Why is Prevention of Legionellosis Necessary?

Legionellosis

By The Numbers

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Legionellosis

By The Numbers

120,000

The approximate number of people who have died from legionellosis in the U.S. since scientists and engineers worked out the cause and how to prevent the disease thirty-five years ago.

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Legionellosis

By The Numbers

34,000

The number of direct healthcare dollars it costs to treat a single case of legionellosis in the U.S.

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Legionellosis

By The Numbers

12

The number of dollars of indirect cost for every direct healthcare dollar spent on pneumonia due to missed time, disability and lost productivity.

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Legionellosis

By The Numbers

Several Billion

The annual cost in dollars to the U.S. economy due to legionellosis. Every year!

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Legionellosis

By The Numbers

$193,000,000

The largest jury award (so far) for gross negligence and other failures in a case of legionellosis that resulted in long-term disability and severe debilitation. The case was not fatal.

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ASHRAE Standard 188P

Prevention of Legionellosis Associated with Building Water Systems

An Update

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Public Review Draft

ASHRAE® Standard

Proposed New Standard 188, Prevention of Legionellosis Associated with Building Water Systems

The American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) develops the following three types of voluntary consensus standards in accordance with the American National Standards Institute (ANSI) rules and regulations, and as accredited by ANSI:

1) Method of Measurement or Test
2) Standard Design
3) Standard Practice

ASHRAE Standard 188P is a Standard Practice.

Summary of Proposed New Standard 188, Prevention of Legionellosis Associated with Building Water Systems

- ▸Compliance with this Standard Practice requires that facility managers/owners establish a team with assigned responsibilities and accountabilities.

- ▸The first job for the team is to describe for each facility the way water is processed and used in the facility. This description must be schematically represented in process flow diagrams. Each processing step must be named and numbered on the diagrams.

Summary of Proposed New Standard 188, Prevention of Legionellosis Associated with Building Water Systems

▸Next, the team is required to perform systematic hazard analysis to:

1) identify the potential hazards for each step in the process
2) decide if the risk of those hazards is significant (yes or no) and if "yes"
3) determine what hazard control is being applied or could be applied at that processing step. Every step in the process at which hazard control is applied must be designated a critical control point.

Summary of Proposed New Standard 188, Prevention of Legionellosis Associated with Building Water Systems

▸For every critical control point, the team must address four issues about the hazard control method being applied:

(1) the critical control limit
(2) the hazard control monitoring method
(3) the frequency of monitoring the hazard control
(4) the corrective actions to be taken if the critical control limit is violated.

Summary of Proposed New Standard 188, Prevention of Legionellosis Associated with Building Water Systems

- Lastly, the team must decide how it will confirm that the overall plan is being implemented (verification) and provide evidence that the plan is effective (validation).

Timeline

•Proposed standard was approved in July 2010 by the Project Committee

•First public review was completed in November 2010

•Revisions were made and approved in April 2011

•Second public review (45 days) closed successfully on July 25, 2011

•Publication could be by the end of 2011 but will probably be in 2012

A Brief History of Hazard Analysis and Critical Control Point Plans
Page 1 of 2

People often associate HACCP with food safety. But food safety experts did not "invent" this system nor did they even develop it. Rather, they adapted it for food safety from a long, successful history of process hazard analysis and control practice and they did so directly in response to a specific need by the National Aeronautic and Space Administration (NASA).

So, it is quite accurate to say that the first applications of HACCP principles were not for food safety. Foodborne illness prevention was not the motive for developing a standardized method for what to do with hazard analysis and control information.

The US Armed Forces after WWII and then later, the National Aeronautics and Space Administration were first to develop and codify these principles for many processes such as, for example, safely making and using munitions and rockets.

A Brief History of Hazard Analysis and Critical Control Point Plans
Page 2 of 2

Today, these hazard analysis and control principles are the basis for many commercial processes including those used in the automotive industry. Ford Motor Co. is famous for its leadership to establish manufacturing standard practices based on sound principles of failure mode effects analysis (FMEA) principles, which were precursors to HACCP principles. The HACCP system is derived directly from this rich and successful development history.

HACCP is now specified in the *Codex Alimentarius* published by the World Health Organization. This is the global standard of practice for preventing environmental-source disease.

In February 2007, the World Health Organization published a definitive work loaded with specific technical guidance and references entitled *Legionella* and the Prevention of Legionellosis. This work is entirely organized around the principles of hazard analysis and control derived from HACCP. Every chapter in the book is arranged around HACCP principles. The work advocates that water safety for all building water systems should be managed in accordance with HACCP.

Principles of Hazard Analysis and Critical Control Point (HACCP)

1. Conduct a hazard analysis.
2. Determine the critical control points.
3. Establish critical limits for each critical control point.
4. Establish a system to monitor control of the critical control points.
5. Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.
6. Establish procedures for verification and validation to confirm that the HACCP system is working effectively.
7. Establish documentation concerning all procedures and records appropriate to these principles and their application.

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Key Success Factor For HACCP

HACCP is a scientifically based process management system.

The key to its successful use is to describe how the product (in this case building water) is <u>processed</u> in the facility, identify potential hazards at each step in the process and to then focus efforts onto applying appropriate, practical hazard control at the key processing steps.

HACCP has been very successful because it focuses activity on systematic routine monitoring of hazard control (not the hazard itself) and corrective actions whenever there are deviations from the hazard control critical limits.

There is no requirement to, or emphasis on "assessing" risk or attempting to reduce risk *per se*. The process is focused onto <u>hazard</u> analysis and <u>hazard</u> control.

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EXAMPLES

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Example Water Management Team

Hospitality/Gaming/Commercial Building
Water Management Team

VP
Director
Risk Manager
Safety Manager
Facilities Supervisor
HACCP-Certified Manager
Independent Water Management Consultant

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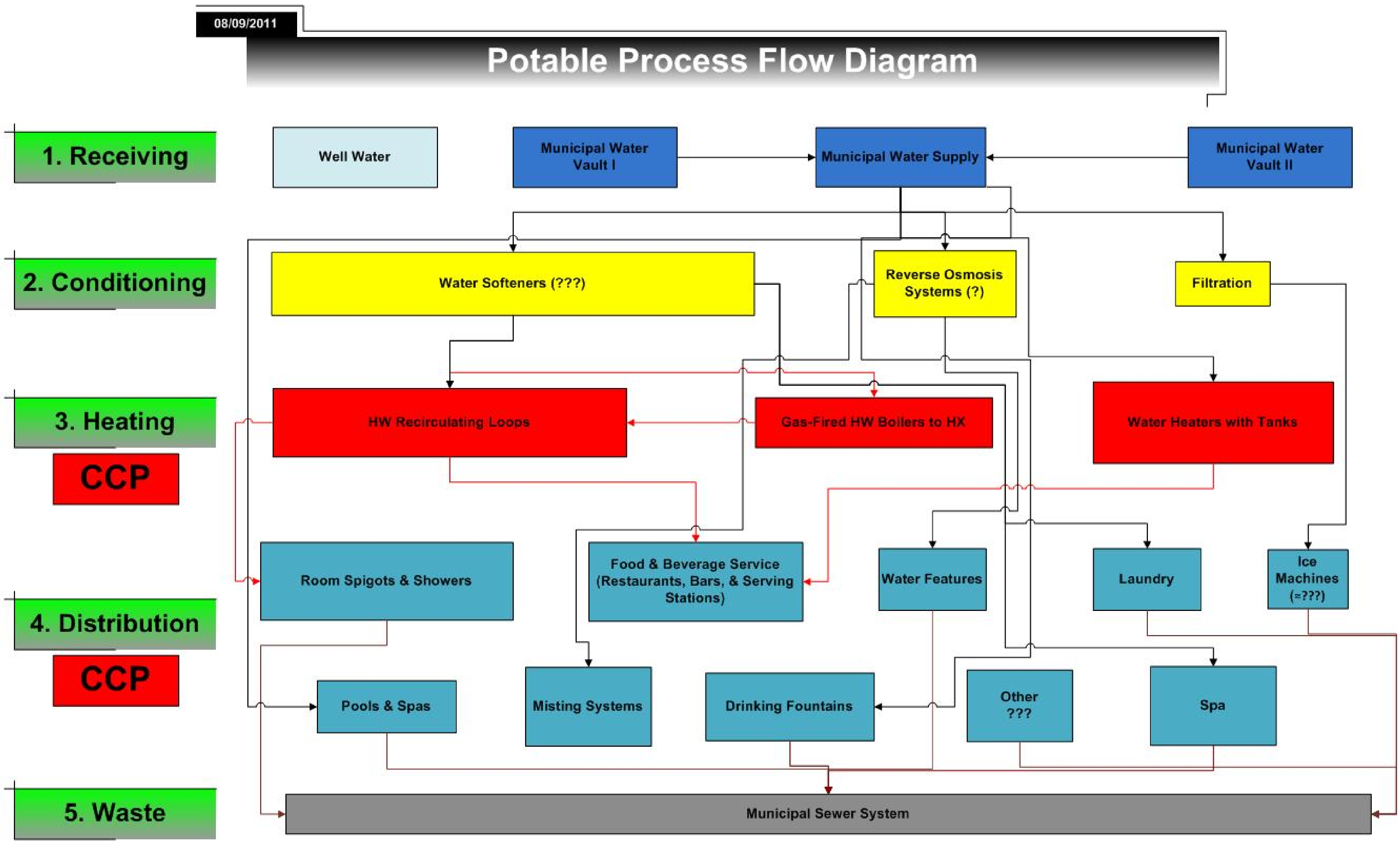
Example Process Flow Diagram

Schematic representation of how potable water is processed and used in the facility. Note that processing steps are named and numbered.



Example Hazard Analysis

For each step in the water process, potential hazards are identified and the risk is characterized in order to decide if hazard control is necessary.

Table B1 Hazard analysis summary for the office building potable water system described in the process flow diagram (Figure B1).

Product: Potable Water **Processing Steps**	**System /subsystem**	**Identify potential hazard introduced, enhanced or controlled at this step**	**Risk and Severity Significant?**	**Basis for the Risk Characterization**	**What controls *could* be applied to eliminate, reduce or prevent the hazard from causing harm?**	**CP**	**CCP**
P1 RECEIVING	General system	**B = Biological Hazards** Coliforms, *Legionella*, viruses, and protozoa **C = Chemical Hazards** Lead, other metals, and disinfection by-products **P = Physical Hazards** Radon	No	Low risk because water is treated to US Standards for drinking water given in the Code of Federal Regulations	Obtain product from sources that are certified to the National Primary Drinking Water Regulations (NPDWR) Obtain water quality test results from the water provider every six months	B C P	NO
S1 RECEIVING	Fire suppression	B = microbial growth due to stagnant water in FS system	No	Low risk because limited exposure	Wear PPE during routine maintenance and periodic flushing	B	NO
P2 HEATING Steam Tables	General system	B = Growth of microbes in the heating system	No	Medium risk because no storage tanks	Maintain temperature in hot water loop above 140 °F Thermal flush hot water loop >120 °F periodically	B	NO
P3 DISTRIBUTION	General system	B = Microbial growth in the potable water distribution system which could be transmitted by faucets and showerheads C = Toxins could be transmitted by ingestion P = Scalding	Yes	Low or medium risk because municipal water source has a measurable halogen residual in the building water system	Flush system x times per year Chlorinate x times per year	B C	YES B,C
F1 FILTRATION	Drinking fountains	B = Microbial growth in filter media	Yes	Medium risk because improperly maintained filters can cause poor microbiological quality	Maintain filters according to manufacturers instructions Replace filters x times per year	B	NO
F2 COOLING	Drinking fountains	B = Microbial growth in the potable water distribution system	No	Low risk because temperature is maintained below 65 °F		B	NO
F3 2ND FILTRATION	Drinking fountains	B = Microbial growth in filter media	Yes	High risk because filtration media are known to harbor pathogenic bacteria if not properly maintained	Maintain filters according to manufacturers instructions Backwash filters?	B P	YES B

Example HACCP Plan

Every step at which hazard control is applied is, by definition, a Critical Control Point (CCP). For every CCP, four issues must be decided by the Water Management Team: 1) the critical control limit, 2) the monitoring method for hazard control, 3) the frequency of monitoring the hazard control and 4) the corrective actions to be undertaken if the critical control limit is violated.

Table B4. HACCP plan for the building water system described in Fig B1, B2 and Tables B1-3.

Product: Potable Water **Processing Step**	**CCP #**	**Critical Control Limit**	**Monitoring Method**	**Frequency**	**Corrective Actions for Deviation from Limits**	**Location of Records**	**Verification Procedure** (Responsible persons)
STEP No. P3 DISTRIBUTION	1B 1C						
STEP No. F3 2nd FILTRATION (Drinking water fountains)	2B						
STEP No. I3 ICE MACHINE FILTRATION	3B						
Product: Utility Water **Processing Step**	**CCP #**	**Critical Control Limit**	**Monitoring Method**	**Frequency**	**Corrective Actions for Deviation from Limits**	**Location of Records**	**Verification Procedure** (Responsible persons)
STEP No. CT1-3 CONDENSER WATER (Cooling Towers)	1B 1C						

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Thank You

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