

Welcome

Office for State, Tribal, Local and Territorial Support
presents . . .

CDC Vital Signs **Legionnaires' Disease**

June 14, 2016
2:00–3:00 pm (EDT)



Centers for Disease Control and Prevention

Office for State, Tribal, Local and Territorial Support



Agenda

2:00 pm	Welcome & Introductions	Dagny Olivares, MPA Associate Director, Program Planning and Communication, Office for State, Tribal, Local and Territorial Support, CDC
2:04 pm	Overview	Laura A. Cooley, MD, MPHTM Medical Epidemiologist, Respiratory Diseases Branch, Division of Bacterial Diseases, National Center for Immunization and Respiratory Diseases, CDC
2:10 pm	Presentations	Robert Fitzhenry, PhD Director of Waterborne Diseases, Bureau of Communicable Disease, New York City Department of Health and Mental Hygiene Bill Gaines Principal Engineer, Environmental Quality Office, Ford Motor Company
2:30 pm	Q&A and Discussion	Dagny Olivares, MPA
2:55 pm	Wrap-up	
3:00 pm	End of Call	



CDC Vitalsigns™ Teleconference
to support STLT efforts and build
momentum around the monthly
release of CDC *Vital Signs*



Legionnaires' Disease

Use Water Management Systems in Buildings
to Help Prevent Outbreaks

Laura A. Cooley, MD, MPHTM

Medical Epidemiologist

LCDR, US Public Health Service

Respiratory Diseases Branch

Division of Bacterial Diseases

CDC Vital Signs Town Hall Meeting
June 14, 2016





Legionnaires' Disease

- Causes severe pneumonia that often requires hospitalization
 - Deadly for about 1 in 10 people who get it
- Occurs in people who inhale small droplets of water contaminated with *Legionella*
 - Human-made water systems provide the opportunity for the bacteria to grow and spread
- Can affect anyone, but some people are at increased risk
 - Adults 50 years or older
 - Current or former smokers or people with a chronic lung disease
 - People with an immune system weakened from diseases or medicines



Legionnaires' disease is on the rise



Legionnaires' Disease Is on the Rise

- Incidence nearly quadrupled from 2000 through 2014
- 5,000 diagnosed cases each year
- At least 20 outbreaks reported each year



Findings from CDC Investigations of Building-Associated Outbreaks: Common Causes

- About **2 in 3** are due to **process failures**
- About **1 in 2** is due to **human error**
- About **1 in 3** is due to **equipment failures**
- About **1 in 3** is due to **unmanaged external change**, changes in water quality due to events occurring outside the building
- About **1 in 2** is due to **more than one** of the above problems

Water management problems can lead to Legionnaires' disease outbreaks.

Findings from CDC Investigations of Building-Associated Outbreaks: Common Settings and Sources

- **Common settings**
 - Hotels
 - Long-term care facilities
 - Hospitals
- **Common sources**
 - Showers and faucets
 - Cooling towers
 - Hot tubs
 - Decorative fountains and water features





Tool to Identify Buildings at Increased Risk

Survey your building (or property) to determine if you need a water management program to reduce the risk of *Legionella* growth and spread.

If you answer **YES to any of questions 1 through 4, you should have a water management program for *that building's* hot and cold water distribution system.**

Healthcare Facilities

- Yes ____ No ____ 1. Is your building a healthcare facility where patients stay overnight or does your building house or treat people who have chronic and acute medical problems[†] or weakened immune systems?
- Yes ____ No ____ 2. Does your building primarily house people older than 65 years (like a retirement home or assisted-living facility)?
- Yes ____ No ____ 3. Does your building have a centralized hot water system (like a hotel or high-rise apartment complex)?
- Yes ____ No ____ 4. Does your building have more than 10 stories (including basement levels)?

Devices in buildings that can spread contaminated water droplets should have a water management program even if the building itself does not. If you answer **NO to all of questions 1 through 4 but **YES** to any of questions 5 through 8, you should have a water management program for *that device*.**

- Yes ____ No ____ 5. Does your building have a cooling tower*?
- Yes ____ No ____ 6. Does your building have a hot tub (also known as a spa) that is not drained between each use?
- Yes ____ No ____ 7. Does your building have a decorative fountain?
- Yes ____ No ____ 8. Does your building have a centrally-installed mister, atomizer, air washer, or humidifier?

A *Legionella* water management program consists of:

- 1 Establishing a water management program team.
- 2 Describing the building water systems using words and diagrams.
- 3 Identifying areas where *Legionella* could grow and spread.
- 4 Deciding where control measures should be applied and how to monitor them.
- 5 Establishing ways to intervene when control limits are not met.
- 6 Making sure the program is running as designed and is effective.
- 7 Documenting and communicating all the activities.

www.cdc.gov/legionella/WMPtoolkit

SOURCE: ASHRAE 188: Legionellosis: Risk Management for Building Water Systems
June 26, 2015.



State and Local Officials Can

- Incorporate *Legionella* water management programs into licensing and accreditation requirements for healthcare facilities.
- Consider changing building and public health codes to include *Legionella* water management programs.
- Provide tools and information to help local building owners and managers carry out *Legionella* water management programs.
- Investigate reports of Legionnaires' disease promptly to prevent more people from getting sick.

New CDC toolkit helps you

- Identify buildings at increased risk of growing and spreading *Legionella*
- Develop and use a *Legionella* water management program that is comprehensive, effective, and in line with industry standards



Developing a Water Management Program to Reduce *Legionella* Growth & Spread in Buildings

A PRACTICAL GUIDE TO IMPLEMENTING
INDUSTRY STANDARDS



www.cdc.gov/legionella/WMPtoolkit



Laura Cooley

404-639-2096

LCooley@cdc.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



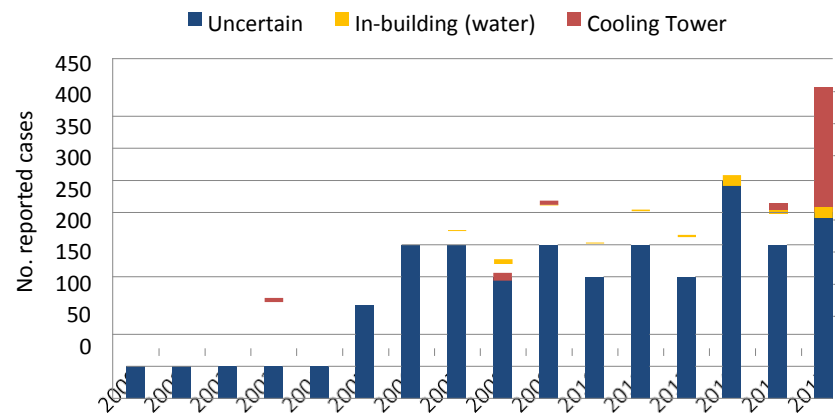
Legionnaires' Disease Caused by a Cooling Tower — New York City, 2015

Robert Fitzhenry, PhD

Director of Waterborne Diseases, Bureau of
Communicable Disease, New York City
Department of Health and Mental Hygiene

Epidemiology of Legionnaires' Disease in New York City (NYC)

Figure 1: No. Reported Legionellosis Cases in NYC by Year and Suspected Source*, 2000-2015



* Cases from documented or suspected cooling tower and in-building-related clusters;
Data from Epi-Query and BCD legionellosis surveillance staff

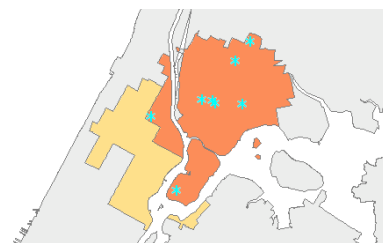


Surveillance

- **Lab reports transmitted electronically**
- **Lab report triggers case investigation**
 - Typically completed within 2–5 days
 - Review medical chart
 - Interview patient or next of kin about patient whereabouts before illness
- **Signal investigation:**
 - SatScan signal based on home or work address with a recurrence interval ≤ 30 days
 - “Analyst of the week” signal based on home address (count of diagnoses in borough or United Hospital Fund neighborhood during past 4 weeks > 2 standard deviations above the adjusted historical baseline)
 - Proximity scan (new): Three or more confirmed or pending cases based on home or work address occurring within 0.1 mile of each other (though not in the same building) within 30 days
 - Disease reviewer identifies 3 or more cases who visited the same area within 30 days

The Signal (July 17, 2015)

- Routine surveillance
- 8 cases of Legionnaires' disease
- South Bronx area
- No common buildings visited by many patients
- Most homes spread across 7 ZIP codes (6.5 mi²)
- Outdoor dissemination most likely exposure
- Cooling tower was the probable source





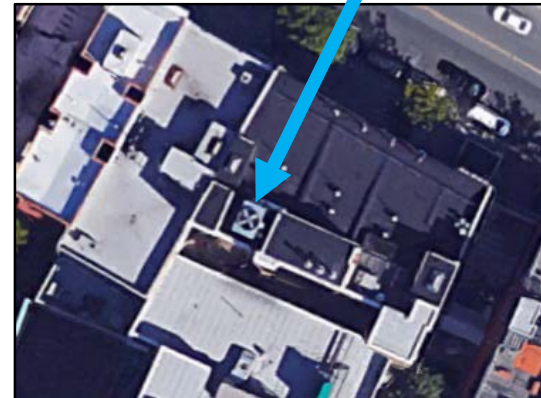
Case Investigations

- **Outbreak case:**
 - Legionnaires' disease (clinical illness + laboratory test)
 - Spent time in 7 ZIP codes
 - Symptom onset after July 1, 2015
- **Outreach to clinicians via Health Alert and calls:**
 - Consider Legionnaires' disease
 - Treat with antibiotics
 - Test including collecting respiratory specimens for culture
- **Medical examiner performed autopsies for case identification, specimen collection**
- **Notified other jurisdictions to help identify cases elsewhere**
 - Epi-X
 - Phone calls to nearby jurisdictions



Environmental Source Identification

- Locate nearby cooling towers
- Owners not required to register cooling towers
- City administrative data
- Satellite imagery
- Reports from outside NYC





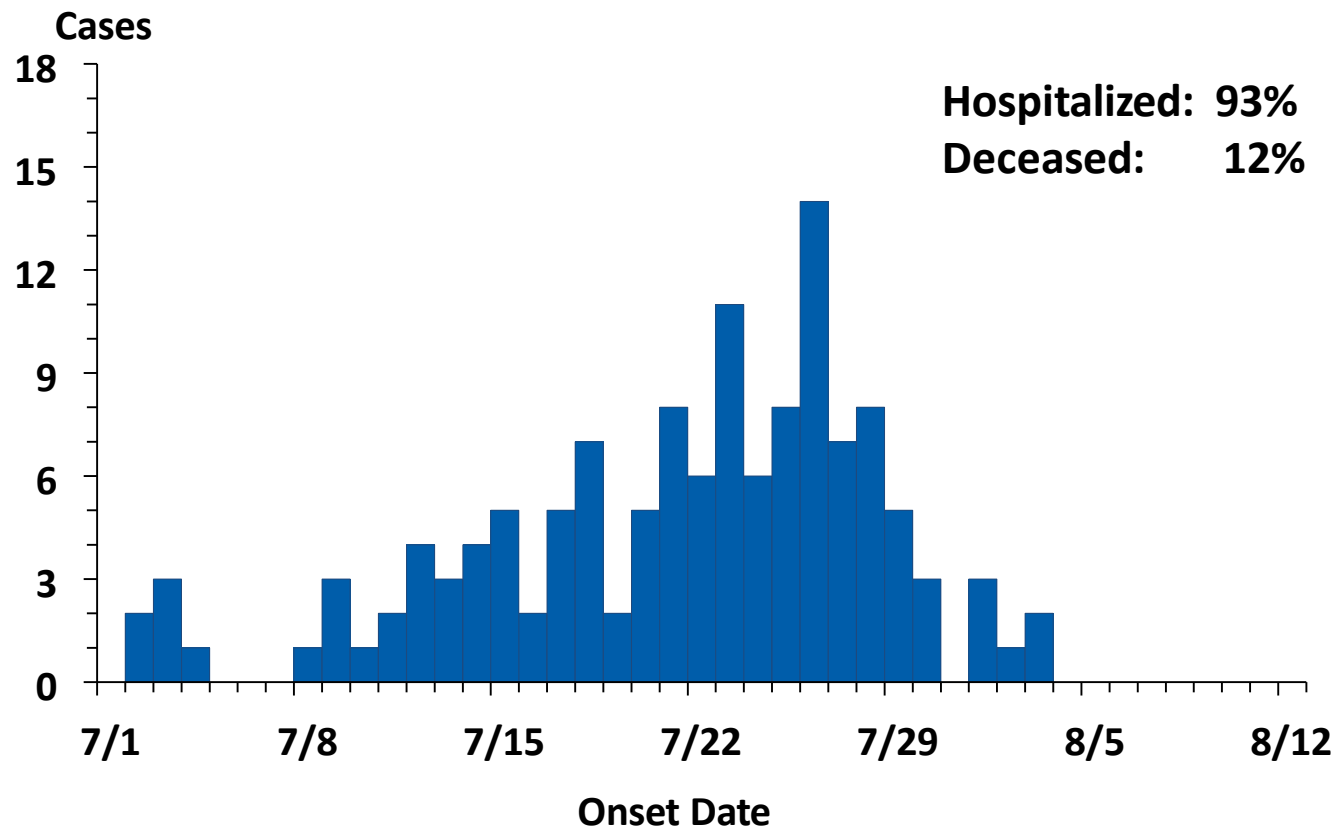
Environmental Testing

- **Sampling at cooling towers**
 - Collected water from pools
 - Collected swabs from biofilm
 - Tested disinfectant levels
- **Testing by culture and polymerase chain reaction (PCR)**
 - Culture
 - Demonstrates viable organisms are present
 - Isolate for comparison
 - 5–14 days for growth
 - PCR
 - Can't tell viable from dead
 - Gives results within hours
 - Can focus testing and help give confidence to remediation orders





Legionnaires' Disease Outbreak Cases (N=138)





Cooling towers
(N=55)

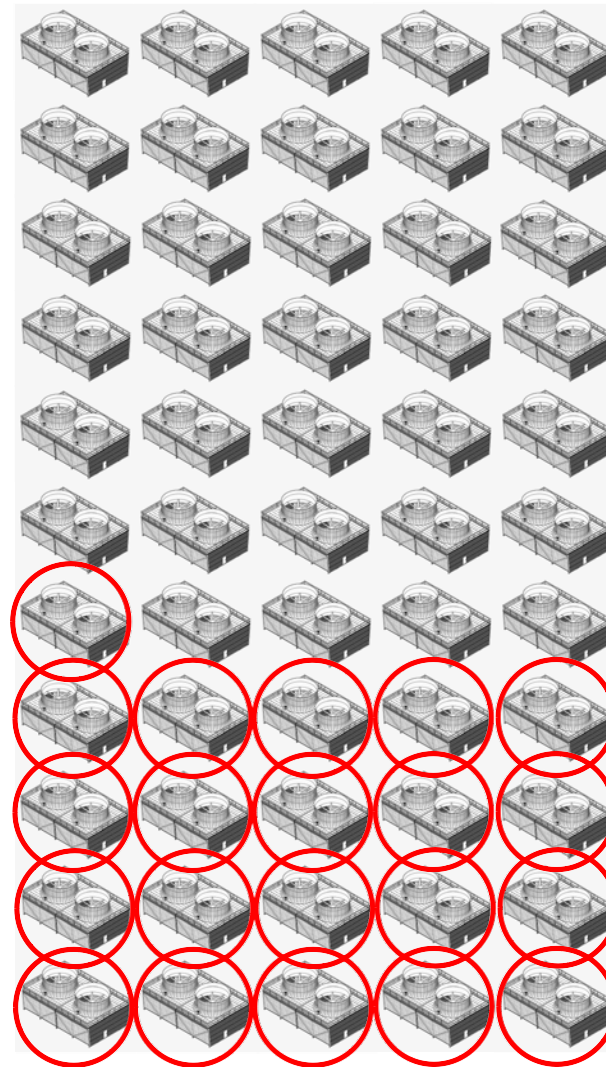


Legionella pneumophila
serogroup 1 (LP1) DNA
by PCR
21 (38%)

*Ordered to start remediation
based on screening results*

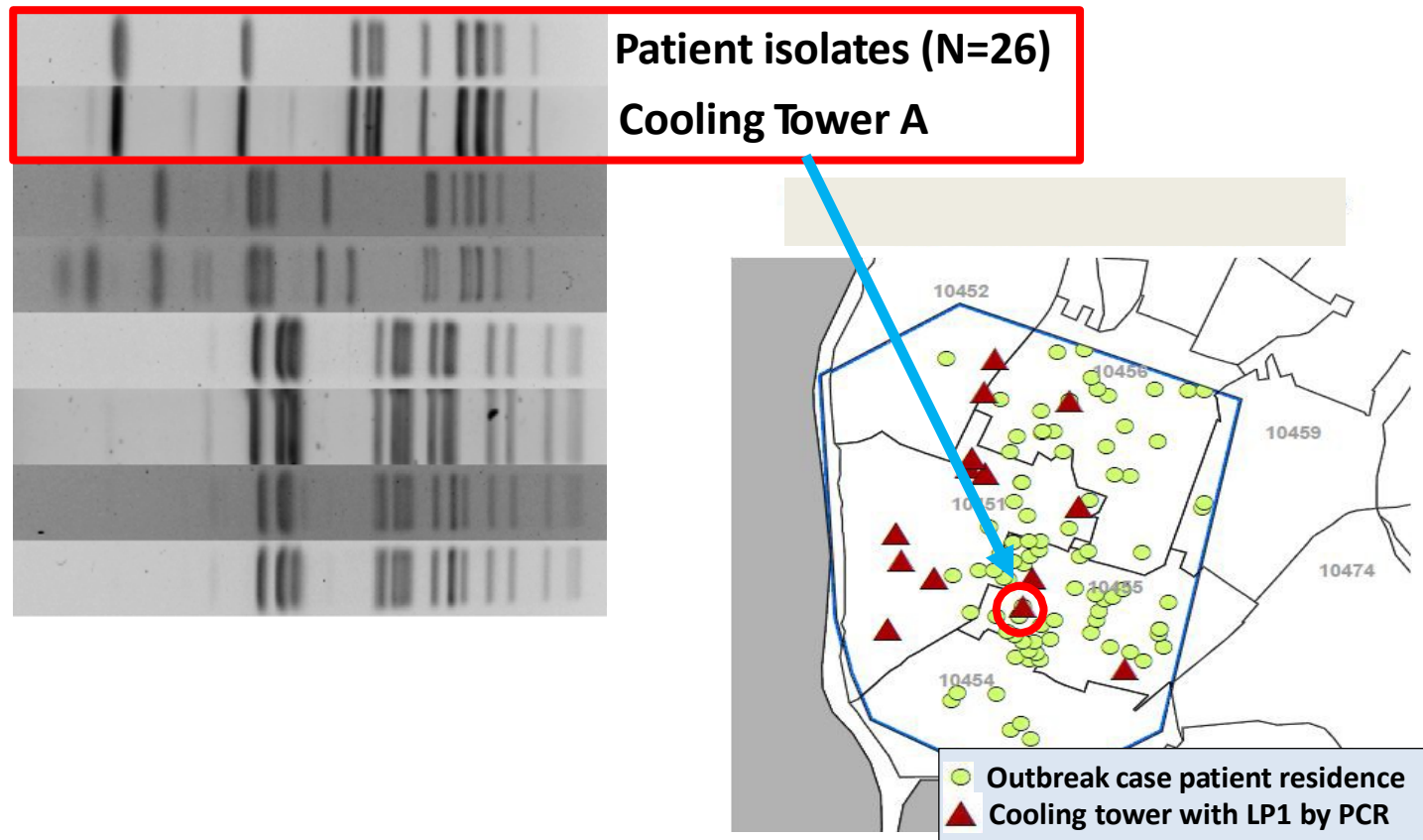


LP1 by culture
14 (25%)



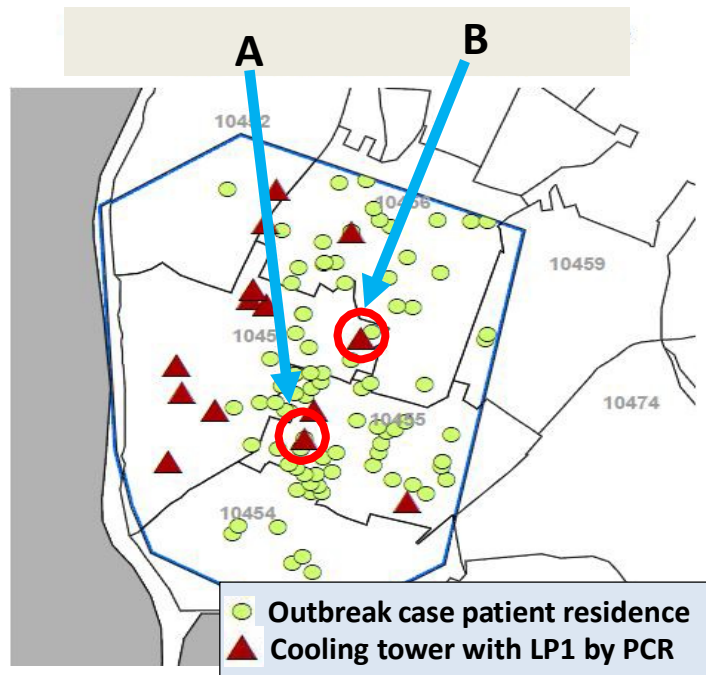


Identifying the Outbreak Source by Pulsed-Field Gel Electrophoresis (PFGE)



Follow-Up Sampling at Cooling Towers

- After cooling tower remediation had begun, collected follow-up water and swab samples
- Cooling Tower B: LP1 by PCR
 - Not in initial sampling
 - Indistinguishable from patient cluster by PFGE





Adding the Laboratory Findings

	Cooling Tower A	Cooling Tower B
Location	Top of hotel	Top of housing shelter
Nearby cases	2 cases in hotel guests, 4 cases in supportive housing on city block	No cases in housing shelter residents or nearby housing
Clustering	56 cases over 26 days of the outbreak period	33 cases over 14 days of the outbreak period
PFGE	Indistinguishable	Indistinguishable
Sequence-based typing (SBT)	Indistinguishable	Indistinguishable
Whole genome sequencing (WGS)	Indistinguishable	1 SNP difference



NYC Cooling Tower Rules Most Robust in US

- Emergency rules during the outbreak
- Effective date May 9, 2016
 - Register
 - Develop and submit maintenance plan
 - Inspection by qualified inspector every 90 days
 - Biannual cleaning and disinfection
 - Regular water chemistries and heterotrophic plate counts
 - Test for *Legionella* every 90 days
- City to inspect annually



Thank you

New York City Clinicians and Hospital Staff

New York City Department of Health and Mental Hygiene

- Bureau of Communicable Disease
- Public Health Laboratory
- Bureau of Environmental Science and Engineering

New York State Department of Health

- Wadsworth Center
- Center for Environmental Health Centers for Disease Control and Prevention
- Respiratory Diseases Branch
- Environmental Health Services Branch



Contact information: rfitzhenry@health.nyc.gov



Global Water Quality Management Program (GWQMP)

***Bill Gaines
Principal Engineer
Ford Motor Company***



“Water Quality Management”

Health & Safety / Asset Preservation

- Considers physical, chemical, & microbial risks of each system
- Corrosion, deposit (scaling), & microbial control is required for *all* systems
- Ford chose to have an entirely *prescriptive* system
- Response action at ≥ 1 colony-forming unit per milliliter (CFU/mL)



What guidance was there in 2001?

Occupational Safety & Health Administration
CDC

World Health Organization
ASHRAE

Cooling Tower Institute

Health and Safety Executive L8 (U.K.)

Association of Water Technologies

Allegheny County

Victoria Dept. of Health (Australia)

Social & Health Directorate (Norway)

Legionella Guidelines (Tasmania)

Enforcement Action for Legionella (Singapore)

What guidance was there in 2005?

Comparison of Recommendations for Potable Water Systems

□ Not addressed □ Briefly addressed ■ Addressed in detail	Temperature °C (°F)					Chlorine, ppm [flush duration, min]			Shower Heads/Faucet Aerators	Routine Environmental testing for <i>Legionella</i> (addressed/ recommended)
	Hot				Cold	Maintenance (following outbreaks)	Emergency			
	Maintenance			Residual						
	Storage	Point of use	Return				"Shock" Dose			
CDC Environmental Infection Control	>60 (140)	≥51 (124)	≥51 (124)	71-77 (160-170) ≥ [5]	<20 (68)	1-2	□	2 [5]	□ ¹	■/conditionally
CDC Nosocomial Pneumonia	□	≥51 (124)	□	71-77 (160-170) ≥ [5]	<20 (68)	1-2	□	2	□ ²	■/conditionally
CDC bone marrow Transplant	□	□	□	□	□	□	□	□	□	□/conditionally
CDC Cruise Ships	□	□	□	□	□	□	□	□	□	□
OSHA	>60 (140)	≥50 (122)	50 (122)	≥70 (158) [20]	20 (68)	□	20 - 50 [60- 120]	1-2	□	■/No
ASHRAE 12- 2000	>60 (140) [high risk] ≥49 (120) [other]	□	≥51 ⁴ (124)	71-77 (160-170)	<20 (68)	□	□	2 [5]	□ ²	■/No
ASTM	>60 (140)	≥50 (122)	□	≥70 (158) x 2-24hrs [5]	<20 (68)	□	10 (hot) 20 x 2hrs or 50 x 1hr (cold)	□	□ ²	■/ conditionally ⁷
AWT	□	≥50 (122)	□	60-66 (140-151) [30]	□	□	20-50	1-2	□	■/Yes
JCAHO	□	□	□	□	□	□	□	□	□	□
CHI	□	□	□	□	□	□	□	□	□	□
Maryland	60 (140)	50 (122)	□	□	□	□	□	□	□	■/Yes
Texas	60 (140)	50 (122)	□	□	□	□	□	□	□	■/conditionally
Allegheny County	57.5- 62.5 (135- 145)	50- 60 (122- 140)	50 (122)	>70 (158) [20-30]	<20 (68)	□	□	□	□ ⁸	■/Yes

Barry Fields, Matthew Moore circa 2005

"Control of Legionellae in the Environment: A Guide to the US Guidelines"

HACCP / FMEA

Hazard Analysis and Critical Control Points (HACCP)

1. Conduct a hazard analysis – create cross-functional team, flow diagram
2. Identify critical control points (CCP) – where can you exert control?
3. Establish limits for each CCP – upper/lower limit or range
4. Establish CCP monitoring requirements
5. Establish corrective actions if limits are not met
6. Establish procedures for ensuring the HACCP system is working as intended
7. Establish reporting/record keeping requirements

Failure Mode and Effects Analysis (FMEA)

1. Occurrence
2. Severity
3. Detection



Determines risk category
and level of control &
monitoring required

Hazard Analysis

Amplification

Exposure

Case History



Equipment Having Individual GWQMP Operational Monitoring & Corrective Action Requirements

Heat Exchange Devices

- Cooling Towers

- Cooling Lagoons & Mill Ponds

Potable Hot Water Systems

- >10-gallon

- ≤10-gallons

Evaporative Cooling Equipment

- Recirculating Water Air Wash Humidifiers (spray-type)

- Direct Evaporative Cooling Systems

- Wetted Media Evaporative Humidifiers

- Portable & Small Wetted Media Evaporative Humidifiers

Whirlpool Spa Baths, Hot Tubs, & Hydrotherapy Equipment

Metalworking Fluids

Parts Washers <140°F having pH.4.0–10.5

Vehicle Wash/Vehicle Leak Test

Paint Spray Booths

Wet Collectors & Scrubbers having pH.4.0–10.5

Immersion Leak Tests (Dunk Tanks)

Tank-Fed Domestic Cold Water Systems

Fire Protection Systems

Decorative Water Features

Emergency Eyewash & Shower Systems

Drinking Water Systems

Vehicle Phosphate & E-Coat Systems

Deionized and Softened Water Systems

Instantaneous Potable Hot Water Systems

Water Picks & Pressure Washers

Negligible Risk Systems

Chilled Water Systems

Steam Boilers

Compressed Air Systems with Air Driers

Glycol-Based Leak Testers

Wastewater Treatment Systems

Storm Water Retention Ponds

Air Conditioners (personal)

Standing Water

Bottled Drinking Water

Distilled Water

Groundwater Sumps

HVAC Systems Without Humidifiers

Closed-Loop Cooling Systems

Metalworking Fluids

Plumbed, Potable Water Systems (covered by FAS08-251)

Exclusions

Any water systems that meet any of the following criteria throughout the entire system are excluded from the GWQMP requirements

- Temperature $\geq 140^{\circ}\text{F}$ (60°C)

- pH ≥ 10.5 or ≤ 4.0

- Salinity $\geq 3\%$ (or conductivity of $\geq 45\text{ mS/cm}$)

- Ethylene glycol or polypropylene glycol $\geq 25\%$

Supporting Tools

GWQMP Training course



Ford Learning & Development
Go Further

Global Water Quality Management

Description
Provides an introduction and background on the GWQMP standard, the biology of Legionella bacteria, risk analysis of various water systems, best practices, Legionella sampling protocol, response planning, and Legionella Tool Box review. Required Frequency: Once Length: .75 Hours

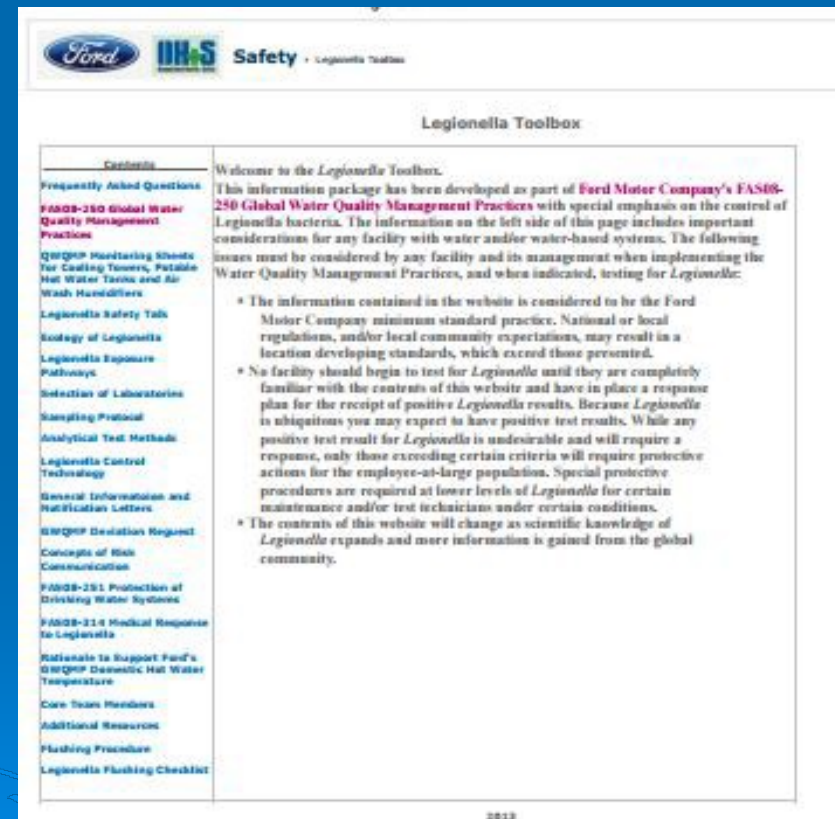
Abstract/Target Audience
Required (Manufacturing Directive): Facility personnel responsible for implementing the requirements of the GWQMP standard. Note: The training is attached to FAS08-250 under Attachment 10 Global Water Quality Management Training.pdf

Resource Number and Domain
C20600 - Ford North America Hourly Domain

Version
Owner
Manufacturing

Delivery Mode
Instructor Led Training

Website with hot links



Legionella Toolbox

Welcome to the Legionella Toolbox.

This information package has been developed as part of Ford Motor Company's FAS08-250 Global Water Quality Management Practices with special emphasis on the control of Legionella bacteria. The information on the left side of this page includes important considerations for any facility with water and/or water-based systems. The following issues must be considered by any facility and its management when implementing the Water Quality Management Practices, and when indicated, testing for Legionella:

- * The information contained in the website is considered to be the Ford Motor Company minimum standard practice. National or local regulations, and/or local community expectations, may result in a location developing standards, which exceed those presented.
- * No facility should begin to test for Legionella until they are completely familiar with the contents of this website and have in place a response plan for the receipt of positive Legionella results. Because Legionella is ubiquitous you may expect to have positive test results. While any positive test result for Legionella is undesirable and will require a response, only those exceeding certain criteria will require protective actions for the employee-at-large population. Special protective procedures are required at lower levels of Legionella for certain maintenance and/or test technicians under certain conditions.
- * The contents of this website will change as scientific knowledge of Legionella expands and more information is gained from the global community.

Contents

- Frequently Asked Questions
- FAS08-250 Global Water Quality Management Practices
- GWQMP Monitoring Sheets For Cooling Towers, Potable Hot Water Taps and Air Wash Humidifiers
- Legionella Safety Talk
- Ecology of Legionella
- Legionella Exposure Pathways
- Selection of Laboratories
- Sampling Protocol
- Analytical Test Methods
- Legionella Control Technology
- General Information and Notification Letters
- GWQMP Deviation Request
- Concepts of Risk Communication
- FAS08-251 Protection of Drinking Water Systems
- FAS08-214 Medical Response to Legionella
- Rationale to Support Ford's GWQMP Domestic Hot Water Temperature
- Core Team Members
- Additional Resources
- Flushing Procedure
- Legionella Flushing Checklist

Supporting attachments

- Attachment 1 Cleaning and Disinfection Procedures.pdf
- Attachment 2 Health and Safety.pdf
- Attachment 3 Plant Response Plan for Legionella Results.pdf
- Attachment 4 ShutDown StandBy and StartUp Procedures.pdf
- Attachment 5 Negligible Risk Systems.pdf
- Attachment 6 Dipslide Procedure for Process Fluid Microbial Testing.pdf
- Attachment 7 Bioluminescence Factsheet.pdf
- Attachment 8 Approved Biocides.pdf
- Attachment 9 GWQMP Deviation Request.pdf
- Attachment_10, Global Water Quality Management Training.pdf

Searchable Database!

Cooling Towers

Narrative

3.4.1.1 Cooling Towers

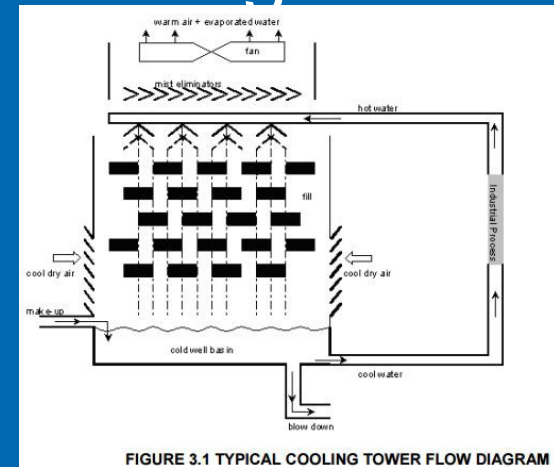
Cooling towers at Ford Motor Company can be found as part of the production process in many areas, for example, providing a heat sink for air compressors, hydraulic oils cooling, spot welders, dynamometer cooling, metalworking systems, laser welder cooling, furnace cooling, and similar processes. Cooling towers may also be used as part of air conditioning systems for paint spray booth processes and as comfort air-conditioning systems for climate control in office buildings. There are other locations where cooling towers are found and used.

The term "cooling towers" is used in this section to describe all open evaporative cooling systems to include *inter alia*: cooling towers (natural draft, forced draft, or induced draft), evaporative condensers, sensible coolers, fluid coolers, and indirect evaporative coolers. Generally the systems are expected to be reasonably clean and free from excessive process contamination or accumulation of debris. Heat loss from the cooling tower is primarily through latent heat due to the phase change from water to vapor with the water not coming in to direct contact with the product or process being cooled. Typical cooling tower schematics and pictures are shown in figures 3.1 through 3.3.

Engineering limits for cooling systems are to be specified locally, the goal of the engineering limits for the treatment program are to achieve the performance criteria as specified in Section 3.1.

The preferred method of biocidal treatment for cooling towers and cooling lagoons is the continuous application of an oxidizing biocide to attain a residual of 0.5 to 1.0 mg/L as free halogen (the sum of free chlorine [Cl₂] and/or free bromine [Br₂]) in the recirculating water. Once adequate levels of control have been established, including control of biofilm, the continuous addition of an oxidizing biocide may be reduced to between 0.2 and 0.5 mg/L as free halogen (the sum of free chlorine [Cl₂] and/or free bromine [Br₂]). Ideally the free chlorine or bromine residual should be controlled by an automatic in-line oxidation/reduction potential (ORP) analyzer. Where appropriate, a biocidal dispersant may be of use in reducing biofilm. The oxidizing biocide may be backed-up with an occasional slug dose of non-oxidizing biocide with proven efficacy against *Legionella* (see Section 3.2 for a list of approved biocides).

Diagram



Pictures



FIGURE 3.2 TYPICAL COOLING TOWER TOP DISTRIBUTION AND FANS

Cooling Tower Monitoring Requirements

Task Test and record bacteriological quality (total colony count) of the system water. Refer to total colony count in Section 3.1.4.	Minimum Frequency Monthly
Monitor and record the following for system water: - oxidizing biocide residual* - inhibitor - pH* - conductivity* - temperature* - cycles of concentration - Langelier index (or equivalent)* - calcium hardness - alkalinity	Weekly
Monitor and record the following for make-up water: - calcium hardness (see Section 3.1.3) - alkalinity (total and free [carbonate]) - pH - iron (optional) - manganese (optional) - phosphate (optional) - silica (optional)	Every 6 months (for city or controlled source) Quarterly (for well or other source) Weekly (for surface water)
Record make-up/blow down (via meter or estimate).	Weekly
Check operation of blow down control.	Weekly
Check chemical dosing equipment; - chemical level check - operational integrity.	Weekly
Visual check of the system for changes in growths, deposits, etc.	Weekly
Check operation of sump immersion heaters.	As required
Visual check of operation of sprays, fans, and drift eliminators.	Monthly
Calcium mass balance monitoring for scale. **	Weekly
Monitor corrosion rates using weight loss coupons matched to system metallurgy in accordance with ASTM G4-01 (ref. 7.2.1 in Section 7) or other acceptable methods (see Section 3.1.2)	Annually
For seasonal towers, conduct off-line disinfection prior to start up (see Section 1 of Attachment 1).	Annually
Conduct off-line cleaning and disinfection (see Section 1 of Attachment 1)	Annually or more frequently as required by testing
Sample and analyze for <i>Legionella</i> (see Section 3.5.2).	Quarterly
Review above water treatment program parameters for performance, cost, usage, etc.	Quarterly

Task

Test and record bacteriological quality (total colony count) of the system water. Refer to total colony count in Section 3.1.4.

Minimum Frequency
Monthly

Monitor and record the following for system water: - oxidizing biocide residual* - inhibitor - pH* - conductivity* - temperature* - cycles of concentration - Langelier index (or equivalent)* - calcium hardness - alkalinity

Weekly

Cooling Tower Response Plan

3.5.3 Action Plans *Legionella* testing is not required for system types other than those discussed in this section. *Legionella* counts in all systems are to be less than 1 cfu/mL. If confirmed *Legionella* counts are ≥ 1 cfu/mL, refer to the plant response plans in Attachment 3 and implement them. In addition, the following actions are required following receipt of a confirmed *Legionella* count ≥ 1 cfu/mL:

COOLING TOWERS, COOLING LAGOONS, AND INDIRECT EVAPORATIVE COOLERS

Legionella Count
Less than 1 cfu/mL

Action

System under control: Continue with routine maintenance program retest system in accordance with the schedule.

1 - 10 cfu/mL

Investigate problem and review Water Treatment Program: Within 7 days, add an extra dose of biocide as recommended by chemical suppliers. Retest the system again 7 to 14 days after biocide additions.

>10 - 1,000 cfu/mL

Investigate problem and review Water Treatment Program: Immediately perform an on line disinfection of the system (Section 1 of Attachment 1). Retest the system again after 7 to 14 days.

>1,000 cfu/mL

Immediately submit GERT report. Investigate problem and perform a third party review of the Water Treatment Program: Immediately shut down system and perform offline cleaning and disinfection (Section 1 of Attachment 1). Bring system back on line and ensure dosing equipment is functional Retest the system again after 7 to 14 days.

Investigate problem and review Water Treatment

Program: Within 7 days, add an extra dose of biocide as recommended by chemical suppliers. Retest the system again 7 to 14 days after biocide additions.

Investigate problem and review Water Treatment Program: Immediately perform an on line disinfection of the system (Section 1 of Attachment 1). Retest the system again after 7 to 14 days.

Immediately submit GERT report. Investigate problem and perform a third party review of the Water Treatment Program: Immediately shut down system and perform offline cleaning and disinfection (Section 1 of Attachment 1). Bring system back on line and ensure dosing equipment is functional Retest the system again after 7 to 14 days.

Immersion Leak Test (Dunk Tank)

Low-Hazard Class

No aerosolization, case history, nutrient addition, or amplification potential

IF GLYCOL IS USED:

Task	Minimum Frequency
Monitor glycol concentration, maintain at 25% or greater	Weekly

IF GLYCOL IS NOT USED:

Task	Minimum Frequency
Clean tank using the Disinfection Procedure for Immersion Leak Tests, Section 9 of Attachment 1	Annually
Drain and refill with potable water	Weekly
Visual check for growths, deposits, etc.	Daily

of Samples ≥ 1 CFU/mL

Year	Total Samples	Total Positive	% Positive
2009	3,089	101	3.3%
2010	3,182	146	4.6%
2011	2,922	104	3.6%
2012	2,350	86	3.7%
2013	1,915	63	3.3%
2014	2,209	69	3.1%
2015	2,690	88	3.3%
Total:	18,357	657	3.6%

Legionella sampling is only performed on high-risk systems: Cooling towers, potable hot water, recirculating spray-type humidifiers, wetted media humidifiers (if no high-efficiency particulate air or HEPA filter is present), & hot tubs.



Contact Information

Bill Gaines
Principal Engineer

Ford Motor Company
Environmental Quality Office
Suite 800 FPN, 290 Town Center Drive
Dearborn, MI 48126

bgaines1@ford.com
(313) 390-7988

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July 12, 2016

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For more information, please contact Centers for Disease Control and Prevention.

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The findings and conclusions in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



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