

CITY OF HAMILTON

*Public Health Services
Health Protection Division*

Report to: Mayor and Members Board of Health	Submitted by: Elizabeth Richardson, MD, MHSc, FRCPC Medical Officer of Health Public Health Services
Date: June 9, 2009	Prepared by: Eric Mathews x2186

SUBJECT: Legionella: Cooling Tower Registry Bylaw - BOH09021 (City Wide)

RECOMMENDATION:

- (a) That Public Health Services staff be directed to consult with stakeholders and report back to the Board of Health with a draft cooling tower and evaporative condenser Registry Bylaw;
- (b) That Public Health Services staff bring forward any costs of enforcement to the 2011 Budget process as an enhancement.

Elizabeth Richardson, MD, MHSc, FRCPC
Medical Officer of Health
Public Health Services

EXECUTIVE SUMMARY:

In the late summer of 2008, an increase in the number of Legionella infections occurred in several public health jurisdictions in southern Ontario, including Hamilton. The City of Hamilton Public Health Services conducted an investigation to determine the source of such infections.

A common source of exposure to Legionella bacteria could not be identified after investigation of many possible sources of infection, including cooling towers in the City. Although there is limited evidence available, the increase in cases of Legionella infections may have been caused by dissemination of Legionella bacteria located in a reservoir associated with air conditioning. Cooling towers and evaporative condensate

SUBJECT: Legionella: Cooling Tower Registry Bylaw - BOH09021 (City Wide) -

Page 2 of 6

units are known to be reservoirs for Legionella bacteria and are known to create conditions favourable for the growth, discharge, and transmission of Legionella bacteria.

The 2008 scenario is similar to a cluster of Legionella infections that occurred in 2006, with the main difference being the geographic distribution of the cases. Having a partial list of cooling tower and evaporative condenser locations and contact information was very useful for outbreak response and investigation in 2008. However, our list is incomplete because owners are not required to register.

Public Health Services staff have worked with the McMaster Institute of Environment and Health (MIEH) to conduct a review of the literature regarding existing legislation pertaining to cooling tower registration, operation, and maintenance. Our recommendation is based on this literature review and the experiences of Public Health Services in 2006 and 2008.

BACKGROUND:

In 2008 Public Health Services investigated fifteen cases of Legionellosis, compared with three cases investigated in 2007. Between July 1, 2008 and October 1, 2008 there were 10 cases of Legionellosis reported to PHS. During this period an increase in the number of Legionella infections in City of Hamilton residents was noted and the possible cluster of cases was investigated by Public Health Services. Many possible local sources for the Legionella infections were explored. Possible sources of infection were established for 4 cases that occurred outside of the summer months. These included exposure to residential hot tubs and exposure to a contaminated residential non-municipal water supply. During the summer months numerous exposure sources were investigated. The investigation included testing the homes and some of the workplaces of the Legionella cases, irrigations systems, and cooling towers.

Cooling towers and evaporative condensers are known to be reservoirs for Legionella bacteria and are known to create conditions favourable for the growth, discharge, and transmission of Legionella bacteria in sufficient concentrations to cause illness in humans. As part of the PHS investigation into the cluster of Legionella infections sampling and testing of cooling towers was conducted. Water samples from 39 cooling towers were tested and 13 (33.3%) cooling towers were found to contain Legionella or Legionella-like bacteria. Three (7.7%) cooling towers were found to contain *Legionella pneumophila* serogroup 1, the most common cause of human illness. However, due to a lack of clinical specimens and laboratory evidence it was not possible to establish a genetic match between the Legionella bacteria found in the cooling tower and the Legionella bacteria that caused illness in some Hamilton residents.

ANALYSIS/RATIONALE:

Around the world there have been many outbreaks of Legionnaires Disease and Pontiac Fever that have affected varying geographic areas and populations that are believed to be caused by emissions of Legionella bacteria from cooling towers. There are many other sources of Legionella bacteria exposure that have been known to cause outbreaks of Legionellosis, such as ornamental fountains, public spas, private spas,

**SUBJECT: Legionella: Cooling Tower Registry Bylaw - BOH09021 (City Wide) -
Page 3 of 6**

respiratory therapy equipment, potable water supplies, institutional hot water systems, etc. The list of proven and theoretical sources of Legionella infections is quite long. As a result of Legionella outbreaks the list and degree of regulatory intervention to prevent Legionella infections from cooling towers is similarly varied, ranging from voluntary Codes of Practice to imprisonment for breaching legislation that was enacted and enforced by local, state, provincial or federal/national levels of government.

An international literature search conducted by the McMaster Institute of Environment and Health (MIEH) at the request of the City of Hamilton Public Health Public Health Services (PHS) has yielded a summary and collection of Regulations and Codes of Practice for Legionella control from around the world (Appendix A). These Regulations and Codes of Practice vary from voluntary to mandatory compliance; simple registration to government inspections and testing; and between no penalties to fines and/or imprisonment.

The Report of the Expert Panel on the Legionnaires' Disease Outbreak in the City of Toronto-September/October 2005 (December 2005)¹ assessed the progress Ontario has made since SARS and identified the key lessons from the recent Legionnaires' disease outbreak and provided advice on how to strengthen infectious disease control in Ontario. This outbreak was focused within and nearby a nursing home in Toronto and affected 135 people, of which 23 were nursing home residents who died. The two Hamilton Legionella clusters in 2006 and 2008 involved 11 and 10 cases respectively, resulting in 1 and 0 deaths.

The opinion of the Report of the Expert Panel is that it seems very likely the long-term care home's cooling tower was the source – despite the fact that the home and its water and cooling systems were well maintained and that the maintenance program met current standards. A combination of unusual factors likely led to the growth and then release of the bacteria including:

- Record breaking summer heat, which led to much heavier use of the cooling system.
- Construction on the hospital across the street (construction dust is known to be a factor in *Legionella* growth).
- The design of the home's ventilation and cooling systems, which placed the home's air intake next to the cooling tower.
- A cold spell in September during which the water in the cooling tower would have dropped below a certain temperature, followed by another warm period when heavy use of the cooling systems resumed¹.

The Report of the Expert Panel on the Legionnaires' Disease Outbreak in the City of Toronto-September/October 2005 (December 2005) recommended that the Ministry of Health and Long-Term Care (MOHLTC) establish an expert group to review the province's environmental standards against those in place in other jurisdictions to ensure they are adequate to protect residents and staff in long-term care homes. In

¹ Henry, Dr. Bonnie, Young Dr. James G., Walker, Dr. David M.C. (Chair) Report of the Expert Panel on the Legionnaires' Disease Outbreak in the City of Toronto - September/October 2005 (December 2005)

**SUBJECT: Legionella: Cooling Tower Registry Bylaw - BOH09021 (City Wide) -
Page 4 of 6**

particular, the guidelines published by the American Society of Heating, Refrigeration and Air-Conditioning Engineers Inc, titled *Minimizing the Risk of Legionellosis Associated with Building Water Systems* (ASHRAE Guideline 12-2000) should be reviewed in light of the situation in Ontario. It is our understanding, based on discussions with City of Toronto Public Health staff and MOHLTC staff, that the MOHLTC did establish an expert group but a report has not been released.

The owners and/or operators of all cooling towers in Hamilton that are known to PHS have received the best practices for Legionella control in cooling towers for the past three years, including this year. They are aware of what they need to do to operate and maintain their cooling equipment in a safe condition. They are responsible for ensuring their cooling equipment is operated and kept in a safe condition. It is the opinion of PHS that the development of prescribed standards for cooling tower operation and maintenance should be done at the Provincial level where there is access to broader resources and expertise. Additionally, it is not clear which Ministry would oversee such an endeavour. If the MOHLTC requires local boards of health to implement cooling tower legislation there would be a consistent Provincial approach for health units and it would ideally be accompanied by resources and funding for program implementation.

PHS is of the opinion that a prudent and fiscally responsible local approach would be to continue with our annual communication of best practices for Legionella control to cooling tower owners/operators and to improve our cooling tower inventory and maps by means of implementing a Bylaw that requires cooling tower owners to register their cooling towers with PHS.

In 2006/2007 PHS staff identified 216 cooling towers on 154 properties in Hamilton. Several PHS staff worked for several months to develop this inventory. On two occasions PHS had to write Orders under the Health Protection and Promotion Act to obtain information about cooling tower locations and ownership to complete the inventory. However, the inventory is not likely complete and several years have passed since the inventory has been updated. It is very likely that changes have occurred regarding ownership, operation, and maintenance. Compelling cooling tower owners by means of a Bylaw to register and update cooling tower operation and maintenance information would greatly assist PHS with investigating future Legionella infections and with outreach and education. There is no formal list or registry of cooling towers in Ontario. The 2006/2007 inventory was a key part of the PHS investigation into the 2008 cluster of Legionella infections.

PHS will consult with cooling tower owners, operators, and maintenance companies, along with the MOHLTC, MOE, and MOL regarding information that can be readily provided and that would be necessary to assess the risk to public health in the presence of an increase of Legionella infections. PHS will also prepare a recommendation report back to the Board of Health in 12 months time. This recommendation report will be the basis of a draft cooling tower registry Bylaw.

It is proposed that the draft Bylaw will require fees to cover administrative and audit costs that will be incurred by PHS. Renewals/updates would be required on an annual or biannual basis. PHS staff will randomly sample and audit a portion of the Registry.

**SUBJECT: Legionella: Cooling Tower Registry Bylaw - BOH09021 (City Wide) -
Page 5 of 6**

Penalties would exist when cooling tower information has not been updated and for situations where PHS staff discover an operating cooling tower that is not registered. PHS is not proposing to inspect or test cooling towers on a routine basis or as part of this proposed Bylaw.

ALTERNATIVES FOR CONSIDERATION:

1. Consult and draft a Bylaw that prescribes operational standards for cooling towers and evaporative condensers, supported by an inspection and testing program. Enacting an operational standards and inspection program does not fall within the mandate of the Board of Health or PHS and would therefore need to be funded 100% by the local tax levy or fees would need to be charged to the owners of cooling towers to cover the costs. Such a program would not necessarily have to sit with PHS. Other City of Hamilton Departments might be better suited to collect fees for inspection services. The local costs would depend on the Bylaw and inspection program.
2. Not develop a cooling tower registry Bylaw. This does not support having an up to date and accurate list and map of cooling towers and other information that would be useful to investigate local clusters or outbreaks of Legionellosis, and for communication with cooling tower owners and operators.

FINANCIAL/STAFFING/LEGAL IMPLICATIONS:

Financial Implications;

PHS will report back in 12 months with financial analysis for a proposed bylaw enforcement.

Staffing Implications;

A cooling tower registry Bylaw will take staff time to consult and draft. PHS will have to dedicate staff time to lead this project and implement the Bylaw. The dedication of staff time will be somewhat significant during the consultation, writing, and implementation phase. This work will be the focus of the workplan of the existing Health Hazard program staff for the coming year.

Legal Implications;

None identified.

POLICIES AFFECTING PROPOSAL:

None known.

**SUBJECT: Legionella: Cooling Tower Registry Bylaw - BOH09021 (City Wide) -
Page 6 of 6**

RELEVANT CONSULTATION:

Ontario Ministry of Health and Long Term Care
Ontario Ministry of Environment
Ontario Ministry of Labour
City of Hamilton Legal Services Department
City of Hamilton Planning & Economic Development Department, Building Services
Division
City of Toronto Public Health

CITY STRATEGIC COMMITMENT:

By evaluating the “**Triple Bottom Line**”, (community, environment, economic implications) we can make choices that create value across all three bottom lines, moving us closer to our vision for a sustainable community, and Provincial interests.

Community Well-Being is enhanced. L Yes Y No
The public are involved in the definition and development of local solutions.

Environmental Well-Being is enhanced. L Yes Y No
Human health and safety are protected.

Economic Well-Being is enhanced. Y Yes L No

Does the option you are recommending create value across all three bottom lines?
Y Yes L No

Do the options you are recommending make Hamilton a City of choice for high performance public servants?
L Yes Y No

By giving the Public Health Services staff the tools to protect the health of the public

Legionella & Cooling Towers

Legislation: Surveillance & Control

Legislation: Surveillance & Control
International Literature Search



PREPARED BY

K. BRUCE NEWBOLD
newbold@mcmaster.ca

&

MARIE MCKEARY
mckear@mcmaster.ca

MCMASTER INSTITUTE OF ENVIRONMENT AND HEALTH (MIEH)

PREPARED FOR

ERIC MATHEWS
PROGRAM MANAGER
WATER SAFETY PROGRAM

HEALTH PROTECTION DIVISION
HAMILTON PUBLIC HEALTH SERVICES

2009

**COOLING TOWERS
LEGISLATION: SURVEILLANCE & CONTROL
INTERNATIONAL LITERATURE SEARCH
2009**

EUROPE

The European Working Group for Legionella Infections (EWGLI) was established in 1986 within the European Union framework to share knowledge and experience about potential sources of *Legionella* and their control. This group has published guidelines about the actions to be taken to limit the number of colony forming units (i.e., the **aerobic count**) of micro-organisms per mL at 30 °C (minimum 48 hours incubation):

Aerobic count	Legionella	Action required
10,000 or less	1,000 or less	System under control.
more than 10,000 up to 100,000	more than 1,000 up to 10,000	Review program operation. The count should be confirmed by immediate re-sampling. If a similar count is found again, a review of the control measures and risk assessment should be carried out to identify any remedial actions.
more than 100,000	more than 10,000	Implement corrective action. The system should immediately be re-sampled. It should then be 'shot dosed' with an appropriate biocide, as a precaution. The risk assessment and control measures should be reviewed to identify remedial actions.

Almost all natural water sources contain *Legionella* and their presence should not be taken as an indication of a problem. The tabled figures assume an aerobic count, cfu/ml at 30 °C (minimum 48 hours incubation) with colony count determined by the pour plate method according to ISO 6222(21) or by spread plate method on yeast extract agar.

Many other governmental agencies, cooling tower manufacturers and industrial trade organizations have developed design and maintenance guidelines for preventing or controlling the growth of *Legionella* in cooling towers.

The **European Working Group for Legionella (EWGLI)** annual dataset shows that between **2002** and **2007** there were an average of **7.3 annual outbreaks of Legionella** caused by **wet cooling systems**, involving a total of **1,175 cases**.

In **2007**, the European Working Group for Legionella Infections (EWGLI) distributed a survey to 35 member countries of the EU.¹ In Brussels and the UK it was also distributed at the regional level bringing the total number of surveys distributed to **39 and 37** countries/regions responded for a **95% response rate**. Most of the countries/regions with regulations/registration introduced it following the recognition of outbreaks caused by wet cooling systems. Approximately, **thirty-two percent (12/37)** of the respondents had implemented registration of wet cooling systems at the national/regional level (Andorra, France, Malta, The Netherlands, Norway, Spain, Belgium (Wallonie and Flanders), the UK (England, Wales, Northern Ireland and Scotland) and the Russian Federation. The **sixty-eight per cent (25)** of countries who responded but who **do not** have legislation are: Austria, Belgium (Brussels), Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Poland, Portugal, Romania, Slovak Republic, Slovenia, Sweden, Switzerland, Turkey.

Other aggregate findings include:

- ³ In **5** countries/regions this legislation is issued by the Ministry of Public Health.
- ³ In **3** countries/regions it is issued by Ministry or Department of the Environment.
- ³ In **2** by the Ministry or Department of Trade and Industry.
- ³ Finally, in **1** country by the Department of Industrial Construction.
- ³ **Timing of the Legislation:** the Netherlands has voluntary registration however; the intention is to create a requirement by **2009**. In England, Scotland, Wales and Northern Ireland the legislation has existed since **1992/94** and in all other countries it was introduced in **2001**.
- ³ The countries with legislation also require periodic microbiological monitoring, ranging between twice a year to weekly, although it is most likely dipstick rather than full environmental sampling.
- ³ In **only 9** countries are periodic inspections required.
- ³ With regards to the authority of the Registry. In **2** countries the registry is held by national authorities, in **3** by regional authorities and in **7** by local authorities.
- ³ In **9/12** regions/countries penalties are imposed for unregistered systems and in **8/9** countries/regions where penalties can be imposed, the owner of the system is responsible for ensuring that the information on the register is correct.
- ³ In the **68%** (25) of countries without registration legislation, **5** require microbiological monitoring and **4** require periodic inspections; **2** impose penalties for not following standards (Ricketts, et al, 2008).

¹ In Belgium and the UK the survey was distributed at the regional level. In Belgium to the following regions, Brussels, Flanders and Wallonie and in the UK to the following regions, England, Wales, Northern Ireland and Scotland.

The following section examines, individually, each of the 12 countries which have implemented registration/legislation:

EU Countries²

ANDORRA

- ³ National Legionella Legislation was issued by the Ministry of Public Health as of 2002.
- ³ The focus of the legislation is the prevention and control of legionellosis.
- ³ Inspections range from daily to annual and the owner is responsible for their implementation. However, the local authority can verify the findings at any time.
- ³ Tower registry exists and microbiological monitoring is monthly. There are penalties for unregistered towers and the registry is national.
- ³ The authority conducts periodic inspections to allow them to gather information.

BELGIUM (Flanders)

- ³ Regional Legislation was issued by the Ministry of Public Health as of 2007.
- ³ The focus of the legislation is the prevention and control of legionellosis in public places.
- ³ There are no periodic inspections and it is unknown who is responsible for these inspections.
- ³ Microbiological monitoring is at least twice a year.
- ³ There are no penalties for unregistered towers although a registry does exist and is under the auspices of the Regional authority.
- ³ The owner is responsible for updating tower information with the authority.

BELGIUM (Wallonie)

- ³ Regional Legislation was issued by the Ministry of the Environment as of 2005.
- ³ The focus of the regulation is embedded in the conditions for building permission.
- ³ Periodic inspections are required but there is no predefined time frame.
- ³ It is unknown who is responsible for the inspections.
- ³ Microbiological testing is required every two months; if negative, then every three months.

² Ricketts, K.D. et al (2008) Survey on Legislation Regarding Wet Cooling Systems in European Countries. *Eurosurveillance* September 18, Vol. 13 (38):1-5 www.eurosurveillance.org

NALCO COMPANY (2007) <http://www.nalcoeuropa.com/technologies/legionnaires-disease-and-the-need-for-risk-assessment.html>

- 3 There are penalties for non-registration and the authority is updated via the environmental permit issued.

FRANCE

- 3 National legislation was issued by the Ministry of the Environment as of 2004.
- 3 The legislation concerns all cooling towers with evaporative cooling systems and periodic inspections are conducted every two years by a Ministry appointed company.
- 3 The maintenance company is certified by the Ministry of Health and the local authority can also conduct inspections.
- 3 Microbiological monitoring is monthly or bimonthly.
- 3 There is a registry and unregistered tower owners are penalized.
- 3 The registry is under local authority and the tower owner must send in results annually.

ITALY

- 3 Legionella spp and Legionella pneumophila are specifically listed as Biological Risk Factors in Attachment X of Italian Law Decree 626/94 regarding Safety at the Work Place.
- 3 According to this law, it is the responsibility of the employer to make a risk evaluation at the work place and take all necessary actions to monitor/control/reduce/eliminate the risk factors.

MALTA

- 3 National legislation was issued by the Ministry of the Public Health as of 2006.
- 3 The legislation concerns the registration of both cooling towers and evaporative condensers.
- 3 The periodic inspections are variable and set by a regulation checklist.
- 3 The tower owner is responsible for inspection and the health authority can conduct their own monitoring if desired.
- 3 Microbiological testing includes monthly colony counts and Legionella testing every six months.
- 3 There is a national registry and penalties exist for non-registered towers.
- 3 The tower owner sends results to the authority and audit inspections are conducted.

NETHERLANDS

- ³ The Netherlands has had Legionella legislation for some time now and owners of collective water installations, e.g., in hospitals, hotels, campsites and swimming pools, are obliged to conduct a risk analysis and if necessary take measures to prevent health risks posed by Legionellae. Actions to correct deficiencies and reduce risk must be specified in a control (risk management) plan.
- ³ National legislation exists but is shared among a number of Ministries.
- ³ Ministry of Employment (if employees may be exposed to cooling tower aerosols) and Ministry of Environment if the surrounding area but not the employee is exposed to cooling tower aerosols.
- ³ The pertinent legislation was issued by the Ministry of Employment in 2004 and amended in 2007 and by the Ministry of the Environment in January 2009.
- ³ The content of the legislation is focused on prevention and is embedded in the company risk analyses. The registration allows for local authorities to impose prevention legislation on cooling tower owners.
- ³ Periodic inspections are required but no time period is specified.
- ³ For employees the employer should ensure inspection compliance and for the owner the local authorities are responsible for ensuring his/her compliance.
- ³ The recommended frequency for microbiological monitoring depends on the location of the tower (monthly, every three months or every six months).
- ³ There is a partial registry and no penalty for non-registration.
- ³ The registry is under local authority and owners are requested to register on a voluntary basis.
- ³ Registration of towers is not addressed by law but in a policy regulation (a guideline that describes 'best practices').

NORWAY

- ³ National legislation was issued by the Ministry of Public Health as of 2005.
- ³ The focus is on regulation to minimize the risk of the spread of Legionella from aerosol generating equipment.
- ³ Periodic inspection is every six months and the owner is responsible for conducting it.
- ³ Microbiological monitoring is monthly for colony counts.
- ³ There is a local registry and penalties for non-registration and the owner is responsible for sending results.

RUSSIA

- ³ The legislation is regional under the jurisdiction of the Department of Industrial Construction.
- ³ Date of issue is unknown.
- ³ Regulation applies to cooling towers and evaporative condensers of public objects.
- ³ No periodic inspections are required and the responsible party is unknown.
- ³ Microbiological monitoring is planned and conducted by the Ministry of Public Health.
- ³ There is a Local registry but it is unknown if there are penalties for non-registration.

SPAIN

- ³ National legislation was issued by the Ministry of the Public Health as of 2001 and amended in 2003 (Generalitat 865/2003)
 - ³ Regulation is focused on the prevention and control of Legionellosis.
 - ³ There are no official inspections and the owner should have a maintenance programme in place.
 - ³ Microbiological monitoring is monthly for colony counts and every three months for Legionella.
 - ³ There is a regional registry and penalties exist for non-registration. The owners are responsible for informing the authority.
-
- ³ Spain has had increasingly stringent Legionella legislation since 2001. The current legislation issued in July 2003 (Decree 865/2003 Prevention & Control of Legionellosis) calls for:
 - % Mandatory training for all contractors and operators.
 - % Limits on permissible Legionella concentrations.
 - % Bi-Annual Cooling Tower Cleans
 - % Quarterly Legionella Testing
 - % Analytical techniques for measuring biocide in the system
 - % Registered biocides for use in Cooling tower operation and Disinfection.
 - % Domestic water system operation

UK

- ³ The UK has extensive guidance on Legionella control and prevention, with government guidance being available since 1988. The guidance has been revised a number of times and most recently in 2000 (HSE 2000). The latest code goes further than previous codes by placing greater emphasis on management responsibilities, which are now legally enforceable. The Code provides guidance on water quality and acceptable bacterial levels, and the use of contractors that can demonstrate competency with training records and membership of professional bodies such as “the Code of Conduct Association.”

UK (England and Wales)

- ³ National legislation was issued by the Department of Employment as of 1992.
- ³ The Regulation is for the registration of cooling towers and evaporative condensers. There is a local registry and owners are responsible for informing the authority. There is a penalty for non-registration.
- ³ There are no proscribed periodic inspections under this legislation but other legislation requires inspection by the owners with the appropriate authorities enforcing and ensuring compliance by the owner.
- ³ Microbiological monitoring is under the coverage of other legislation requiring monitoring of colony counts weekly and for Legionella every three months.

UK (Northern Ireland)

- ³ National legislation was issued by the Department of Enterprise, Trade and Investment as of 1994.
- ³ The Regulation is for registration of cooling towers and evaporative condensers.
- ³ There is a local registry and the owner is responsible for sending results. There is a penalty for non-registration.
- ³ Periodic inspections twice a year are the responsibility of the owner and enforcing authorities should ensure compliance.
- ³ Microbiological monitoring is for weekly colony counts and Legionella every three months.

UK (Scotland)

- ³ National legislation was issued by the Department of Trade and Industry as of 1992.
- ³ The Regulation is for registration of cooling towers and evaporative condensers.
- ³ There is a local registry where the business occupier is requested to register. There is a penalty for non-registration.
- ³ There is Periodic inspection and the owner should have a management system in place.
- ³ Microbiological monitoring depends on level of compliance with a Code of Practice.

UK: CODE OF PRACTICE

L8 - Approved Code of Practice (ACoP) & Guidance

"Legionnaires' disease: The control of legionella bacteria in water systems"

In the UK the Health and Safety Executive's (HSE) [Approved Code of Practice \(ACoP\)](#) and Guidance document titled "Legionnaires' disease: The control of legionella bacteria in water systems" (L8) gives practical advice on how to comply with UK health and safety law with respect to the control of Legionella bacteria. This Code is important in that it has a special legal status. If you are prosecuted for a breach of health and safety law, and it is proven that you did not follow the relevant provisions of the Code, you would need to demonstrate that you have complied with the law in some other way or a Court would find you at fault.

The document also contains guidance issued by the Health and Safety Commission and Health and Safety Executive. Following the guidance is not compulsory and organisations are free to take other action. However, if you do follow the guidance you would normally be doing enough to comply with the law.³

³ The guidance issued by the UK government's Health and Safety Executive (HSE) now recommends that microbiological monitoring for wet cooling systems, using a dip slide, should be performed weekly. The guidance now also recommends that routine testing for legionella bacteria in wet cooling systems be carried out at least quarterly, and more frequently when a system is being commissioned, or if the bacteria has been identified on a previous occasion.

http://www.accepta.com/industry_water_treatment/hse-acop-18-part1.asp

Health and Safety Executive Guidelines includes:

Do I have any other duties?

Yes. If you have a cooling tower or evaporative condenser on site you must, under the Notification of Cooling Towers and Evaporative Condensers Regulations, notify the local authority in writing with details of where it is located. You must also tell them when/if such devices are no longer in use. Notification forms are available from your local environmental health department. If you have a case of legionellosis in an employee who has worked on cooling towers or hot water systems that are likely to be contaminated with legionella, you have to report this under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations.

What happens when there is an outbreak?

Local authorities have special plans for dealing with major outbreaks of infectious disease including legionellosis. These are usually investigated by an Outbreak Control Team whose purpose is to protect public health and prevent further infection. HSE or the local authority environmental health department may also be involved in investigating compliance with health and safety legislation.

Where can I get further information?

More detailed guidance can be found in the Approved Code of Practice and guidance *Legionnaires' disease: The control of legionella bacteria in water systems. Approved Code of Practice and guidance L8 (Third edition) HSE Books 2000 ISBN 978 0 7176 1772 2*. Part 1 of this publication contains advice on required duties under the law. Part 2 contains guidance on technical aspects of the assessment and control of legionella risks.

You may also find the following helpful: *Controlling legionella in nursing and residential care homes* INDG253 HSE Books 1997 (single copy free)

LOCAL AUTHORITY GUIDELINE, UK. (example)

EREWASH BOROUGH COUNCIL
EREWASH, Derbyshire, UK (example of Local Authority guidelines)

Environmental Health

We deal with a range of functions to help maintain a safe environment for us all.

These include:

- Food Hygiene, Health and Safety
- Noise & Pollution
- Animal Welfare
- Pest Control Advice
- Home Improvement Grants
- ***Notification of Cooling Towers and Evaporative Condensers***

Notification of Cooling Towers and Evaporative Condensers

Under the provisions of this legislation it is the duty of each person who has control of premises to ensure that cooling towers, evaporative condensers and any other notifiable device on the premises are registered in writing with the local authority.

If a subsequent change of particulars occurs then the local authority has to be notified in writing by the responsible person within one month of the change occurring.

Cooling Towers and related equipment need to be registered with local authorities to assist public health measures and control the spread of Legionella.

AUSTRALIA

Regulatory approaches by Australian States and Territories to the prevention of Legionellosis

The primary reference document used to facilitate control measures to minimize or prevent health hazards associated with air and water systems in buildings throughout Australia is the Australian/New Zealand Standard AS/NZS 3666, “Air-handling and water systems of buildings – Microbial control”.

The standard has three parts:

- ³ Part 1: Design, installation and commissioning (AS/NZS 3666.1:1995)

shop.standards.co.nz/scope/ASNZS3666.1-2002.scope.scope.pdf

- ³ Part 2: Operation and maintenance (AS/NZS 3666.2:1995)

www.legionellacontrol.com/australia/as-nzs-3666-2-legionnaires-disease.pdf

- ³ Part 3: Performance-based maintenance of cooling water systems (AS/NZS 3666.3:2000)

www.legionellacontrol.com/australia/as-nzs-3666-3-legionnaires-disease.pdf

The control measures in place throughout Australia have legislative backing, although the means of enactment varies from State to State. **The following Australian states have legislation and guidelines in place: Queensland, New South Wales, Victoria, Tasmania, South Australia, Western Australia, Australian Capital Territory, Northern Territory, The ‘acts’ governing the legislation include: Public Health Act, Development Act, Health Act, Work Health Act, Building (Legionella) Act, Public and Environmental Health Act, and Workplace Health and Safety Act.**

NEW SOUTH WALES, AUSTRALIA

NSW Code of Practice for the Control of Legionnaire's Disease (2nd Edition) June 2004

Summary

This is the second NSW Code of Practice for the Control of Legionnaires' disease and updates the previous 1991 Code. The Code explains the 2000 legislation for microbial control and outlines common and accepted practice to minimise the transmission of Legionnaires' Disease through hazard minimisation in air handling systems, water cooling systems, hot and warm water systems, evaporative coolers and compost and potting mix. Advice is also provided on training, safe working practices, roles of authorities and emergency management. Compliance with the code should ensure compliance with the NSW legislation.

http://www.health.nsw.gov.au/pubs/2004/legionnaire_disease.html

The emphasis is on water and air systems in buildings but the contents are also applicable to the equivalent industrial processes, such as power stations and process heat rejection devices which use water. ***The code is based on the legal requirements of the Public Health Act 1991, Part 4 – Microbial Control and the Public Health (Microbial Control) Regulation 2000.*** The code needs to be read in conjunction with, not only the above, but AS/NZ 3666.1-2:2002 and AS/NZ 3666.3:2000. Penalties for breach of the Act maybe instituted by the NSW Department of Health, public health units, and the local authority and may include:

- ³ A local court where the maximum penalty is 100 penalty units and/or 12 months imprisonment.
- ³ The supreme court where the maximum penalty is 500 penalty units and/or two years imprisonment.

Public Health (Microbial Control) Regulation is available at:

http://www.health.nsw.gov.au/pubs/2004/ph_mc_r2000.html

Each local authority is responsible for maintaining a registry of water cooling and warm-water systems in its area. Local councils may charge fee for service for registration of water cooling and warm-water systems. They may also charge for inspections of cooling towers and other systems providing the fee establishment procedure under the Local Government Act is followed. ***However, a recent survey found that very few councils charge fee for service.***

SYDNEY, AUSTRALIA

Cooling Tower Inspections

The [*Public Health Act 1991*](#) requires that all cooling towers are registered with the corresponding local council due to the potential risks associated with Legionnaires Disease.

As there are over 2,000 cooling towers within the City of Sydney LGA, Environmental Health Officers conduct regular inspection and samples to ensure compliance with acceptable microbial standards.

These standards are included in the NSW Code of Practice for the Control of Legionnaires Disease.

VICTORIA, AUSTRALIA ***DEPARTMENT OF HUMAN SERVICES***

History of the Legionella Program & Legislative Reform

During late 2000 and early 2001 the Victorian Government strengthened the regulatory framework to improve the testing and maintenance standards for cooling towers, and to reduce the impact on the community of Legionnaires' Disease.

In summary the key aspects of the strategy were to:

- ³ Establish a comprehensive register of cooling tower systems by amending the Building Act 1993 to facilitate improved educative programs, and also enhance outbreak investigations.
- ³ Require all registered owners to develop and implement risk management plans for the effective maintenance and to control the risk of Legionella from cooling tower systems.
- ³ Require annual independent audits of risk management plans.
- ³ Provide for random inspections of cooling tower systems by Department of Human Services officers.
- ³ Provide an enhanced technical advisory and outbreak investigation service through the Department of Human Services.

VICTORIA, AUSTRALIA (continued)

The strategy has been implemented by the Department of Human Services, [Building Commission](#) and the [Plumbing Industry Commission](#).

Regulatory impact statement, health (legionella) regulations 2001

The proposed Health (Legionella) Regulations 2001 form part of a larger package of measures being implemented by the Victorian Government to reduce the risks of contracting Legionnaires' disease associated with the operation of cooling tower systems and warm water systems. The package of controls is based on the recommendations of the Legionella Working Party and on consultation undertaken with stakeholders during 1999-2000. The document also outlines the cost of implementing the regulations.

[Legionnaires' Disease: Managing the Health Risk Associated with Cooling Towers - regulatory impact statement, health \(legionella\) regulations 2001 \(83kb, pdf\)](#)

Code of Practice for Water Treatment Service Providers (Cooling Tower Systems) January 2002, Department of Human Services, Public Health Group

The Victorian Government developed the Code of Practice as part of its Legionella Risk Management Strategy. The Code will serve as accepted 'best practices' standard for the industry and lead to more professional, consistent and accountable service. Compliance with the code is voluntary.

[http://www.health.vic.gov.au/search.htm?q=code+of+practice+for+water+treatment+service+providers+\(cooling+tower+systems\)&cx=007082598692133596617%3Aiammvjytm_w&cof=FORID%3A11&origin=index.htm#1134](http://www.health.vic.gov.au/search.htm?q=code+of+practice+for+water+treatment+service+providers+(cooling+tower+systems)&cx=007082598692133596617%3Aiammvjytm_w&cof=FORID%3A11&origin=index.htm#1134)

Legionnaires' Disease: Managing the Health Risk Associated with Cooling Towers, Findings and Recommendations of the Department of Human Services Legionella Working Party, June 2000

www.health.vic.gov.au/environment/downloads/0007024.pdf

Registration of cooling tower systems

The Building (Legionella) Act 2000 requires all cooling tower systems in Victoria to be registered with the Building Commission. The tower owner is responsible for registration and renewal of registration on an annual basis. ***There is a registration fee of \$110 per cooling tower in the system and renewal is \$85.*** The owners are also responsible for preparing/implementing a Risk Management Plan (RMP). The Department of Human Services (DHS) investigates cases and outbreaks of Legionnaires' Disease/Legionellosis and provides advice and, enforces legislation relating to Legionella and cooling towers.

VICTORIA, AUSTRALIA (continued)

Synchronise now into one registration period

From 1 March 2005, owners registering more than one cooling tower system may synchronise the registration periods, following changes to the *Building Act 1993*.

Guide to Registration of Cooling Towers – Building Commission

<http://www.buildingcommission.com.au/www/html/504-registration-of-cooling-tower-systems.asp>

Legislation

The new Legionella reform package includes the following legislation, these are available on the [Victorian Legislation and Parliamentary Documents](#) website.

Building Act 1993

Building (Cooling Tower Systems Register) Regulations 2001

Building (Legionella Risk Management) Regulations 2001

Building (Legionella Risk Management) (Amendment) Regulations 2002

Health (Legionella) Regulations 2001

Plumbing (Cooling Towers) Regulations 2001

ASIA

HONG KONG

Prevention of Legionnaires' Disease: Code of Practice (2007 English Version) written by Prevention of Legionnaires' Disease Committee, Hong Kong. Government of Hong Kong Special Administrative Region

Following an outbreak of LD in 1985 at Stafford District Hospital, UK, the “*Prevention of Legionnaires' Disease Committee*” was set up in Hong Kong. The Committee is chaired by the Electrical and Mechanical Services Department, and it is comprised of members from the Department of Health, the Works Bureau, the University of Hong Kong, the Chinese University of Hong Kong, the Architectural Services Department and the Water Supplies Department.

There were 62 reported cases of LD between 1994 and the end of 3rd quarter of 2007. All were sporadic cases with no evidence of clustering.

Table 1: Summary of Notified Cases of Legionnaires' Disease 1994 – 2007

Year	No. of Cases	Year	No. of Cases
1994	3	2001	3
1995	1	2002	4
1996	2	2003	3
1997	2	2004	3
1998	1	2005	11
1999	1	2006	16
2000	2	2007*	10

Cooling Towers are addressed under Sections 4.2-4.3.3 on pages 8-13 of the Code. The recommendations are similar to other Codes of Practice globally, in terms of structural design, maintenance and microbiological monitoring.

www.ab.ust.hk/hseo/pdf/legio.pdf

SINGAPORE

Government of Singapore, Environmental Public Health Act, Chapter 95, Section 113

Environmental Public Health (Cooling Towers & Water Fountains) Regulations, Revised Edition, 2002

www.nea.gov.sg/cms/ld/legislation/EPHA_Reg_16.pdf

The owner is responsible for making sure the cooling tower has a standard plate count that does not exceed 100,000 colony-forming units per milliliter and a legionella bacteria count that does not exceed 10 colony-forming units per milliliter. In addition the tower must be kept in a good state of repair and inspected at least once a week. It should also be equipped with Drift Eliminators.

The owner is responsible for arranging for microbiological monitoring by a Government Lab:

- ³ At least once per month to determine standard plate count.
- ³ At least once every three months for Legionella bacteria.

There are penalties in place for contravention of the regulation. Conviction Liability:

- ³ 1st offence – fine not exceeding \$5,000
- ³ 2nd offence – fine not exceeding \$10,000

THAILAND

Presently, there are no control measures to prevent Legionnaires' disease issued in Thailand. Possible reasons include the fact that there has never been a reported outbreak of the disease in the country. It has been recommended by medical personnel that appropriate control measures should be set up by the working team consisting of representatives from the fields of engineering, chemistry, microbiology and medicine. It is also recommended that the Ministry of Public Health, Bangkok, Metropolitan Administration and regional provincial municipalities are assumed to be the authorities responsible for this special task.

pubnet.moph.go.th/hto/vol9no1/refresher1.pdf

USA

In the US, there are no regulations requiring testing or maintaining of any specified levels for Cooling Towers. There are no unifying national documents since both the Environment and the Medical sectors are affected and thus there are multiple disciplines and ministries/departments forced to collaborate on any efforts. At the federal level, the responsibility for Legionnaires outbreaks falls under the jurisdiction of the Center for Disease Control (CDC) in Atlanta and the responsibility for monitoring environmental risk (including Cooling Towers as a site for possible Legionnaires') falls under the jurisdiction of the Environmental Protection Agency (EPA). The EPA may also experience 'tension' in the process of enacting their regulatory powers. For example, cooling towers can lower the effect of biofouling on water systems situated close to industries, yet the cooling tower carries its own environmental impact in terms of both water and air pollution emissions. The EPA has established a Maximum Contaminant Level Goal (MCLG) of zero organisms for drinking water. An MCLG is a non-enforceable guideline based solely on an evaluation of possible health risks taking into consideration a margin for public safety. EPA does list Legionella on their list of water contaminants and has set a MCLg of zero or an MCL of TT³.

CDC

http://www.cdc.gov/legionella/legionella_CSTE_statement.htm

<http://www.cdc.gov/legionella/index.htm>

EPA

<http://www.epa.gov/safewater/contaminants/index.html>

USA (continued)

Numerous Codes of Practices have arisen outlining 'best practices' within the industry with regards to Legionella surveillance and control and both of the above agencies rely on these industry codes, in particular, those of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc (ASHRAE) and the Cooling Technology Institute (CTI).

ASHRAE Guideline 12-2000, Ashrae Standard, "Minimizing the Risk of Legionellosis Associated with Building Water Systems", 2000

<http://www.ashrae.org/>

Cooling Technology Institute, "Legionellosis Guideline:Best Practices for Control of Legionella", July 2008.

http://www.cti.org/cti_search.shtml

Some individual states may have enacted state level legislation or at least adopted a Code of Practice based on industry standards. At least, one city has recently enacted surveillance and control legislation under the auspices of a city ordinance (see News Article below).

GARLAND, TEXAS

Garland tough on bacteria

City among 1st requiring apartments to inspect for Legionnaires' culprit

10:48 AM CST on Thursday, February 1, 2007

By RICHARD ABSHIRE / The Dallas Morning News
[***rabshire@dallasnews.com***](mailto:rabshire@dallasnews.com)

The Garland Health Department has become one of the first public health agencies in the world to require inspections for the bacteria that cause Legionnaires' disease. A city ordinance revised last year requires every apartment complex that uses a cooling tower as part of its heating and air-conditioning system to have the tower inspected annually. "It is a low-cost, noninvasive, proactive approach," said Richard Briley, the Health Department's managing director. "We don't know why more health departments aren't doing it, especially for the peace of mind it provides." In the first round of inspections last year, nine of the 18 towers tested at 13 Garland apartment complexes were positive for legionella. After cleanups, all tested negative. Mr. Briley said he realized a need for the testing after investigating a case in which a cooling tower had to be eliminated as the source of an illness. The opportunity to implement the program arose because the city was revising its minimum housing standards ordinance.

Dr. Matt Moore of the National Center for Immunizations and Respiratory Diseases at the U.S. Centers for Disease Control and Prevention in Atlanta said Garland was the only U.S. city he knew of with such an ordinance. He said he knew of only two others in the world, one in the United Kingdom and another in France. That may be because the disease doesn't get much attention until there's an outbreak, such as the one at an American Legion convention in Philadelphia in 1976 that infected more than 200 people, caused 34 deaths and gave the disease its name. Several similar outbreaks have occurred around the world since. People get the disease by inhaling airborne water droplets contaminated with legionella bacteria, which grow best in warm water – in cooling towers, hot tubs and hot water tanks. Legionnaires' disease is not spread from person to person. The disease mimics conventional pneumonia so well that it is seldom identified unless there is a cluster of victims. The CDC estimates that only about 10 percent of the thousands of cases that occur each year are reported. "Dallas County Health and Human Services supports any city that wishes to encourage this type of testing to possibly prevent legionella cases in their municipalities," said Zachary Thompson, director of the county Health Department.

Inspections and lab tests cost about \$150 and can be done by city health inspectors or by companies approved by the city. Cleanup is relatively simple and usually can be done by the same contractors who maintain the heating and air-conditioning systems, Mr. Briley said. The city also recommends, but doesn't require, testing for hospitals and nursing homes. Vikki Yeatts, Garland's clinical services manager, said only nine cases of the disease were reported in Dallas County from January through November 2006, the most recent period for which figures are available. Five of those cases were reported in March. No cases were confirmed in Garland last year. But Mr. Briley said it's better to be safe than sorry. "We could be preventing people from getting sick," he said. "And nothing makes us feel better than that."

For more information, call the Garland Health Department at 972-205-3460.



THE END