



Legionella

Who's Addressing the Risks in Canada?





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1. INTRODUCTION

1.1 Background

1.1.1 What is *Legionella*?

Legionella bacteria live in both natural and human-made water sources. The bacteria can cause two types of illnesses in humans: Legionnaires' disease and Pontiac fever.

1.1.2 What is the incidence of *Legionella*-related disease outbreaks in Canada?

In 2012, a significant outbreak of Legionnaires' disease occurred in Québec City, resulting in 13 deaths and 170 documented cases of the disease. The source of the infection was a cooling tower in a Québec City building.

In Canada, the average number of reported cases of Legionnaires' disease is generally less than 100 per year. The actual number of cases, however, is thought to be much higher, as many people with pneumonia may not be tested for *Legionella* infection.

1.1.3 Who is responsible for *Legionella* control in Canada?

Preventing future incidents and ensuring those that occur are dealt with in an appropriate and timely manner are the shared responsibilities of several government departments and agencies (hereafter referred to as "agencies") in Canada. These include Health Canada, the National Research Council of Canada, the Public Health Agency of Canada, Public Services and Procurement Canada, and the Treasury Board of Canada Secretariat. Each is involved in mitigating the risks associated with *Legionella*-related disease outbreaks.

1.2 About this document

1.2.1 History

In January 2017, the agencies responsible for *Legionella* control at the federal level held a roundtable discussion on the growth and transmission of *Legionella* bacteria in building systems. They discussed mitigation strategies within their own agencies and agreed to develop a document outlining the responsibilities of all agencies involved in *Legionella* control. The focus of the document would be on federal/national resources and activities.

This document is the result.

1.2.2 Purpose

This document is not meant to be a comprehensive summary of all one needs to know about *Legionella*; it is meant to be an overview of the risks facing the key national agencies charged with responding to the impact of the growth and transmission of the bacteria in building systems. It also notes where additional information on the subject can be found.

1.2.3 Audience

The audience for this document includes the stakeholders involved in regulating and building construction projects (e.g., building and systems designers, building officials, and national and provincial agencies), as well as those affected by the construction (e.g., occupants, health care professionals, maintenance and operational personnel, and individuals tasked with the surveillance of reported outbreaks of Legionnaires' disease, etc.).

2. **LEGIONELLA-RELATED ILLNESSES**

2.1 **Legionellosis**

2.1.1 **What is legionellosis?**

Legionellosis is an infection caused by *Legionella* bacteria. Legionellosis causes either Pontiac fever or Legionnaires' disease.

2.2 **Legionnaires' disease**

2.2.1 **What is Legionnaires' disease?**

Legionnaires' disease is a serious respiratory illness that results in severe pneumonia and may lead to death. The name comes from an outbreak of pneumonia that killed 29 people at an American Legion convention in Philadelphia, Pennsylvania in 1976.

Legionnaires' disease is the main focus of this document.

2.3 **Pontiac fever**

2.3.1 **What is Pontiac fever?**

Pontiac fever is a milder illness than Legionnaires' disease. It causes flu-like symptoms, but it does not cause pneumonia. It was first described in Pontiac, Michigan in the early 1970s. People with Pontiac fever generally recover within two to five days without treatment.

3. LEGIONNAIRES' DISEASE

3.1 Risk factors

3.1.1 What conditions promote the growth of *Legionella* bacteria?

Certain conditions that promote the growth of the bacteria may be present in buildings and homes. These include stagnant water, warm water temperatures (especially between 20°C and 50°C) and the presence of biofilm, scale and sediment.

These conditions may be present in:

- cooling towers and other evaporative heat rejection systems, such as those used with air-conditioning systems in large buildings,
- whirlpool bathtubs, hot tubs and public spas,
- plumbing systems (including water heaters, faucets and showers), and
- humidifiers, evaporative air coolers, misters, atomizers and air washers.

Cooling towers are often linked to outbreaks of Legionnaires' disease, as they can provide an ideal environment in which *Legionella* bacteria can grow. Cooling towers can release large quantities of contaminated water droplets or mist into the air, which can enter buildings whose ventilation systems have a clear pathway to the tower. Humans are exposed to the bacteria by inhaling the contaminated droplets.

3.1.2 Who's at risk for Legionnaires' disease?

The following segments of the population are at greater risk of developing the disease than the general population:

- people over 40 years of age,
- people who are smokers,
- people who are alcoholics,
- people with chronic lung or kidney disease,
- people with diabetes, and
- people with weakened immune systems due to diseases such as cancer, or procedures such as organ transplants.

Individuals in certain occupations—such as those who do maintenance work on large air-conditioning systems—may also be at an increased risk of developing diseases resulting from exposure to *Legionella* bacteria. Generally, more men than women contract Legionnaires' disease. It is uncommon for people younger than 20 years of age to get Legionnaires' disease.

3.1.3 Will everyone exposed to *Legionella* bacteria get Legionnaires' disease?

No. The number of bacteria present determines the risk for humans. The concentration of *Legionella* bacteria found in natural water sources such as lakes, rivers, ponds, and streams is generally too low to cause Legionnaires' disease. However, the concentration of *Legionella* bacteria found in certain building systems can be elevated enough to cause the disease.

3.2 Symptoms and treatment

3.2.1 Can Legionnaires' disease be transmitted from one person to another?

No.

3.2.2 What are the symptoms of Legionnaires' disease?

Symptoms can include fever, cough, muscle pain and headache. Symptoms can present within two to fourteen days of infection and last for several months. If symptoms persist, a health care provider should be consulted.

3.2.3 How is Legionnaires' disease treated?

Most cases can be treated successfully with antibiotics. The effectiveness of the treatment varies with age and overall health, and can also depend on how quickly the person receives the right medical treatment.

4. *LEGIONELLA* CONTROL – ROLES AND RESPONSIBILITIES

4.1 Before and during construction

4.1.1 National Research Council of Canada (NRC)

Under the oversight of the Canadian Commission on Building and Fire Codes (CCBFC), NRC publishes the National Model Construction Codes, which are designed to protect public health and safety as they relate to the construction and occupancy of buildings and structures. As the regulation of building construction and fire safety is a provincial/territorial responsibility under Canada's Constitution, the Codes must be adopted by the regulatory authority having jurisdiction to come into effect.

Two of the Codes, the National Building Code of Canada (NBC) and the National Plumbing Code of Canada (NPC), contain provisions that deal with *Legionella* in building systems.

4.1.1.1 National Building Code of Canada (NBC)

The NBC addresses the design and construction of new buildings and the substantial renovation of existing buildings. Part 6 of Division B of the NBC 2015 applies to the design and installation of heating, ventilating and air-conditioning (HVAC) systems and equipment in buildings. It includes requirements that minimize the growth and transmission of *Legionella* bacteria, which in turn help mitigate adverse health effects on building occupants.

For example, the Code:

- clarifies design requirements for evaporative equipment in different applications to address health risks such as those associated with *Legionella*,
- specifies that cooling tower blow-down products must be located not less than a specific minimum distance from outdoor air intakes and be connected to the building's drainage system,
- includes requirements that help prevent the introduction of warm discharge air and associated drift that may contain biological contaminants to indoor environments via outdoor air intakes,
- contains requirements that mitigate the growth and dispersion of *Legionella* and protect potable water sources, and
- requires that evaporative equipment be provided with service platforms, access ports, fixed ladders and restraint connections so that visual inspections, maintenance and water testing may be carried out on this equipment.

The CCBFC Standing Committee on HVAC and Plumbing has developed proposed changes to the requirements in Part 6 of the NBC 2015 that address the growth and transmission of *Legionella* bacteria. These Code changes will undergo a public review and then be recommended to the CCBFC (which is responsible for developing and updating the National

Model Construction Codes) for publication in the 2020 edition of the NBC.

4.1.1.2 National Plumbing Code of Canada (NPC)

The NPC addresses the design and installation of plumbing systems in buildings and facilities. The NPC 2015 requires that electric storage-type service water heaters be set at a temperature of 60°C to minimize the growth of *Legionella* bacteria. Storing hot water at temperatures below 60°C in the hot water tank or delivery system of this type of water heater may lead to the growth of *Legionella* bacteria as a result of temperature stratification. The growth of *Legionella* bacteria is not a concern for other types of water heaters with different designs or that use different energy sources.

4.1.1.3 Additional information

The [Codes Canada website](#) contains general information on the National Model Construction Codes and related documents and on the Code development process, as well as a list of the provincial/territorial authorities and their contact information. The final responsibility for official interpretations of Code requirements rests with the authority having jurisdiction.

4.2 After construction

4.2.1 Health Canada (HC)

HC's *Legionella*-related activities are concerned with drinking water.

HC's [Healthy Environments and Consumer Safety Branch \(HECSB\)](#) develops the [Guidelines for Canadian Drinking Water Quality](#) in collaboration with the provinces and territories. No specific drinking water guideline exists for *Legionella*, but *Legionella* is discussed in the context of drinking water management in the document, [Guidance on Waterborne Bacterial Pathogens](#). Water treatment and distribution system practices are also recommended as general control measures.

4.2.2 Treasury Board of Canada Secretariat (TBS)

TBS's *Legionella*-related activities are concerned with occupational health.

By designation of TBS, the [Public Service Occupational Health Program \(PSOHP\)](#) provides advice and consultation to federal departments on the investigation, assessment of risk, and control of *Legionella* that could affect the health of federal employees across Canada and abroad. PSOHP has, in the past, also provided occupational hygiene expertise to provincial bodies; for example, PSOHP provided expertise to the [British Columbia Centre for Disease Control](#) in the development of a *Legionella* investigation guide used by British Columbia health authorities.

4.2.3 Public Services and Procurement Canada (PSPC)

[PSPC's Real Property Branch](#) manages one of the largest and most diverse portfolios of real estate in the country and is the Government of Canada's (GC's) real property expert. The Branch has taken a leadership role as a custodian department in implementing processes to mitigate the risk of Legionnaires' disease outbreaks originating in GC buildings.

PSPC developed the standard [MD-15161 Control of Legionella in Mechanical Systems](#), which applies to Crown-owned buildings managed by PSPC and provides requirements for the proper design, installation, maintenance, operation and bacterial testing to control the growth of *Legionella* bacteria. The standard also requires the development of a site-specific *Legionella* Bacteria Control Management Program (LBCMP).

To ensure that consistent communications and actions are employed to meet the requirements of PSPC's MD-15161 *Legionella* standard, PSPC developed a *Legionella Management Communications and Actions Protocol* to:

- provide interpretation of the bacterial testing result levels in MD-15161,
- establish mandatory communication responsibilities

following receipt of bacterial testing results,

- clarify to all stakeholders when and how they are to be engaged following receipt of bacterial testing results,
- provide tools to ensure timely, consistent and appropriate communication of the situation and actions being taken, and
- ensure proper support to the employer in meeting their requirements under the *Canada Labour Code*.

4.3 Legionellosis case management

4.3.1 Public Health Agency of Canada (PHAC)

[PHAC](#) is responsible for developing the national case definition for legionellosis, which is the infection that causes Legionnaires' disease and Pontiac fever. PHAC is also responsible for national surveillance of legionellosis in Canada.

PHAC collects information about the number of reported cases of legionellosis in Canada as part of its work with provincial and territorial public health officials to monitor and analyze the rates of reported nationally notifiable diseases. Nationally notifiable diseases are infectious diseases that have been identified by the federal government and all provinces and territories as priorities for monitoring and control efforts. When requested, PHAC will help to investigate outbreaks of infectious diseases.

PHAC's [National Microbiology Laboratory \(NML\)](#) is Canada's main public health infectious disease laboratory. Regarding *Legionella*-related referrals, the NML routinely:

- identifies the bacterium to genus, species and subspecies using several molecular or monoclonal typing methods,
- characterizes novel *Legionella* bacteria (should they be found) using internationally-recognized standard methods,
- reports molecular types (based on a study of seven genes) for *Legionella pneumophila* referrals after comparison to types in an international (European) database to indicate

- how rare the type is and the locations by province where it has previously been found (if anywhere) in Canada, and studies strains thought to be linked in an outbreak at a whole genome sequencing level (upon request).

PHAC's Centre for Communicable Diseases and Infection Control provides advice and guidance to health care organizations and providers to prevent and control the spread of infections in health care and community settings. Evidence-based guidance complements provincial/territorial jurisdiction efforts and informs policies and procedures related to infection-control practices in Canada in all settings where health care is provided.

The PHAC publication [*Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Healthcare Settings \(RPAP\)*](#)⁽¹⁾ provides a general overview of infection-control principles to prevent the transmission of microorganisms to patients, health care workers and visitors. There is no specific national infection-control guideline for *Legionella*. Most provinces and territories have published *Legionella*-related disease outbreak prevention, investigation and control protocols (see Appendix A). Legionellosis is referenced in RPAP, whereby routine practices are recommended as a general infection-control measure. In the event of an outbreak, an investigation would be managed by the relevant public health authority.

⁽¹⁾ The full version of RPAP is available on the GC publications website at <http://publications.gc.ca/site/eng/440707/publication.html>.

APPENDIX A – PROVINCIAL AND TERRITORIAL *LEGIONELLA* PROTOCOLS

The following protocols address *Legionella*-related disease outbreak prevention, investigation and control:

Alberta

[Public health disease management guidelines : legionellosis](#)

British Columbia

[Communicable Disease Control Chapter 1 – Management of Specific Diseases](#)

[Legionella outbreak investigation and control – March 2018](#)

Manitoba

[Communicable Disease Management Protocol: Legionellosis](#)

New Brunswick

No published protocol for *Legionella* was identified.

Newfoundland and Labrador

[Disease Control Manual – Section 3 – Diseases transmitted by respiratory routes](#)

Northwest Territories

No published protocol for *Legionella* was identified.

Nova Scotia

[Communicable Disease Manual – Legionella](#)

Nunavut

[Communicable Disease and Surveillance Manual](#)

Ontario

[Infectious Disease Protocol, Appendix A: Disease-Specific Chapters: Legionellosis](#)

[Revised January 2013](#)

Prince Edward Island

No published protocol for *Legionella* was identified.

Québec

[Guide d'intervention - La légionellose \(Édition 2015\)](#)

Saskatchewan

[Communicable Disease Manual – Respiratory and Direct Contact – Legionellosis
Section 2-70](#)

Yukon

No published protocol for *Legionella* was identified.

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