Public *Accommodation* Facilities *Regulations*

Effective April 2006

Appendix B:
Legionella Sampling Plan and Form

Serving Boulder City, Clark County, Henderson, Las Vegas, Mesquite and North Las Vegas

Southern Nevada Health District

Southern Nevada District Board of Health
P.O. Box 3902, Las Vegas, NV 89127 | 702.759.1000

LEGIONELLA CONTROL GUIDELINES AND RECOMMENDATIONS

Maintenance, Treatment, and Testing of Cooling Tower Systems; Decorative Water Fountains and Water Shows

Responsible persons should ensure that all cooling tower, decorative water fountain, and water show systems (hereinafter referred to as systems) they own, manage, or control are maintained clean and kept in good repair. It is recommended that all systems are treated and tested in the manner set forth in this Guidance Document. If the system is shut down and is completely drained of water, testing is not required.

1) Water Quality and Treatment:

The responsible person should ensure that the water of the system is treated at appropriate intervals with:

a) One or more biocides or disinfectants to effectively control the growth of microorganisms, including *Legionella* sp.; and

b) Chemicals or other agents to minimize scale formation, corrosion and fouling, as is appropriate for the type of system.

2) Initial Disinfection Cleaning:

a) The responsible person should ensure that a biocide or disinfectant is added to the circulating water of the system, and that the system is then disinfected, cleaned, and disinfected again immediately prior to initial start up, and prior to any shut-down period for one month or longer. In the case of a cooling tower system, water fountain or water show, this consists of dosing and then mixing the water of the system using any method accepted by the Health Authority that produces equivalent results to the methods listed above.

b) In the case of a circulated tempered-water or warm-water system:

i) A chemical compound, equivalent to at least 10 ppm of free chlorine for at least one (1) hour, [e.g., 25 ppm for two (2) hours or 5 ppm for five (5) hours], at a pH of between 7.0 and 7.6; followed by flushing of the system until the free chlorine measures 1 ppm or less; or

ii) Heating of the system to 149ºF, followed by continuous flushing, for a total contact time of one (1) hour; or

iii) Any method accepted by the Health Authority as producing equivalent results to above methods.

3) Routine Inspections and Testing:

a) The responsible person should ensure that:

i) The system is inspected at least once each month to check that the system is operating effectively and without defects. Results of the inspection can be documented accurately on forms provided by the Health Authority for this purpose.

ii) At least once each month a bacterial dip slide is done. If the bacterial dip slide results in a general bacterial colony count greater than 1,000 colony forming units per milliliter (CFU/ml), a sample of the circulating water of the system should be collected and delivered to a laboratory for testing for heterotrophic colony count.

iii) At least once every three (3) months a sample of the circulating water of the system is collected and delivered to a laboratory for testing for *Legionella* sp.

b) Water samples shall be collected in quantities of between 200 milliliters to one (1) liter each, using a method approved by the laboratory receiving the sample.

4) High Heterotrophic Colony Count Detected in the Circulating Water of a System:

a) Within 24 hours of receiving a report that any sample of water collected from the system has a heterotrophic colony count exceeding 100,000 CFU/ml, the responsible person should ensure that the following procedure is implemented:

i) The water of the system should be treated with additional quantities of biocide or disinfectant, equivalent to 50 ppm free chlorine;

ii) Maintain the equivalent of 10 ppm free chlorine for 24 hours.

iii) Drain system and inspect for visual evidence of biofilm; if found, repeat **Sections (4)(a)(i) and (4)(a)(ii)**.

iv) Perform mechanical cleaning individualized to be effective for the type of system being cleaned.

v) Refill system, bring biocide level to the equivalent of 10 ppm free chlorine, and circulate for one (1) hour.

vi) Flush system and refill.

vii) Review the water treatment program, operation and maintenance program of the system; and

viii) Correct any faults and make any changes necessary to prevent a reoccurrence.

b) Between two (2) and four (4) days after the water has been treated under **Section (4) (a),** the responsible person should ensure that a further sample of the circulating water of the system is collected and delivered to a laboratory for testing for heterotrophic colony count and that a copy of that report is delivered to the Health Authority within 48 hours of notification of test results by the laboratory.

c) Within 24 hours of receiving a report that a sample collected in accordance with **Section (4) (b)** has a heterotrophic colony count exceeding 100,000 CFU/ml, the responsible person should ensure that the water of the cooling tower system is disinfected, cleaned (drained, flushed or filtered) and disinfected.

d) Between two (2) and four (4) days after the water has been disinfected under **Section (4) (c),** the responsible person should ensure that a further sample of the re-circulating water of the cooling tower system is collected and delivered to a laboratory for heterotrophic colony count testing, and that a copy

of that report is delivered to the Health Authority within 48 hours of notification of test results by the laboratory.

e) If, after following the procedure in **Sections (4) (a) through (4) (d)**, the heterotrophic colony count still exceeds 100,000 CFU/ml, the responsible person should:

i) Ensure that the steps in **Sections (4) (a) (i) and (4) (a) (iv)** are repeated until the heterotrophic colony count does not exceed 100,000 CFU/ml in two (2) consecutive water samples collected approximately one week apart; or

ii) Close the system until the problem has been remedied.

iii) Notify the Health Authority of all lab test results within 48 hours of notification of test results by the laboratory.

5) *Legionella* sp. Detected in System:

a) Within 24 hours of receiving a report that *Legionella* sp. has been detected at or above 10 CFU/ml in a water sample collected from a system, the responsible person should ensure that the following procedure is implemented:

i) The cooling tower system should be disinfected, cleaned of scale and bio-film, and re-disinfected, following procedures provided in **Sections (4) (a) (i) through (4) (a) (iv);**

ii) The water treatment program, tower operation and maintenance program of the system should be reviewed; and

iii) Any faults should be corrected and any changes necessary to prevent an occurrence of those faults should be implemented.

b) Between two (2) and four (4) days after the disinfection required by **Section (4) (a)** has been completed, the responsible person should ensure that a further sample of the circulating water of the system is collected and delivered to a laboratory for testing for *Legionella* sp. and that a copy of that report is delivered to the Health Authority within 48 hours of notification of test results by the laboratory.

c) Within 24 hours of receiving a report that *Legionella* has been detected at or above ten (10) CFU/ml in a sample collected in accordance with **Section (5) (b)**, the responsible person should ensure that the water of the cooling tower system is disinfected, cleaned and disinfected.

d) Between two (2) and four (4) days after the disinfection required by **Section (5) (c)** has been completed, the responsible person should ensure that a further sample of the circulating water of the system is collected and is delivered to a laboratory for testing and reporting on for *Legionella* sp., and that a copy of that report is delivered to the Health Authority within 48 hours of notification of test results by the laboratory.

e) If, after following the procedure as outlined in **Sections (5) (a) through (5) (d)**, *Legionella* is still detected at or above ten (10) CFU/ml, the responsible person should:

i) Ensure that **Sections (5) (c) and (5) (d)** are repeated until *Legionella* is not detected at levels at or above ten (10) CFU/ml, in two (2) consecutive water samples collected approximately one (1) week apart; or

ii) Close the cooling tower system until the problem has been remedied.

f) If, while following the procedure in this Regulation, *Legionella* is detected at or above ten (10) CFU/ml in three (3) consecutive water samples collected from the same system, the responsible person should notify the Health Authority of the repeated detection of the presence of *Legionella*:

i) Immediately by telephone; and

ii) By notice in writing within 48 hours of the detection of the organism on the third occasion.

Maintenance and Testing of Potable Warm-Water or Tempered-Water Circulation Systems, Potable Plumbing System Components

6) Maintenance:

The responsible person should ensure that potable warm-water or tempered-water circulation systems, and potable water plumbing systems, including cold potable water distribution systems which contain water between 68 and 122 °F because they are routinely or seasonally affected by ambient heat gain from a hot environment (hereinafter referred to as the warm "water system"), that the responsible person owns, manages or controls are maintained and tested in the manner set out in this section, unless the system is shut down, or is otherwise not in use, and is completely drained of water.

7) Start up Procedures:

The responsible person should ensure that the warm water system is disinfected by a method approved by the Health Authority, and cleaned immediately prior to initial start up following commissioning, or any shut down period of greater than one month.

8) Routine Disinfection:

The responsible person should ensure that the potable warm-water or tempered-water circulation system, including all parts of the potable water plumbing system, is disinfected by one (1) or more of the following methods:

a) At least once each month by heat or approved high-level chemical treatment; or

b) Continuously by means of automatic, approved low-level chemical treatment; or

c) Continuously by means of ultra-violet light treatment in combination with another method which provides residual disinfection; or

d) Another method approved in writing by the Health Authority.

9) Routine Testing:

Three (3) samples shall be collected from the warm water system for evaluation for *Legionella sp.*, 200 milliliters to one (1) liter each, using a method approved by the laboratory receiving the sample. One (1) sample shall be of water from the draw-off valve of the water heaters, one (1) from the tempered/warm-water line, and one (1) from a faucet or showerhead, and that a copy of that report is delivered to the Health Authority within 48 hours of notification of test results by the laboratory:

a) At intervals not exceeding three (3) months for so long as *Legionella* remains at or below ten (10) CFU/ml in the warm water system; and

b) If *Legionella* is detected above ten (10) CFU/ml in any sample collected and delivered to a laboratory for testing during the previous twelve (12) months, and the procedures under these Regulations have been followed, then at intervals not to exceed monthly, until a sample at or below ten (10) CFU/ml is confirmed.

10) Warm Water Circulation System Outlets (Faucets and Showerheads):

a) The responsible person should ensure that at least once during each week all outlets of the warm water system not in use for seven (7) days or more are disinfected and then flushed at full flow.

b) The period of flushing referred to in **Section (10) (a)** should be sufficient to remove all stagnant water and disinfectant leading to the outlet and until the temperature at which the system is set is reached at the outlet.

11) Thermostatic Mixing Valves:

The responsible person should ensure that all thermostatic mixing valves of warm water systems are cleaned and maintained at least once in each calendar year.

12) *Legionella* Detected in Warm Water Systems (Potable):

a) Within 24 hours of receiving a report that *Legionella* has been detected at or above ten (10) CFU/ml in a water sample collected from a warm water system, the responsible person should ensure that the following procedure is implemented:

i) The warm water system should be disinfected by heat or chemical treatment as provided in **Section (8);**

ii) The warm water system operation, maintenance program and any water treatment should be reviewed; and

iii) Any faults should be corrected and any changes necessary to prevent an occurrence of those faults should be implemented.

iv) The Health Authority should be notified of the detection of the presence of that organism:

(1) Immediately by telephone, fax or email, and

(2) By notice in writing within 48 hours of the detection, if the previous notice was by telephone only.

b) Between two (2) and four (4) days after the disinfection required by **Section (12)(a)** has been completed, the responsible person should ensure that a further sample of the water of the warm water system is collected from the same sampling point as the original sample and is delivered to a laboratory for testing for *Legionella* sp., and that a copy of that report is delivered to the Health Authority within 48 hours of notification of test results by the laboratory.

c) If, after following the procedure under **Sections (12) (a) and (12) (b)**, *Legionella* is still detected at or above ten (10) CFU/ml, the responsible person should:

i) Ensure that the steps in those Regulations are repeated until *Legionella* is no longer detected at or above ten (10) CFU/ml in two (2) consecutive water samples collected approximately one (1) week apart; or

ii) Close the warm water system until the problem has been remedied.

d) If, while following the procedure in this Regulation *Legionella* is detected at or above ten (10) CFU/ml in three (3) consecutive water samples collected from the same warm water system, the responsible person should notify the Health Authority of the detection of the presence of that organism:

i) Immediately by telephone, fax or email; and

ii) By notice in writing within 48 hours of the detection of the organism on the third occasion.

13) Other systems of concern in regard to *Legionella* sp. growth, including, but limited to, humidifiers and misting systems that are operated as part of a facility under permit with the Health Authority shall:

a) Operate directly from the potable water system, under pressure at no less than 20 psi.

b) Be isolated from the potable water system via an approved back-flow prevention assembly.

c) Be drained, cleaned and disinfected every six (6) months.

14) Chiller and boiler systems which circulate treated, closed-loop cooling or heating water shall be isolated from the potable make-up water by means of an approved reduced pressure zone back-flow prevention assembly.

15) Fire-suppression systems, and other non-potable systems, shall be isolated from the potable water system by means of an approved back-flow prevention assembly.

16) Each public accommodation facility should have at least one person on staff or available for consultation who thoroughly understands the maintenance and operation of all water systems located on property and who is available on call when needed.

Records

17) The responsible person should:

a) Keep a maintenance log book of all activities relating to each cooling tower system, warm-water system, evaporative condenser system, evaporative cooler, evaporative air conditioner, water fountain, and/or water show that is owned, managed or controlled by the responsible person that records details of:

i) All inspection records,

ii) All maintenance and corrective activities undertaken in relation to the system,

iii) All microbiological test results of samples collected from the system, and

iv) Any approval issued under Regulation in respect of the system.

v) See an example *Legionella* Form at the end of this appendix.

b) Designate whether or not a facility staff member or consultant can enter the data into the maintenance log book on behalf of the responsible person.

c) Keep the maintenance log book up to date and on the premises where the system is located.

d) Produce the maintenance log book and any other relevant records for inspection on the request of the Health Authority.

18) The Health Authority may approve a different method of maintenance, testing and keeping of records. The Health Authority may approve the use of the different method if the Health Authority is of the opinion:

a) That the use of the method will achieve results that are at least equivalent to the results that would be achieved using the method specified; or

b) That it is not practical to use the method specified in **Section (17) (a)** in the circumstances applying to the system for which the application is made.

19) In approving the use of a different method, the Health Authority may impose any conditions in relation to the use of the system or the method that the Health Authority considers to be appropriate.

20) If the Health Authority approves the use of a different method, the responsible person should ensure that any condition imposed by the Health Authority in approving the use of the method is complied with while the method is being used.

Potable Water Systems Suspected or Implicated as a Source of Infection

21) The Health Authority shall investigate each report of a guest or employee having Legionellosis to confirm the diagnosis and to gather information for the case report.

22) If two (2) or more cases of Legionellosis occur among associated persons, the Health Authority shall investigate to determine the extent of the outbreak and identify a common environmental source.

23) The responsible person shall aid the Health Authority in the investigation of any case of suspected or confirmed Legionellosis.

24) A system suspected or implicated as the source of infection in any instance where the Health Authority has informed the responsible person that the system is suspected or implicated as the source of infection in a case or an outbreak of Legionellosis, should ensure that:

a) A water sample from the system is promptly collected and delivered to a laboratory for testing for *Legionella* sp., and that the Health Authority be notified of the test results, when available:

i) Immediately by telephone; fax or email, and

ii) By notice in writing within 48 hours of the detection.

b) The system is decontaminated in accordance with directions given to that person by the Health Authority.

Comprehensive Review

25) The responsible person should provide a comprehensive review of all plumbing systems annually to determine if the systems contain:

a) Any locations were water may stagnate (“dead legs”, or capped or abandoned pipes connected to the system);

b) Any locations where water may backflow into the plumbing system;

c) Any cross-connections to closed-loop heating, cooling water, or fire suppression systems which may exist, or

d) Other potential sources of *Legionella* sp. infection.

26) The comprehensive review shall also assess

a) The current risk factors for *Legionella sp.* developing within the water systems of the facility,

b) Any changes to the water system that may have a negative impact on contamination control, and

c) A review of the effectiveness of current control measures which have been instituted, including a reexamination of the year’s laboratory results.

27) A report containing the results of this review should be submitted to the Health Authority on an annual basis, and is a condition of permit renewal.

New Construction

28) All new construction or remodeling of facilities subject to this Regulation should be constructed to reduce the likelihood of *Legionella* sp. growth in water systems, and the subsequent likelihood of exposure. This should include, but is not limited to:

a) The use of point-of-use tempering devices for potable water systems, and the reduction or elimination of potable tempered or warm-water loop systems.

b) The incorporation of automatic disinfection systems and aerosol drift control for cooling towers.

c) The incorporation of internal cross-connection control protocols.

Document Sources/References

1.*Legionnaires' Disease: Slides*, Public Domain, November 18, 2002. www.cdc.gov/excite/classroom/slides_legionnaires/15.htm
2.MMWR Recommendations and Reports June 6, 2003/52(RR10);43 Appendix *Water Sampling Strategies and Culture Techniques for Detecting Legionellae* www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a2.htm
3.*Approaches to Prevention and Control of* Legionella *Infection in Allegheny County Health Care Facilities*, Allegheny County Health Department, January, 1997
4.*Healthcare Facilities Management Series: Waterborne Pathogens:* Legionella *and Other Opportunistic Pathogens,* American Society for Healthcare Engineering of the American Hospital Association, August 2001.
5.*Routine Surveillance and Electronic Liquid Purification Systems Prevent Outbreaks*, Infection Control Today, February 2000.
6.Legionella *in Hot Tap Water Production*, Industry Workshop, Task 26-Solar Combisystems, IEA Solar Heating and Cooling Programme
7.*Experiences of the First 16 Hospitals Using Copper-Silver Ionization for* Legionella *Control: Implications for the Evaluation of Other Disinfection Modalities,* Infection Control and Hospital Epidemiology, Vol. 24 No. 8, August 2003
8.*Disinfection of Water Distribution Systems for* Legionella, Seminars in Respiratory Infections, Vol 13, No 2 (June) 1998, pp 147-159
9.*Continuous Hyperchlorination for Control of Nosocomial* Legionella pneumophilia, *Pneumonia: a Ten-Year Follow-Up of Efficacy, Environmental Effects, and Costs,* Prevention and Control of Legionellosis, pp 226-229.
10. Legionella *in Water Distribution Systems*, Journal of the American Water Works Association, Volume 90, Issue 9, pp. 112-121.
11. *OSHA Technical Manual-Section III: Chapter 7*, U.S. Department of Labor, Occupational Safety & Health Administration, March 25, 2004 http://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_7.html
12. Legionella *Bacteria in Environmental Samples: Hazard Analysis and Suggested Remedial Actions,* PathCon® Laboratories Technical Bulletin 1.5, © 1998, Pathogen Control Associates, Inc.
13. *Guidance for the Control of* Legionella, National Environmental Health Forum Monographs, Water Series No. 1, 1996

Example

Legionella and Bacteriological Sampling Log

Facility Name				**Responsible Person at Facility**		
Address				**Telephone/FAX Numbers** **( ) /**		
City				**Date Samples Collected**		
State		**ZIP**		**Name of Staff Member or Consultant Collecting Samples**		
Sample #	**Sample Location—Room, Type****	**Sample Type** *water Dip slide other*	**Time Sample Collected**	**Sample/Lab Results**	**Date Results Received**	**Follow-up actions/Comments**

****Identify as cooling tower, decorative water fountain, water show, circulated tempered water, warm water, OR potable plumbing system components (showerhead, faucet).**

Give Room Number or Location

For hot-water tanks, identify as preflush or postflush

Example

Maintenance Log Book

Facility Name		Responsible Person at Facility
Address		Telephone/FAX Numbers ( ) /
City		Name(s) of all person(s) approved to keep records
State	ZIP	

Water System Log Book for _____

(cooling tower, decorative water fountain, water show, circulated tempered water, warm water, OR potable plumbing system components (showerhead, faucet).

From:_____to _____ **Page 1 of _____**

beginning date ending date

Date: Inspected, Maintenance/Corrective Work Done, OR Instructions/Approvals from the Health Authority Issued	Results of the inspection, Description of any maintenance or corrective actions done, description of any instructions/approvals issued by the Health Authority. Any other information relevant to the system shown above.

Example

Maintenance Log Book-Supplemental Page

Water System Log Book for _____

(cooling tower, decorative water fountain, water show, circulated tempered water, warm water, OR potable plumbing system components (showerhead, faucet).

From:_____to _____ **Page _____of _____**

beginning date ending date

Date: Inspected, Maintenance/Corrective Work Done, OR Instructions/Approvals from the Health Authority Issued	**Results of the inspection, Description of any maintenance or corrective actions done, description of any instructions/approvals issued by the Health Authority.** **Any other information relevant to the system shown above.**