. Growth also slows between 68°F and 77°F, and *Legionella* become dormant below 68°F.

Water Age – Slowly moving or stagnant water increases water age, which provides opportunities for *Legionella* growth. Higher water age also contributes to disinfectant residual loss and favorable temperatures for growth.

Disinfectant Residual – Disinfectant residuals are the amount of chemical disinfectant available in the water to inhibit *Legionella* growth. Disinfectant residual decreases as water age and temperature increase.

Refer to CDC's [Legionella Control Toolkit](#) for detailed guidance on evaluating the key factors for *Legionella* growth in specific water systems and devices. For additional training and information, please see [CDC's resources for health departments](#).

 01/23/2023 CS28502-4

APPENDIX A. HEALTHCARE, ASSISTED LIVING, AND SENIOR LIVING FACILITIES

APPENDIX B. COOLING TOWERS AND EVAPORATIVE CONDENSERS

APPENDIX C. HOT TUBS, WHIRLPOOL SPAS, AND HYDROTHERAPY SPAS

APPENDIX D. OTHER WATER DEVICES

APPENDIX E. RECENT* OR ONGOING MAJOR CONSTRUCTION

LEAF- Marking Guide

- CDC *Legionella* Homepage
<https://www.cdc.gov/legionella/index.html>
- *Legionella* Environmental Assessment Form Guide
<https://www.cdc.gov/legionella/downloads/legionella-environmental-assessment-marking-guide-508.pdf>

Centers for Disease Control and Prevention

Legionella Environmental Assessment Form
Marking Guide

HOW TO USE THIS GUIDE

The *Legionella* Environmental Assessment Form Marking Guide (Marking Guide) is supplemental to the [Legionella Environmental Assessment Form \(LEAF\)](#). The LEAF Marking Guide walks the user through the LEAF by providing instructions and additional considerations for the questions. Additional considerations for questions provide further context and discuss relevant risk factors for *Legionella* growth and spread that users may find helpful. Using the LEAF Marking Guide will improve users' understanding of a facility's water systems and aerosolizing devices and assist facility management with minimizing the risk of Legionnaires' disease. The LEAF and accompanying Marking Guide can be used along with epidemiologic information to determine whether to conduct *Legionella* environmental sampling and to inform a sampling plan. In addition, findings from the environmental assessment can be used to develop a water management program (WMP) by identifying areas at risk for *Legionella* growth or spread. The assessment should be performed on-site by an epidemiologist or an environmental health specialist with knowledge of the ecology of *Legionella*, building water systems, and water treatment. Public health professionals familiar with CDC resources such as the LEAF Marking Guide, *Legionella* Control Toolkit, and PreventLD have the appropriate knowledge to perform the environmental assessment and complete the LEAF.

For more information and detailed guidance on evaluating the key factors for *Legionella* growth in specific water systems and devices, refer to [CDC's Toolkit for Controlling Legionella in Common Sources of Exposure](#). For additional training and information, please see [CDC's resources for health departments](#).

LEGIONELLA ENVIRONMENTAL ASSESSMENT FORM

Please fill out the questions *Person(s) completing the assessment* and *Person(s) interviewed during the assessment*. Several parts of this form may require communicating with a facility manager, facility engineer, facility consultant, industrial hygienist, infection preventionist, etc.

Environmental assessments may occur over multiple days. If this is true for your department, please provide the dates the assessment occurred.



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Sampling

CDC Legionella Sampling Guide

<https://www.cdc.gov/legionella/downloads/cdc-sampling-procedure.pdf>



Centers for Disease Control and Prevention

Sampling Procedure and Potential Sampling Sites

Protocol for collecting environmental samples for *Legionella* culture during a **cluster or outbreak** investigation or when **cases of disease** may be associated with a facility.

Sampling should only be performed after a thorough environmental assessment has been done and a sampling plan has been made. This protocol describes how to take standard biofilm swab, bulk water, and filter samples from commonly sampled sites. This protocol may be used in conjunction with the following tools:



LEGIONELLA ENVIRONMENTAL ASSESSMENT FORM



SAMPLE DATA SHEET



LEGIONELLOSIS OUTBREAK INVESTIGATION VIDEOS:

Legionella Ecology and an Introduction to Environmental Health and Engineering
Conducting and Interpreting the Environmental Assessment

How to Make a Sampling Plan

How to Sample Potable Water

How to Sample Cooling Towers

How to Sample Spas and Fountains



Centers for Disease
Control and Prevention
National Center for Immunization
and Respiratory Diseases

Sampling discussion

- Water vs. Swab
- What does each type of sample tell you:
- Swab samples tell us about the fixture and water samples tell us about the water system
- Swab samples are not taken when aerators from sinks and showerheads cannot be removed
- Sampling is not done at water heaters for residential investigations
- Sampling hot water returns is done on a case-by-case basis

Sample interpretation

- 1cfu/ml is considered positive

Third Party Vendors

ELITE Certified Laboratories in Arizona

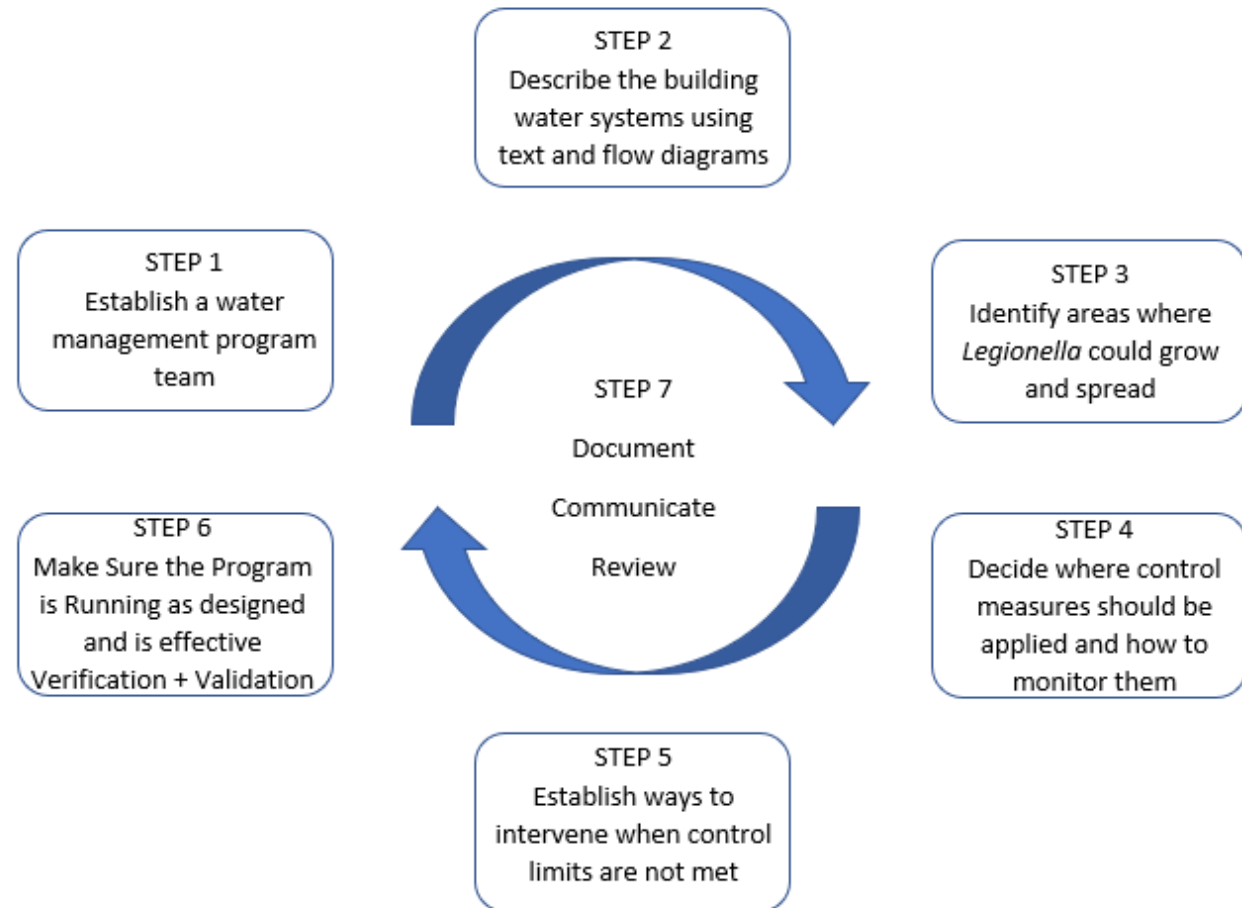
<https://wwwn.cdc.gov/elite/public/memberlist.aspx>

- Eurofins EMLab P&K Phoenix
- Legend Technical Services of Arizona, Inc
- Aerobiology Laboratory Associates, Incorporated
- EMSL Analytical, Inc

Third Party Consultants

<https://www.cdc.gov/legionella/wmp/consultant-considerations.html>

Seven Steps of a Water Management Program (WMP)



CDC Toolkit: Developing a Water Management Program to Reduce *Legionella* Growth and Spread in Buildings
www.cdc.gov/legionella/downloads/toolkit.pdf

STEP 1

Form a Team

- If you don't have staff on hand that have these abilities, you may need to hire a 3rd party or obtain training for staff.
 - Challenge - \$\$\$\$
 - Is the person who pays the bills on the team?

- Communication 
- Multi-disciplinary team
 - Is the team working together or is one person doing most of the work?
 - Everyone listed as a team member is responsible
 - Are all skill sets represented on the team?



STEP 2

Describe your water system using text

Challenges and Opportunities

Are building engineers/facilities personnel on the team?

- Properly describe the building's water system and how water flows through the building/water system
- Knowledgeable on various fixture details
- Develop process flow diagrams that are easily understood by every team member



Taken from the CDC toolkit page 14
<https://www.cdc.gov/legionella/downloads/toolkit.pdf>

STEP 3 Identify areas where *Legionella* could grow and spread

Challenges and Opportunities

- Using the process flow diagram, identify where potentially hazardous conditions and risks could occur in the building water systems (i.e. stagnant/slow water)
- Regularly check building and implement new equipment



Taken from the CDC toolkit page 15
<https://www.cdc.gov/legionella/downloads/toolkit.pdf>

STEP 4 Determine Control Measures / Limits

- Now that you've identified the hazards and risk, what will you do to prevent them?
- Identify **Control Measures** – actions that will be taken to limit growth and spread of *Legionella*. Must be implemented on a regular basis.
 - Heating, adding disinfectant, cleaning
- Identify **Control Points** – locations in the water system where control measures can be applied
- Set **Control Limits** – for each control measure, what values should you be seeing when monitoring to prevent *Legionella* growth and spread
 - Water temperature (120°F), disinfectant levels (chlorine at 1ppm), pH
- **Monitor** Control Limits and Control Measures on a regular basis
- **Challenge:** Existing equipment at facility is inadequate. Example:
 - IMPORTANT:
Document Control Measures, Control Points, and Control Limits.
Always document actions and results when monitoring

STEP 5

Establish ways
to intervene
when control
limits are not
met

Challenges and
Opportunities

- **Corrective actions** are taken when there are deviations outside of the set control limits
- Are corrective actions being followed and done in a timely manner? - ⌚ \$
- Are funds available to pay for the corrective actions?



STEP 6

Make sure the
program is
running as
designed and is
effective
Verification +
Validation

VERIFICATION

Are we doing what we said we would do?

- Documentation
- Documentation
- Documentation
- No Documentation? It didn't happen!



***A person shouldn't verify the action they're responsible for ***

STEP 6

Make sure the
program is
running as
designed and is
effective
Verification +
Validation

VALIDATION

Is our WMP working?

Have we reduced the hazard, (*Legionella*) in the water
system?

Are we taking the appropriate type of tests for *Legionella*?
DNA vs Culture?



STEP 7 Document Communicate Review

Document

- Pertinent emails
- Water quality reports etc.
- Maintenance logs
- Routine flushing logs

Communicate

- Know different communication styles
- Are people being left out of communication?
- Are you over communicating?
- Angry emails / phone calls
- “The possibility of depositions and litigations is intimidating, so there is some pressure to remember each step of an investigation and do each step properly. “



Travel- Associated Investigation timeline

- Case notification
- Site visit with ACDC/EH
 - ACDC confirms patient stayed at facility
- EH begins investigation with water sampling
 - Positive samples require remediation of the water system
 - Post remediation sampling schedule
- If outbreak is confirmed ACDC is brought back into investigation
- Complete EH investigation ends after 12 – 16 months

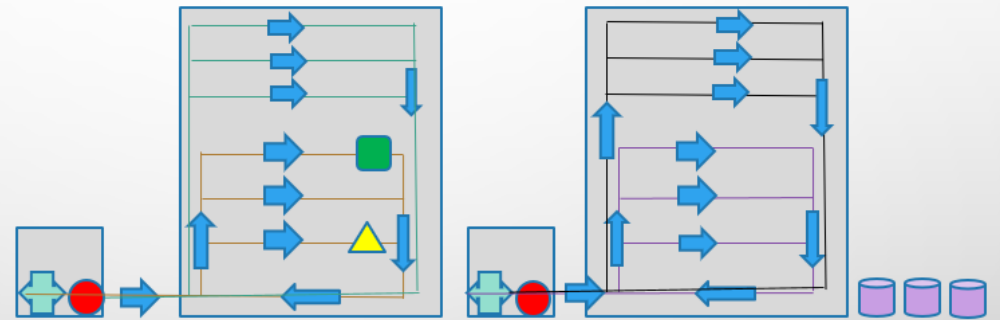
Outbreak Investigation

MULTIPLE BUILDING MULTIPLE RISER SINGLE CASE INVESTIGATION DECEMBER 15

MESSAGE: BUILD A TEAM. PROTECT PUBLIC HEALTH. PROTECT PUBLIC IMAGE OF FACILITY.

- SAMPLE CASE ROOM, DISTAL ROOM, HOT WATER RETURN.

-  FLOW OF WATER
-  CASE ROOM
-  DISTAL ROOM
-  HOT WATER RETURN
-  COOLING TOWER
-  WATER HEATER

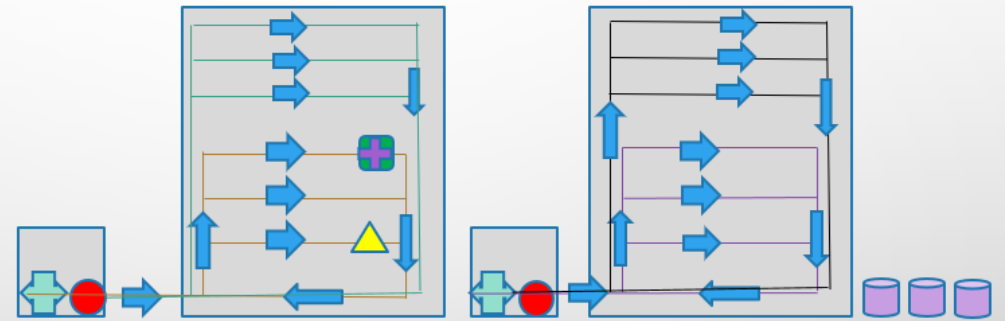


Outbreak Scenario

SINGLE CASE INVESTIGATION POSITIVE SAMPLE SCENARIO. JANUARY 1. - DISINFECTION OF WATER RISER *MESSAGE: DON'T PANIC. FOLLOW THE PLAN.*

- POSITIVE SAMPLE IN DISTAL ROOM. BUILDING 1. LOWER RISER. TEST 1% OF OTHER RISERS.

-  POSITIVE SAMPLE
-  CASE ROOM
-  DISTAL ROOM
-  HOT WATER RETURN
-  COOLING TOWER
-  WATER HEATER



Outbreak Scenario

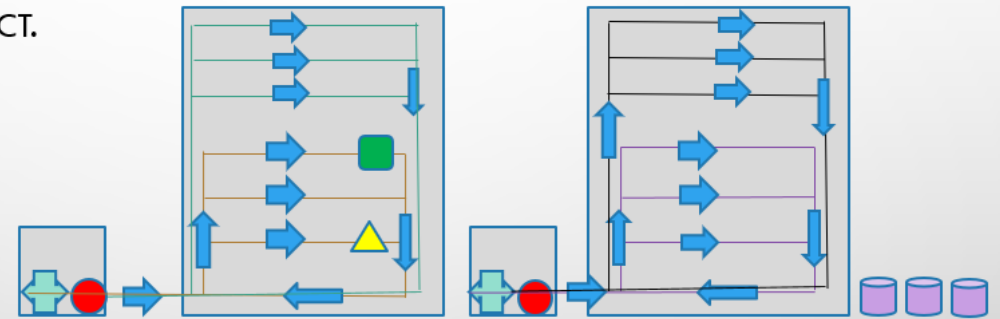
MULTIPLE BUILDING MULTIPLE RISER POSITIVE SAMPLE SCENARIO. JANUARY 15 – FEB 15

MESSAGE: JOB WELL DONE. DON'T ABANDON PLAN.

- EMERGENCY DISINFECTION OF BUILDING 1 LOW RISER. FOLLOW UP SAMPLING SCHEDULE.

ALL SAMPLES NON DETECT.

-  CASE ROOM
-  DISTAL ROOM
-  HOT WATER RETURN
-  COOLING TOWER
-  WATER HEATER



Outbreak Scenario

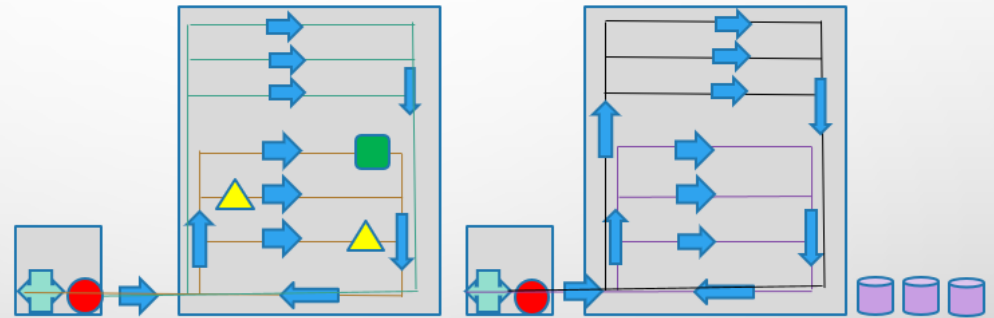
MULTIPLE BUILDING MULTIPLE RISER SECOND CASE. OCTOBER 1 OUTBREAK INVESTIGATION

MORE THAN 1 CASE IN A 12-MONTH PERIOD

MESSAGE: DON'T PANIC. PREPARE FOR PUBLIC NOTICE.

- SAMPLE CASE ROOM, DISTAL ROOM, HOT WATER RETURN. 1% OF OTHER ROOMS

-  POSITIVE SAMPLE
-  CASE ROOMS
-  DISTAL ROOM
-  HOT WATER RETURN
-  COOLING TOWER
-  WATER HEATER



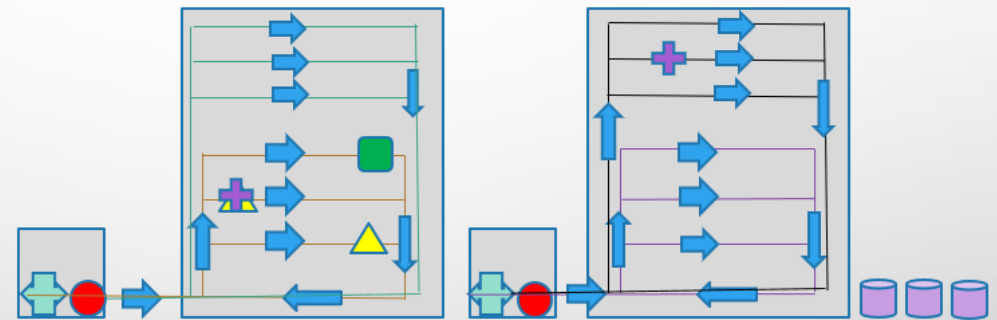
Outbreak Scenario

OUTBREAK INVESTIGATION OCTOBER 15 - PUBLIC NOTICE BY SNHD GUEST NOTIFICATION BY FACILITY

MESSAGE: SNHD IS WORKING WITH FACILITY TO RESOLVE THE PROBLEM AND PROTECT PUBLIC HEALTH.

- EMERGENCY DISINFECTION OF ALL AFFECTED WATER RISERS.

-  POSITIVE SAMPLE
-  CASE ROOMS
-  DISTAL ROOM
-  HOT WATER RETURN
-  COOLING TOWER
-  WATER HEATER

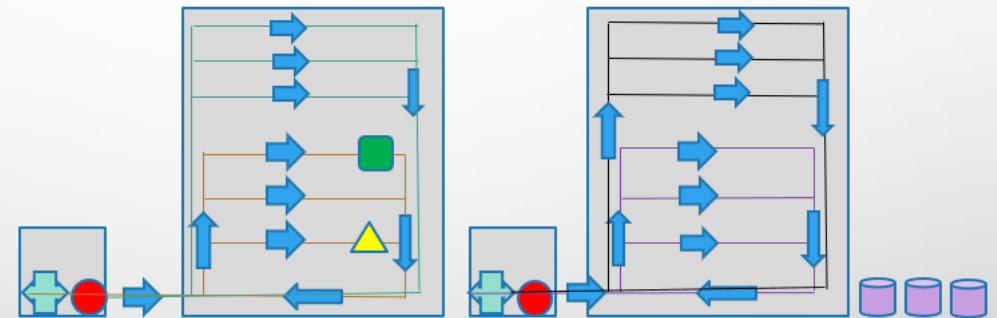


Outbreak Scenario

OUTBREAK INVESTIGATION
POST DISINFECTION SAMPLING SCHEDULE COMPLETE
ALL SAMPLES NEGATIVE
INVESTIGATION ENDS 12 MONTHS LATER IN OCTOBER.

MESSAGE: GOOD JOB. FOLLOW LONG TERM PLAN.

- ALL SAMPLES NEGATIVE
-  FLOW OF WATER
-  CASE ROOM
-  DISTAL ROOM
-  HOT WATER RETURN
-  COOLING TOWER
-  WATER HEATER



Remediation

Remediation

- Historical options
 - Typically heat treatment or hyperchlorination
- Current Practice
 - Chlorine remediation is typically used
- Third party consultants develop remediation protocols
- SNHD does not tell facilities how to remediate
 - SNHD reviews remediation plans

Post Remediation

Post remediation samples will be taken on the following cycle:

- 3 Bi-weekly (every two weeks) sampling events.
 - Once samples are non-detect for *Legionella* the facility moves to
- 3 Monthly sampling events
 - Once samples are non-detect for *Legionella* the facility moves to
- 3 Quarterly sampling events.
 - Once samples are non-detect for *Legionella* the SNHD single case investigation of *Legionellosis* will be completed

Possible Upcoming Issues for Nevada

- AB263
 - Covered Health Care facilities shall adopt and implement a water management program for *Legionella*, including water sampling.
 - Effect on SNHD – currently none

Resources

CDC Legionella Homepage

<https://www.cdc.gov/legionella/index.html>

Legionella Environmental Assessment Form

<https://www.cdc.gov/legionella/downloads/legionella-environmental-assessment-p.pdf>

Legionella Environmental Assessment Form Guide

<https://www.cdc.gov/legionella/downloads/legionella-environmental-assessment-marking-guide-508.pdf>

CDC Legionella Sampling Guide

<https://www.cdc.gov/legionella/downloads/cdc-sampling-procedure.pdf>

CDC Toolkit: Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings

www.cdc.gov/legionella/downloads/toolkit.pdf

ASHRAE 188

<https://www.ashrae.org/technical-resources/bookstore/ansi-ashrae-standard-188-2018-legionellosis-risk-management-for-building-water-systems>

ELITE Certified Laboratories

<https://wwwn.cdc.gov/elite/public/memberlist.aspx>

Third Party Consultants

<https://www.cdc.gov/legionella/wmp/consultant-considerations.html>

Questions?

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