



REPORT

Report Date: May 13, 2020
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Meeting Date: June 10, 2020
[Submit comments to Council](#)

TO: Standing Committee on City Finance and Services

FROM: General Manager of Development, Buildings, and Licensing
and the Chief Building Official, in collaboration with the
Vancouver Coastal Health Authority

SUBJECT: Legionella Prevention — Vancouver Building By-law Amendments

RECOMMENDATION

- A. THAT Council approve, in principle, the amendments to the Building By-law generally in the form attached as Appendix C, implementing safety improvements to various plumbing and building mechanical systems;

FURTHER THAT Council instruct the Director of Legal Services to bring forward for enactment amendments to the Building By-law generally as set out in Appendix C, with certain provisions to come into force and take effect on January 1, 2021, and others on January 1, 2022.

- B. THAT Council approve, in principle, the amendments to the Gas Fitting By-law generally in the form attached as Appendix D, updating the by-law to reflect the Provincial legislation governing gas safety and making various housekeeping amendments to the Fee Schedule;

FURTHER THAT Council instruct the Director of Legal Services to bring forward for enactment amendments to the Gas Fitting By-law generally as set out in Appendix D, with provisions to come into force and take effect upon enactment, except the section amending the Fee Schedule (section 4), which will come into force and take effect on October 1, 2020.

REPORT SUMMARY

Legionnaires' disease is the leading cause of waterborne illness and death in the United States. It is connected to improperly maintained mechanical systems. It is preventable. Reported cases of Legionnaires' disease have increased multi-fold in recent years. The Surrey 2018 outbreak stemmed from a cooling tower and resulted in two deaths.

This Report recommends *Legionella* prevention strategies to protect residents and visitors to Vancouver. It builds upon the Operating Permits established unanimously by City Council in December 2018. For cooling towers, decorative water features and non-potable water treatment systems (such as for rainwater re-use), the Report proposes routine testing to validate maintenance practices, mandatory corrective actions and notifications when exceedances occur, and basic operator qualifications. It also recommends adoption of construction design standards from the model National Codes.

The recommendations are evidence-based and pro-active, were developed in collaboration with health authorities, enjoy widespread local support — including from building owners and managers — and have been endorsed by many North American experts.

The Report concludes with recommended plumbing amendments which expand options for developers and plumbers, and gas amendments to reflect the Provincial legislation governing gas safety.

COUNCIL AUTHORITY/PREVIOUS DECISIONS

In April 1893, Council created the new position of Plumbing Inspector, administered by the Medical Health Officer and one of the City's earliest public health initiatives.

In December 2018, Council approved Building By-law amendments to protect public health, including new Operating Permits for specific building mechanical systems.

In July 2019, Council approved the 2019 Vancouver Building By-law, with the phased implementation of new plumbing and building mechanical systems requirements for cooling towers and decorative water features on January 1, 2020, and July 1, 2020.

CITY MANAGER'S/GENERAL MANAGER'S COMMENTS

The City Manager recommends approval of the foregoing.

REPORT

Background/Context

“Legionnaires’ disease afflicts and kills more people in the United States than any other reportable waterborne disease,” with 52,000 to 70,000 estimated cases annually.¹ Between 3 and 33% of infections lead to death.² There is no vaccine. The name originates from a 1976 Philadelphia outbreak amongst members of the American Legion.

Surrey’s 2018 *Legionella* outbreak resulted in 14 cases (all hospitalised), including seven in the intensive care unit with two deaths.³ More Canadian examples include:

- Moncton, 2019: 16 cases, 15 of whom were hospitalised;
- Quebec City, 2012: 181 cases with 14 deaths; and
- Toronto, 2005: 135 cases with 23 deaths.

Legionella are associated with the built environment and the disease is preventable. The bacteria can proliferate in unsatisfactorily maintained plumbing and building mechanical systems, and are transmitted through inhalation of contaminated water that has been aerosolised, but not by ingestion of water. It is not contagious.⁴

Cooling towers, used for air conditioning or equipment cooling, were implicated in all of the aforementioned outbreaks. Other possible sources of infection — due to potentially conducive growth conditions for *Legionella* and water aerosolisation — include decorative water features, hot tubs, shower heads, and special events displays (Appendix A).

This Report proposes *Legionella* prevention strategies to protect residents and visitors to Vancouver.

¹ National Academies of Sciences, Engineering and Medicine (NASEM) (2020). “Management of *Legionella* in Water Systems.” Washington, DC: The National Academies Press, doi.org/10.17226/25474 One of the NASEM report’s coauthors, Dr. Michèle Prévost, has provided a Letter of Support for this Council Report (Appendix E).

² *Legionella* bacteria can cause Legionnaires’ disease, a potentially life-threatening infection, and Pontiac fever, a milder flu-like illness. “The conditions under which an individual develops either Legionnaires’ disease or Pontiac fever are not fully understood but may depend on the health status of the individual, the degree of exposure to the organism, and/or the strain-specific virulence.” Rarely the bacteria can result in endocarditis or a wound infection. Lalancette *et al.* (2020) *J Assoc Med Microbiol Infect Dis Can*, doi.org/10.3138/jammi-2019-0021
Borton (2020) *Nursing2020* 50:3, doi.org/10.1097/01.NURSE.0000651660.70883.b4

³ Mark McCabe, MPH (Epidemiologist, Fraser Health Authority) (2020), “Investigating an Outbreak of Legionnaires’ Disease from Cooling Towers in Surrey, BC,” presented at the NCCEH Environmental Health Seminar Series, nceh.ca/sites/default/files/EH%20Seminar%20Legionella%20-%20Mark.pdf

⁴ Human-to-human transmission may occur in rare cases, and there are no animal-to-human cases documented. There are no reports of Legionnaires’ disease associated with natural freshwater like lakes, streams or waterfalls. In North America, most cases of Legionnaires’ disease are caused by *Legionella pneumophila*. There are however over 60 different *Legionella* species, many of which are pathogenic to humans; *Legionella longbeachae*, for example, is associated with exposure to contaminated potting soils or compost. Graham *et al.* (2020) *Sci Rep* 10:7337, doi.org/10.1038/s41598-020-63740-y
Borton (2020) *Nursing2020* 50:3, doi.org/10.1097/01.NURSE.0000651660.70883.b4
Toberna *et al.* (2020) *J Patient Cent Res Rev* 7:165, doi.org/10.17294/2330-0698.1721

For reasons not entirely understood, cases of Legionnaires' disease have increased over nine times since 2000 in the United States, and a similar pattern is true for Canada.⁵ Factors likely include an aging and growing urban population with increased exposure to building mechanical systems. Poverty is a strong risk factor.⁶ Studies show a higher risk of Legionnaires' disease in urban areas compared to rural settings, and complex plumbing infrastructure and systems like cooling towers are proliferating in cities like Vancouver to meet the demands of a densifying built-form and changing climate.⁷ Exacerbating this is that *Legionella* from cooling towers may be dispersed up to 12 km.⁸ As the City of Vancouver densifies and meteorological conditions change, this Report recommends demonstrably effective, pro-active measures to avert illness and death.

This Report builds upon the Operating Permits established unanimously by City Council in December 2018 (which the U.S. Centers for Disease Control and Prevention have held up as a model to other agencies; see "Public/Civic Agency Input," below). That Council Report has established the location and corresponding contact information for cooling towers and decorative water features in Vancouver, information which accelerates the response to a *Legionella* outbreak, but does not prevent an outbreak. This Report now recommends routine testing to validate maintenance practices, mandatory corrective actions and notifications when exceedances occur, and basic operator qualifications. It also proposes new construction design standards.⁹

The Report concludes with recommended plumbing amendments which expand options for developers and plumbers, and gas amendments to reflect the Provincial legislation governing gas safety.

⁵ "Conventional" waterborne diarrheal diseases have been largely eliminated in North America by better drinking water treatment, and contemporary waterborne infections have shifted to respiratory diseases. After delivery of centrally treated water to buildings, *Legionella* can contaminate the water, amplify and be dispersed by mechanical equipment and plumbing fixtures.

U.S. Centers for Disease Control and Prevention (2018), "*Legionella*: History, Burden, and Trends,"

cdc.gov/legionella/about/history.html

National Collaborating Centre for Environmental Health (2020), "*Legionella*," ncceh.ca/environmental-health-in-canada/health-agency-projects/legionella

Cotruvo (2020), "*Legionella* Management in Building Water Systems: The Role of Chlorine Products,"

chlorine.org/wp-content/uploads/2020/03/Legionella_in_Building_Water_Systems_WEB_March_2020.pdf

⁶ Gleason *et al.* (2017) *Int J Health Geogr* 16:45, doi.org/10.1186/s12942-017-0118-4 The Downtown Eastside is a particular concern.

⁷ A Scottish study found that the "relative risk of community acquired, non-travel, non-outbreak Legionnaires' disease was over 3.0 in people living within 0.5 km of a cooling tower compared with people living more than 1 km away." A Latvian study found that "[b]lood samples from inhabitants of apartment buildings were positive for *Legionella pneumophila* more often than those ... of single-family homes." An investigation into an explosive *Legionella* outbreak in Pamplona documented construction activities burdening cooling towers with debris. Particulates from other sources, such as wildfires and air pollution, can also potentially overwhelm cooling tower treatment systems (City of Vancouver conversations with the Fraser Health Authority and the Los Angeles Department of Water and Power). Bhopal *et al.* (1991) *BMJ* 302:378, doi.org/10.1136/bmj.302.6773.378
Valciņa *et al.* (2015) *Int J Environ Res Public Health* 13:58, doi.org/10.3390/ijerph13010058
Castilla *et al.* (2007) *Epidemiol Infect* 136:823, doi.org/10.1017/S0950268807009077
Graham *et al.* (2020) *Sci Rep* 10:7337, doi.org/10.1038/s41598-020-63740-y

⁸ White *et al.* (2013) *Epidemiol Infect* 141:789, doi.org/10.1017/S0950268812000994

⁹ An important co-benefit to better designed and maintained systems can also be decreased water and energy use.

Strategic Analysis

A. Legionella Prevention

1) New Construction

Cooling Towers. The recommended amendments duplicate upcoming changes pertaining to *Legionella* in the model National Codes of Canada.¹⁰ These include new standards for cooling towers to minimise *Legionella* proliferation and transmission, with setbacks from air intakes and other building components. The City will also require proof of a service contract with a new cooling tower. This is an industry best practice, will simplify responsibilities for fledgling strata corporations, and eliminates cooling towers being handed over at occupancy with no maintenance plan.

Hot Water. For electric hot water systems, the Vancouver Building By-law requires a storage tank set-point of 60 °C, explicitly for *Legionella* control. The recommendation is to expand this to all new hot water storage tanks, regardless of the heat source. This is consistent with a recommendation from the consensus study report on *Legionella* by the National Academies of Sciences, Engineering and Medicine (NASEM).¹¹

Plumbing Fixtures. To prevent unintended consequences from water efficiency measures, buildings with vulnerable populations (*i.e.*, care and treatment occupancies) are recommended for exemption from low-flow shower head and faucet requirements. This is consistent with the NASEM report, and the impact on water use will be minimal.¹²

2) Maintenance (Applicable to new and existing equipment)

Legionnaires' disease is transmitted from the built environment, and almost all of the *Legionella* outbreaks studied by the U.S. Centers for Disease Control and Prevention were attributed to ineffective water management in a building.¹³ Public health can be improved by controlling potential exposure sources in buildings through engineering controls and proper maintenance.¹⁴

¹⁰ The 2019 Vancouver Building By-law is substantially based on the 2018 British Columbia Building Code, which in turn is substantially based on the model 2015 National Codes of Canada. While this model of adoption helps promote consistency amongst building codes, an undesirable side effect is that improvements to the model National Codes can take years to be incorporated into the Vancouver Building By-law. New, model 2020 National Codes of Canada are forthcoming, and this Council Report proposes to "leap-frog" some of the improvements into the Building By-law.

¹¹ National Academies of Sciences, Engineering and Medicine (NASEM) (2020). "Management of *Legionella* in Water Systems." Washington, DC: The National Academies Press, doi.org/10.17226/25474

¹² Water efficiency measures can pose a *Legionella* risk by unintentionally promoting water stagnation, and the NASEM report (2020) recommends that low-flow fixtures should not be allowed in hospitals and long-term care facilities. In 2015 in the United States, 20% of Legionnaires' disease cases were health-care associated. Scanlon *et al.* (2020) *Int J Res Public Health* 17:2168, doi.org/10.3390/ijerph17062168
Borton (2020) *Nursing2020* 50:3, doi.org/10.1097/01.NURSE.0000651660.70883.b4

¹³ Garrison *et al.* (2016) *MMWR Morb Mortal Wkly Rep* 65:576, doi.org/10.15585/mmwr.mm6522e1
A water management program (WMP) can help to reduce a building's risk of amplifying and dispersing *Legionella* by identifying and reducing hazardous conditions. The US CDC provides a free, comprehensive toolkit with guidance for developing a WMP: cdc.gov/legionella/wmp/toolkit/

¹⁴ Gamage *et al.* (2018) *JAMA Netw Open* 1(2):e180230, doi.org/10.1001/jamanetworkopen.2018.0230

Routine testing validates *Legionella* control strategies. If *Legionella* is growing, “it is prudent to recognise the situation early on, review and modify the treatment regimen, and then verify the efficacy of the remediation.”¹⁵ The NASEM report states that mandatory testing regulations “have been shown to reduce cooling tower colonisation rates in several jurisdictions,” such as within the Province of Quebec and within Crown-owned facilities nation-wide.¹⁶

The recommendations herein are performance-based, with verification and validation of effective water management through mandatory maintenance logs, routine *Legionella* testing and reporting (with prescribed corrective actions and notifications), and a minimum professional competency for those maintaining complex mechanical systems.

Maintenance logs. For cooling towers and decorative water features, an on-site maintenance log and records will be required as of January 1, 2021.

Testing. Routine *Legionella* testing will be required for cooling towers, decorative water features and non-potable water treatment systems. To preclude a regulatory patchwork, these proposals are intentionally harmonised with provincial regulations in Quebec and the standards for Public Services and Procurement Canada (PSPC) buildings.¹⁷

Legionella pneumophila tests (offered by commercial laboratories) are about \$150 each and will be the responsibility of the building owner. Requirements will be phased in:

- January 1, 2021: One *Legionella* test at start-up for each cooling tower and decorative water feature, with at least one test for a device that runs year-round.
- January 1, 2022: As above, with *Legionella* tests every month for cooling towers and every two months for decorative water features and non-potable systems.

Reporting, corrective actions and notification. *Legionella* test results will be reported on-line through the Operating Permit program, which is fully integrated into the City’s web-based inspection platform (see Figures 1 and 2 for current Operating Permits). Expectations for corrective actions are based on PSPC’s federal standards, and exceedances will trigger mandatory notification of the local Medical Health Officer and the Chief Building Official. Audits and inspections will be conducted by Plumbing Inspectors. To fund the program on a cost-recovery basis, starting January 1, 2022 an annual Operating Permit fee of \$250 is recommended, with a fee of \$100 for each additional device in the same building.¹⁸ These permits will continue to be auto-issued on-line, immediately upon application (a four minute process).

¹⁵ American Industrial Hygiene Association (AIHA) (2015), “Recognition, Evaluation, and Control of *Legionella* in Building Water Systems.”

¹⁶ NASEM (2020). See also Letters of Support (Appendix E) from Dr. Michèle Prévost, Polytechnique Montréal, and Patrick Racine, DuBois Chemicals Ltd. for details on the results of the Province of Quebec’s regulations. Routine testing also facilitates quality control of service providers by building owners and managers, and contractors may “be more likely to perform their duties with diligence if the results are being monitored.” Whitney *et al.* (2017) *J Public Health Manag Pract* 23:6, doi.org/10.1097/PHH.0000000000000518

¹⁷ Public Services and Procurement Canada (PSPC) have been extremely generous in sharing information with the City of Vancouver. The House of Commons Question Period notes for December 2019 identify this collaboration: tpsgc-pwgsc.gc.ca/trans/pq-gp/gp20-eng.html.

¹⁸ Annual Operating Permit fees for elevators are \$246 to \$527 in British Columbia (as of January 1, 2020), with no discount for additional elevators within the same building: technicalsaftybc.ca/sites/default/files/resource/elevating-devices-fee-schedule.pdf

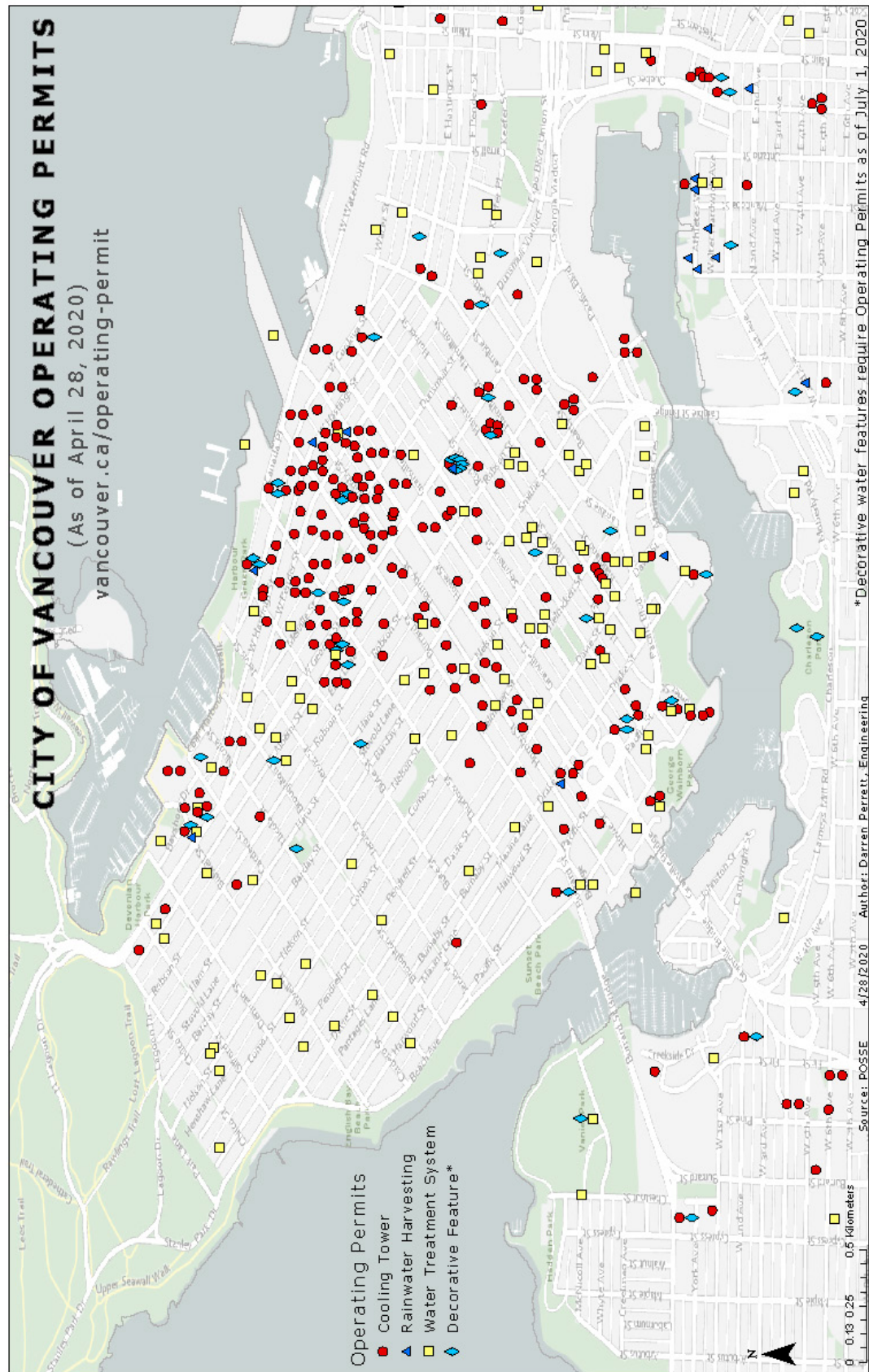


Figure 1

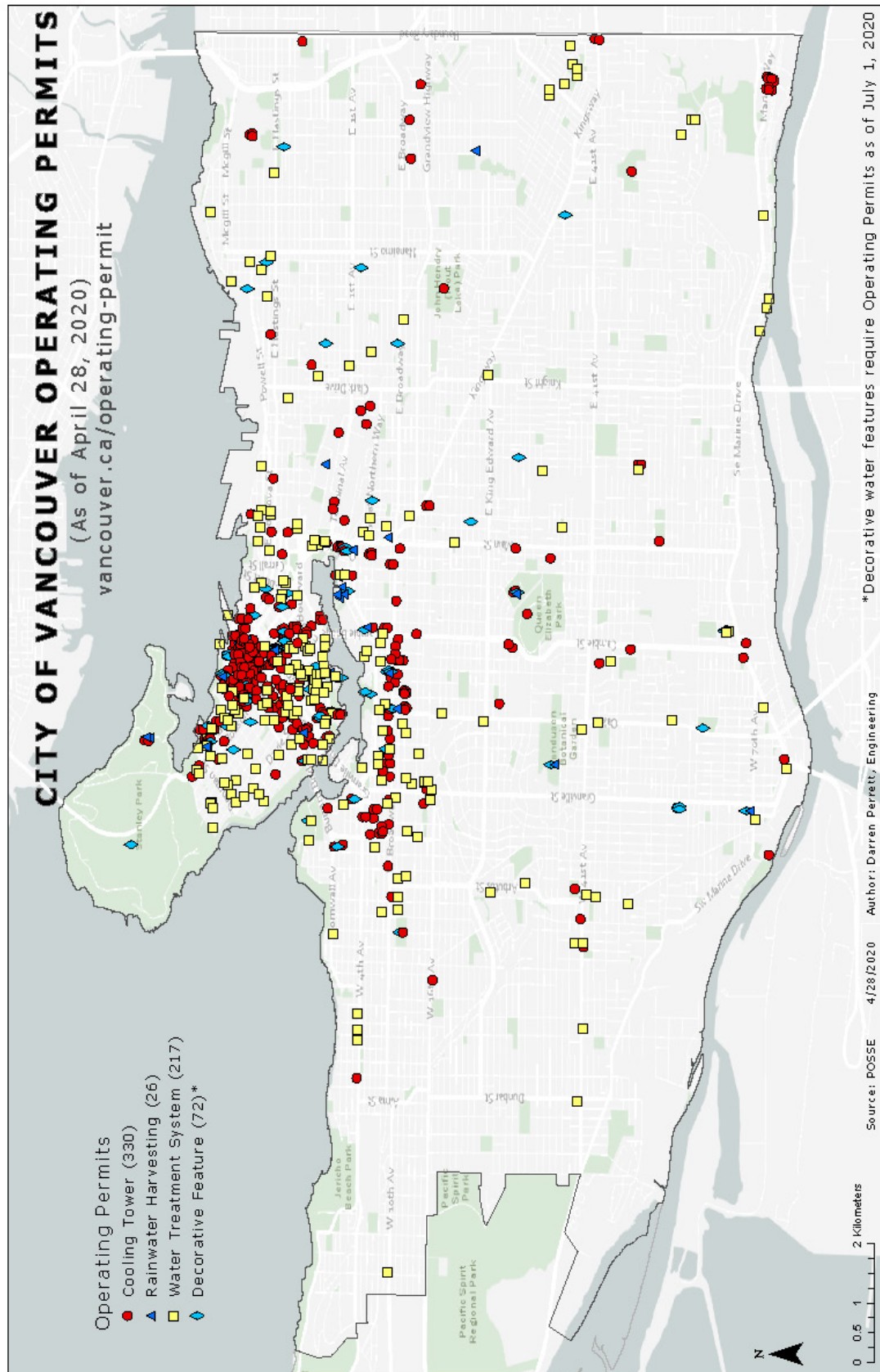


Figure 2

Minimum professional competency. A new “Building Water System Operator” certification is recommended, which would be administered independently by the provincial Environmental Operators Certification Program (EOCP).¹⁹ This organisation certifies the thousands of water and wastewater operators in British Columbia. The administration of this new certification will have no financial, administrative or human resources implications to the City.

The new certification would be required as of January 1, 2022 for at least one individual associated with a given Operating Permit, and could be someone within the building, such as a facility engineer, or someone associated with the building, such as a service provider. The intent is to establish *Legionella* awareness and a minimum proficiency with microbiological sampling and the interpretation of laboratory results.

With Council approval, this certification will be launched by EOCP in September 2020 and is geared to facility managers, building operators and contractors. The one-time training course, intended as a supplement to an existing skill-set, and EOCP exam for an individual will be about \$600, with annual dues to EOCP of about \$100. There will be a continuing education requirement to retain certification.

Note on hot tubs and pools. No changes are proposed for hot tubs and pools as these already require Operating Permits under the *BC Pool Regulation*. Administration and inspections are conducted locally by the Vancouver Coastal Health Authority.

3) Special Events (Collaboration with City and Park Board staff)

Water-using displays and devices at special events have been associated with *Legionella* outbreaks. Hot tubs on display at the North Carolina Mountain State Fair (September 2019) were the likely source of 135 cases, with four deaths.²⁰

Guidance for special events to prevent such an outbreak has been published by the Vancouver Coastal Health Authority (Appendix B) and has been shared with the applicable City and Park Board staff. It is also posted at vancouver.ca/operating-permit

4) Water Distribution System Disruptions (Collaboration with Engineering Services)

Water supply interruptions within the City’s distribution system can alter water quality.²¹ If a building owner or manager has notice of potential changes due to construction, water main breaks, or other water quality changes, actions can be taken at the building level to mitigate potentially harmful consequences to public health and equipment.

¹⁹ Letter of Support (Appendix E) from Kalpna Solanki, CEO, Environmental Operators Certification Program (EOCP).

²⁰ North Carolina Department of Health and Human Services (January 30, 2020) “Legionnaires’ disease outbreak associated with the North Carolina Mountain State Fair, 2019,” epi.dph.ncdhhs.gov/cd/legionellosis/MSFOutbreakReport_FINAL.pdf?ver=1.1

²¹ U.S. Centers for Disease Control and Prevention (2017), “Developing a Water Management Program to Reduce *Legionella* Growth & Spread in Buildings” (version 1.1), cdc.gov/legionella/downloads/toolkit.pdf See also the Letter of Support (Appendix E) from Dr. Michèle Prévost, Polytechnique Montréal, which discusses the importance of water distribution system interruptions to buildings.

Local building owners and managers have expressed the desire for improved notification of water supply interruptions from the City.²² The distribution system is managed by Engineering Services, and DBL staff are discussing opportunities with Engineering to provide this enhanced service, potentially through the Operating Permit program.

5) Coronavirus Disease Context

After a prolonged shutdown, a building's plumbing and mechanical systems may be conducive to contamination by pathogens (such as *Legionella*) and chemicals (such as lead).²³ The Vancouver Coastal Health Authority was amongst the first jurisdictions in the world to issue an advisory to building owners of these risks due to unoccupied and under-occupied buildings.²⁴ DBL staff have conducted extensive outreach to local building owners and managers, including through the Operating Permit program, and with the Vancouver Coastal Health Authority have been providing informal assistance to REFM and Park Board staff at civic facilities.²⁵ Selected guidance has been posted at vancouver.ca/operating-permit

B. Plumbing & Gas Amendments

1) Non-potable Water Treatment Systems (Rainwater Re-use)

About 40% of indoor household drinking water use is for toilets and clothes washers.²⁶ The amendments expand a developer's options for treated non-potable water use to clothes washers and other equipment such as vehicle wash facilities. Codifying these options will expedite building permit processing by eliminating an "Alternative Solution" requirement. Also included are housekeeping revisions and simplifications to improve readability. These changes support water conservation goals and facilitate compliance with the Rain City Strategy.

Under the Operating Permit program, such systems are required to report water quality parameters (*E. coli*, turbidity and temperature) and water meter readings every three months via the City's on-line portal. A reporting frequency of every two months is proposed to begin in 2021, with the addition of *Legionella* testing in 2022.

²² Letter of Support (Appendix E) from Damian Stathonikos, President, Building Owners and Managers Association (BOMA) British Columbia.

²³ Viglione (2020) *Nature*, doi.org/10.1038/d41586-020-01286-9
Shiffman (April 24, 2020), "Buildings closed by coronavirus face another risk: Legionnaires' disease", Reuters, reuters.com/article/us-health-coronavirus-legionnaires/buildings-closed-by-coronavirus-face-another-risk-legionnaires-disease-idUSKCN2261AO

²⁴ VCH (March 27, 2020), "Water Stagnation Risks Due to Prolonged Reduced Building Occupancy," vch.ca/Documents/VCH%20Bulletin%20-%20Building%20Water%20Systems%20and%20COVID19%20.PDF

²⁵ DBL staff contributed to a forthcoming journal article led by Purdue University on this topic: Proctor *et al.* (2020) "Considerations for Large Building Water Quality After Extended Stagnation." OSF Preprints, doi.org/10.31219/osf.io/qvj3b

²⁶ Water Research Foundation (2019), "Residential End Uses of Water, Version 2." Executive Report, awwa.org/Portals/0/AWWA/ETS/Resources/WaterConservationResidential_End_Uses_of_Water.pdf

The annual cost increase to an owner in 2022 will be around \$1,000, and the improvements harmonise Vancouver with standards for Crown-owned buildings. Lastly, as described above, beginning in 2022 systems with Operating Permits will require at least one individual to hold the EOCP “Building Water System Operator” certification to raise the knowledge level for mechanical system operations.²⁷

Future policy research will explore the re-use of treated groundwater and perimeter drainage water for non-potable applications. This research is contingent on the City’s Groundwater Management Strategy (under development by Engineering Services), including a comprehensive assessment of groundwater quality and an understanding of the nature and extent of contaminants within the City of Vancouver.

2) Other Plumbing Amendments

This Report recommends adoption of selected plumbing revisions from the model National Codes of Canada (in a manner analogous to the new design standards recommended above for cooling towers). These innovations will introduce new product options for builders and plumbers, such as fibrocement pipe and fittings, flexible water connectors, and for residential construction, cellular core PVC pipe and fittings (which cost 15-20% less than other materials).²⁸ Updates to minimum product performance requirements (standards) are also proposed. All of the public consultation for these amendments was conducted nationally by Codes Canada.

3) Gas Amendments

The Gas Fitting By-law has been updated to align with the provincial *Safety Standards Act* and *Gas Safety Regulation*. The fee schedule has been amended for replacement appliances, to expedite the permitting process, harmonise with provincial permitting fees, and reduce the cost for homeowners and businesses.

²⁷ San Francisco, a North American leader in urban non-potable water use, has highlighted the development of an “onsite water system operator certificate/certification program” as a priority. Paula Kehoe (Director of Water Resources, San Francisco Public Utilities Commission), presentation on December 19, 2019 “Advancing Onsite Water Reuse & Lessons Learned,” watereuse.org/wp-content/uploads/2019/12/Webcast-Onsite-Water-Reuse.pdf Vancouver and San Francisco have exchanged information on this subject.

²⁸ As estimated by BILD Alberta, “2019 National Codes Public Review,” bildalberta.ca/wp-content/uploads/2019/12/Public-Review-Key-Changes-Dec-12-2019-Final.pdf

Public/Civic Agency Input

Local building owners and managers, public health authorities, and North American subject matter experts support the proposals. Letters of support are in Appendix E.²⁹

The U.S. Centers for Disease Control and Prevention (CDC) have publicly showcased four examples of “promising developments” for *Legionella* policies: New York City and State, the U.S. Centers for Medicare & Medicaid Services, and the City of Vancouver.³⁰

The Urban Sustainability Directors Network (USDN) graciously offered that “Vancouver is a true leader in North America in advancing public health measures in urban water systems,”³¹ and with NSF Health Sciences LLC, funded research that has been integrated into this Council Report.³²

The amendments proposed herein build upon the work of the December 2018 Council Report. Staff consulted with health authorities, other jurisdictions, international thought-leaders, building owners and managers, service providers and professional associations to refine proposals. Numerous presentations were made. Consultation culminated in a public engagement letter sent to over 200 entities on August 16, 2019 and public workshops held on October 29-30, 2019. Staff incorporated input consistent with the public interest.

²⁹ Letters in Appendix E have been provided by:

- Building Owners and Managers Association (BOMA) British Columbia – Damian Stathonikos, CAE, President
- Tourism Vancouver – Gwendal Castellan, Manager, Sustainable Destination Development
- Vancouver Coastal Health Authority – Michael Schwandt, MD, MPH, FRCPC, Medical Health Officer
- BC Centre for Disease Control (BC CDC) – Natalie Prystajewsky, Ph.D., SCCM, Environmental Microbiologist and Eleni Galanis, MD, MPH, FRCPC, Physician Epidemiologist
- Polytechnique Montréal – Michèle Prévost, Ph.D., Professor and Principal Chairholder, NSERC Industrial Chair on Drinking Water, and Committee Member, NASEM *Legionella* report
- Special Pathogens Laboratory – Janet Stout, Ph.D., President, and Research Associate Professor, University of Pittsburgh
- NSF International – Christopher Boyd, General Manager, Building Water Health Program
- DuBois Chemicals Canada – Patrick Racine, P.Eng., CEM, Regional Vice President
- Environmental Operators Certification Program (EOCP) British Columbia & Yukon – Kalpna Solanki, MBA, CPHI(C), Chief Executive Officer

³⁰ Patrick Breyse, PhD, CIH (Director, CDC National Center for Environmental Health / Agency for Toxic Substances and Disease Registry), keynote address at the international *Legionella* conference, Los Angeles, CA (Sept. 2019), [nsf.org/newsroom/legionella-2019-water-plans-policies-communication-regulation-crucial-to-fi](https://www.nsf.org/newsroom/legionella-2019-water-plans-policies-communication-regulation-crucial-to-fi) and Jasen Kunz, MPH, REHS, Commander USPHS (Environmental Health Officer, CDC National Center for Environmental Health), presentation at the May 2019 session of the CDC Public Health Grand Rounds “Turning the Tide: The Role of Water Management to Prevent Legionnaires’ Disease,” [cdc.gov/grand-rounds/pp/2019/20190501-Legionnaires-Disease.html](https://www.cdc.gov/grand-rounds/pp/2019/20190501-Legionnaires-Disease.html)

³¹ Nils Moe, Executive Director, USDN (March 9, 2020), [nsf.org/newsroom/report-provides-road-map-to-improve-response-to-legionnaires-disease-outbre](https://www.nsf.org/newsroom/report-provides-road-map-to-improve-response-to-legionnaires-disease-outbre)

³² USDN Innovation Fund Grant GR51 (2019-2020) “Cooling Towers: A Nexus of Public Health, Sustainability and Equity,” usdn.org/uploads/cms/documents/deliverable_3_cooling_towers_technical_paper_lt_0120_digital.pdf

Implications/Related Issues/Risk

Financial

The implementation schedule has been adjusted and fees have been deferred until January 1, 2022, in acknowledgement of potential practical constraints as buildings recover from the pandemic.

Annual Operating Permit fees will be \$250, and each additional device in the same building will be \$100. These permits will continue to be auto-issued on-line, immediately upon application. *Legionella pneumophila* tests (offered by commercial laboratories) are about \$150 each. The “Building Water System Operator” certification (administered independently by EOCP) for an individual will be about \$600, with annual dues of about \$100. This certification can be held by someone within the building or a service provider.

The Operating Permit program is fully integrated into the City of Vancouver’s web-based inspection platform, and all reporting requirements will be managed through a customer’s online account. There is no paperwork. Maintenance and improvements will be self-funded by Operating Permit fees.

A critical point to these preventative recommendations is the potential to avoid loss of life, suffering, litigation and economic costs resulting from a *Legionella* outbreak. There are no financial implications to the other plumbing and gas amendments.

Human Resources/Labour Relations

The Vancouver Coastal Health Authority has generously seconded a senior Environmental Health Officer to the Office of the Chief Building Official for one year — at no cost to the City — to assist with the implementation of these policies. Plumbing Inspectors and technical staff will be required for the enhanced Operating Permit program in 2022. Operating Permit fees will cover the program on a cost-recovery basis.

Environmental

The amendments enhance public health protections through formalised expectations on the design, operations and maintenance of specific building mechanical systems. Non-potable water system revisions support the Rain City Strategy and water conservation goals.

Legal

Council has the authority from the *Vancouver Charter* to make by-laws for regulating the installation of plumbing facilities and for fixing standards for plumbing facilities under section 306(1)(l) and for protecting the health of inhabitants of the city and for preventing, prohibiting and remedying insanitary conditions in the city under sections 330(a) and 330(b).

Under the *Safety Standards Act* and the *Gas Safety Regulation*, the province has delegated the authority to require the inspection of regulated work in respect of gas equipment and gas systems, and to issue installation permits, to the City.

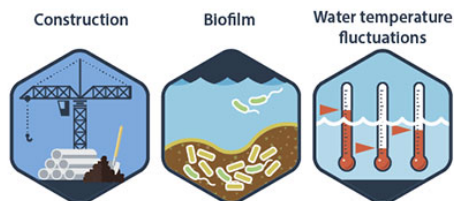
CONCLUSION

The 2018 Legionnaires' disease outbreak in the City of Surrey was a potential harbinger of future events within Metro Vancouver. The City of Vancouver is moving pro-actively to avoid an outbreak. The proposed Building By-law amendments will lead to improved public health for both residents and visitors to the City of Vancouver.

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How *Legionella* affects building water systems and people

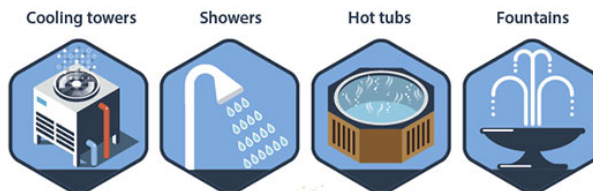
1. Internal and external factors can lead to *Legionella* growth in building water systems.



2. *Legionella* grows best in large, complex water systems that are not adequately maintained.



3. Water containing *Legionella* is aerosolized through devices.



4. People can get Legionnaires' disease when they breathe in mist or accidentally swallow water into the lungs containing *Legionella*. Those at increased risk are adults 50 years or older, current or former smokers, and people with a weakened immune system or chronic disease.



www.cdc.gov/legionella

01/12/2018

Source: U.S. Department of Health and Human Services,
Centers for Disease Control and Prevention (January 2018)

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Legionnaires' Disease at Temporary Events or Trade Shows A Guide for Event Coordinators & Vendors

Please read if you are a coordinator or vendor showcasing equipment that can generate water aerosols, such as:

- **Recreational or physical therapy tubs** (e.g. hot tubs, whirlpools, float tanks, birthing pools)
- **Cooling equipment** (e.g. misters, spraying devices)
- **Water features** (e.g. decorative fountains)
- **Plumbing fixtures** (e.g. shower heads, taps)



What is Legionnaires' disease and why is it concerning?

Legionnaires' disease is caused by *Legionella* bacteria that can grow rapidly in stagnant, under-disinfected water at temperatures above 20°C. The public may be infected when they inhale *Legionella*-contaminated aerosolized water droplets from the product displays.

- Symptoms are similar to pneumonia, including fever, dry cough, chest pain, headache, malaise, and muscle aches.
- Case fatality rates of up to 30% have occurred in Legionnaire's disease outbreaks.
- Smokers, older adults, males, and individuals with underlying health conditions, such as immunosuppression, chronic lung disease, diabetes, and cancer are the most susceptible to the disease.

Recommendations to prevent the growth and spread of *Legionella* bacteria and reduce the risk of *Legionella* bacteria causing illness:

Event Coordinators: Set up vendor stations in an area located at least 10m from air intakes.

Vendors:

1. Do not let water stagnate for more than six (6) hours and drain water at the end of each event. Drain, scrub, and disinfect the equipment if water becomes cloudy.
2. Maintain a sufficient concentration of disinfectant (i.e. 3-5 ppm free chlorine/check using a swimming pool test kit) in the circulating water and maintain water temperatures at or below 20°C during the event and off hours.
3. Check and maintain records of free chlorine, disinfection, and cleaning records during the event.
4. Clean and sanitize equipment before and after each event:
 - **Recreational or physical therapy tubs:** use 20 ppm free chlorine (0.4 mL of 5% domestic bleach/litre of tub water) to hyperchlorinate all components including the surge tank, filters, and piping for one (1) hour with the hydrotherapy jets off. Then, turn on the hydrotherapy jets to circulate the hyperchlorinated water for nine (9) additional hours.
 - **Cooling equipment:** soak all aerators, misters, and sprayers in a chlorinated solution (such as 1,000 ppm chlorine – 21 mL of 5% domestic bleach/litre of water) for at least 10 minutes after each event. Hoses should also be flushed, dismantled and kept clean. Drain any water reservoirs in misters every 24 hours.
 - **Water features or plumbing fixtures:** Scrub thoroughly and disinfect the system with 10 ppm (0.2 mL of 5% domestic bleach per litre water of fixture water) free chlorine for one (1) hour after each event.
5. Remove filters for cleaning and let dry in between uses. Replace filters regularly as per manufacturer's instructions.
6. Drain and store all components of the equipment in a dry and cleaned manner between events.

Sources:

<https://www.awt.org/pub/035C2942-03BE-3BFF-08C3-4C686FB7395C>
<http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Epid/CD%20Manual/Chapter%201%20-%20CDC/legionella%20Guidelines.PDF>
<https://www.ccohs.ca/oshanswers/diseases/legion.html>
<https://www.cdc.gov/legionella/downloads/hot-tub-disinfection.pdf>
<https://epi.dph.ncdhhs.gov/cd/docs/legionellaTemporaryFactSheet25Sep19.pdf>
 Heymann, David L. *Control of Communicable Diseases Manual*. American Public Health Association, 2015.
<https://www.mayoclinic.org/diseases-conditions/legionnaires-disease/symptoms-causes/syc-20351747>
 February 2020

Source: Vancouver Coastal Health Authority
(February 2020)

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**DRAFT By-law to amend Building By-law No. 12511
Regarding Plumbing Safety Amendments**

Note: A By-law will be prepared generally in accordance with the provisions listed below, subject to change and refinement prior to posting.

1. This by-law amends the indicated provisions of Building By-law 12511.
2. In Book II, Division A, Council adds a new definition to Sentence 1.4.1.2.(1), in correct alphabetical order, as follows:

“Decorative water feature means a human-made fountain, waterfall, cascade, spray or the like that uses water for architectural, decorative or aesthetic effects, is not intended for human contact, and is located indoors or outdoors, and does not include a fish pond, natural body of water, natural waterfall, or a regulated activity under the BC Pool Regulation. (See Note A-1.4.1.2.(1).)”
3. In Book II, Division A, Council adds the following new abbreviations to Sentence 1.4.2.1.(1), in correct alphabetical order:
 - (a) “CFU colony forming units”;
 - (b) “LPM litres per minute”;
 - (c) “MPN most probable number”; and
 - (d) “NTU nephelometric turbidity units”.
4. In Book II, Division A, Council adds a new note under “A-1.4.1.2.(1) Defined Terms.” in the Notes to Part 1, in the correct alphabetical order, as follows:

“Decorative Water Feature.

A living or green wall is not considered a *decorative water feature*, but should be reviewed to identify hazards and to establish procedures to reduce risks. To preclude the growth of *Legionella*, consideration should be given to including non-chemical water treatment (such as UV), maintaining water temperature below 20 °C, and removing organic matter from the water. Water flow should be behind the plant material and airflow should be directed toward the living wall to minimize aerosolization into the occupied space.”.
5. In Book II, Division B, Council strikes out in Table 1.3.1.2 the rows for “CSA CAN/CSA-B127.1-99” and “CSA B127.2-M1977”.
6. In Book II, Division B, Council strikes out in Table 1.3.1.2 the By-law Reference “2.2.10.10.(2)” in the row for “CSA B125.3-12”.
7. In Book II, Division B, Council strikes out in Table 1.3.1.2 the By-law Reference “2.7.6.2.(1)” in the row for “IAPMO Water Demand Calculator” and substitutes “2.7.6.2.(2)”.
8. In Book II, Division B, Council adds in Table 1.3.1.2 new By-law References to the row for “CSA CAN/CSA-B181.2-11”, in correct numerical order, as follows:

“2.2.5.15.(1)
2.2.5.15.(2)”.

9. In Book II, Division B, Council adds new rows to Table 1.3.1.2. in correct alphabetical order, as follows:

(a)

“

ANSI/ ASHRAE	188-2018	Legionellosis: Risk Management for Building Water Systems	2.2.10.6.(7)
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”

(b)

“

ASME/CSA	ASME A112.18.6- 2017/CSA B125.6-17	Flexible Water Connectors	2.2.10.18.(1)
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”

(c)

“

ASSE	ASSE 1002- 2015/ASME A112.1002- 2015/CSA B125.12-15	Anti-Siphon Fill Valves for Water Closet Tanks	2.2.10.10.(2)
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”

(d)

“

ASSE	ASSE 1037- 2015/ASME A112.1037- 2015/CSA B125.37-15	Performance Requirements for Pressurized Flushing Devices for Plumbing Fixtures	2.2.10.8.(1)
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”

(e)

“

ASTM	F 3128-19	Poly(Vinyl Chloride) (PVC) Schedule 40 Drain, Waste, and Vent Pipe with a Cellular Core	2.2.5.15.(1)
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”

(f)

“

BC	B.C. Reg. 296/2010	Pool Regulation	1.4.1.2.(1)
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”

(g) “

CSA	CAN/CSA-B127.3-18	Fibrocement Drain, Waste, and Vent Pipe and Pipe Fittings	2.2.5.1.(1) A-2.2.5., 2.2.6. and 2.2.7.
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”

(h) “

ISO	11731:2017	Water Quality — Enumeration of <i>Legionella</i>	2.2.1.7.(2)
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”

(i) “

ISO/IEC	17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories	2.2.1.7.(2)
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(j) “

NSF/ANSI	55-2019	Ultraviolet Microbiological Water Treatment Systems	2.2.11.3.(3)
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”, and

(k) “

PSPC	MD 15161-2013	Control of Legionella in Mechanical Systems	A-2.2.11.6.(7)
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”

10. In Book II, Division B, Council adds the following new abbreviations to Sentence 1.3.2.1.(1), in correct alphabetical order:

- (a) “BC Province of British Columbia (gov.bc.ca)”;
- (b) “IEC International Electrotechnical Commission (www.iec.ch)”;
- (c) “ISO International Organization for Standardization (www.iso.org)”;
- and
- (d) “PSPC Public Services and Procurement Canada (www.tpsgc-pwgsc.gc.ca)”.

11. In Book II, Division B, Council adds a new Article 2.2.1.7. as follows:

“2.2.1.7. Microbiological Testing

- 1) *E. coli* testing shall be conducted by an *accredited laboratory*.
- 2) *Legionella pneumophila* testing shall be conducted by a laboratory
 - a) accredited to ISO/IEC 17025, “General requirements for the competence of testing and calibration laboratories,” or equivalent,
 - b) using a culture method to identify all serogroups of *Legionella pneumophila* and that conforms to ISO 11731, “Water Quality — Enumeration of *Legionella*,” or equivalent, and
 - c) enrolled in a bi-annual external proficiency testing program for recognised approval for testing.
- 3) The owner of a *building* with a *cooling tower* or a *decorative water feature* shall ensure that the laboratory conducting *Legionella pneumophila* testing for the *cooling tower* or *decorative water feature* has agreed to give immediate notice to the owner, the *Chief Building Official*, and the local medical health officer if the result exceeds a standard set out in Table 2.2.11.6. or 2.2.11.7. that requires such notice to be given.”.

12. In Article 2.2.5.1. of Book II, Division B, Council:

- a) strikes out the title “Asbestos Cement Pipe and Fittings” and substitutes “Fibrocement Pipe and Fittings”; and
- b) in Sentence (1), strikes out “Reserved.” and substitutes “Fibrocement pipe and fittings for use in a drain, waste and vent system shall conform to CAN/CSA-B127.3-18, “Fibrocement Drain, Waste, and Vent Pipe and Pipe Fittings.”

13. In Book II, Division B, Council adds to the beginning of Table A-2.2.5., 2.2.6. and 2.2.7. in Note A-2.2.5., 2.2.6. and 2.2.7 “Pipe and Fitting Applications”, in the Notes to Part 2 the following:

“

<u>Fibrocement DWV pipe</u>	<u>CAN/CSA-B127.3-18</u>	<u>2.2.5.1.(1).</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>N</u>	<u>N</u>	<u>N</u>	<u>N</u>
<u>Type 1, Class 3000</u>											
<u>and</u>											
<u>Type 2, Class 4000</u>											

”.

14. In Subsection 2.2.5, Council adds a new Article 2.2.5.15. as follows:

“2.2.5.15. Cellular Core PVC Pipe and Fittings

- 1) Cellular core PVC pipe shall
 - a) conform to ASTM F 3128-19, “Poly(Vinyl Chloride) (PVC) Schedule 40 Drain, Waste, and Vent Pipe with a Cellular Core,” and
 - b) be light grey, as specified in CAN/CSA-B181.2, “Polyvinylchloride (PVC) and Chlorinated Polyvinylchloride (CPVC) Drain, Waste, and Vent Pipe and Pipe Fittings.”

2) Fittings and solvent cements for cellular core PVC pipe shall conform to CAN/CSA-B181.2, "Polyvinylchloride (PVC) and Chlorinated Polyvinylchloride (CPVC) Drain, Waste, and Vent Pipe and Pipe Fittings."

3) Cellular core PVC pipe shall only be used in residential *buildings* containing 1 or 2 *dwelling units* and row houses that do not exceed 3 *storeys* in height."

15. In Article 2.2.10.6. of Book II, Division B, Council:

- a) in sentence (2), strikes out "Supply fittings and individual shower heads" and substitutes "Except as provided in Sentence (7), supply fittings and individual *shower heads*";
- b) strikes out Table 2.2.10.6. and substitutes the following:

"Table 2.2.10.6.
Water Flow Rates from Supply Fittings
Forming Part of Sentence 2.2.10.6.(2)

Supply Fittings	Maximum Water Flow Rate, L/min
Kitchen faucet (non-residential)	8.3
Kitchen faucet (residential)	6.8 ⁽¹⁾
Lavatory faucet (for <i>private</i> use)	5.7
Lavatory faucet (for <i>public</i> use)	1.9 ⁽²⁾
<i>Pre-rinse spray valve</i>	4.8 ⁽³⁾
<i>Shower head</i>	7.6 ⁽⁴⁾
Wash fountain, per <i>plumbing fixture</i> fitting	6.8 ⁽⁵⁾

Notes to Table 2.2.10.6.:

(1) May be temporarily increased to a maximum flow rate of 8.3 L/min but must default to the lower flow rate upon release of the activation mechanism or closure of the faucet valve.

(2) A *metering fixture* faucet is limited to 1.0 L per cycle.

(3) Each *pre-rinse spray valve* shall be equipped with an automatic shut-off.

(4) Emergency and safety *shower heads* are exempted from this requirement.

(5) A maximum flow rate of 6.8 L/min is permitted for each 500 mm of circumference. For a wash fountain with *metering fixture* faucets, a maximum of one *metering fixture* faucet is permitted for each 500 mm of circumference. A *metering fixture* faucet is limited to 1.0 L per cycle.";

- c) in Sentence (3), italicizes the words "shower head" wherever they appear;
- d) in Sentence (4), italicizes the words "shower heads" and "shower head" wherever they appear;
- e) in Sentence (5), strikes out "Each lavatory" and substitutes "Except as provided in Sentence (7), each lavatory"; and
- f) adds a new Sentence (7) as follows:

"7) The requirements of Sentences (2) and (5) do not apply to

- a) any part of a *building* classified as Group B within Table 3.1.2.1. of Division B of Book I (General) of this By-law, or

b) a *plumbing fixture* specifically identified in a *building's* water management plan that conforms to ANSI/ASHRAE 188, "Legionellosis: Risk Management for Building Water Systems" and is signed by a *registered professional*."

16. In Sentence 2.2.10.8.(1) of Book II, Division B, Council:

- a) in Clause (c), strikes out "and" at the end of the Clause;
- b) in Clause (d), strikes out "." at the end of the Clause and substitutes ", and"; and
- c) adds a new Clause (e) as follows:

"e) conform to ASSE 1037-2015/ASME A112.1037-2015/CSA B125.37-15, "Performance Requirements for Pressurized Flushing Devices for Plumbing Fixtures."".

17. In Sentence 2.2.10.10.(2) of Book II, Division B, Council strikes out "CSA B125.3, "Plumbing Fittings."" and substitutes "ASSE 1002-2015/ASME A112.1002-2015/CSA B125.12-15, "Anti-Siphon Fill Valves for Water Closet Tanks."".

18. In Clause 2.2.10.17.(1)(b) of Book II, Division B, Council adds "a minimum of 8.5 in by 11 in in size and" before "securely fastened".

19. In Subsection 2.2.10., Council adds a new Article 2.2.10.18. as follows:

"2.2.10.18. Flexible Water Connectors

1) Flexible water connectors exposed to continuous pressure shall conform to ASME A112.18.6-2017/CSA B125.6-17, "Flexible Water Connectors."".

20. In Article 2.2.11.1. of Book II, Division B, Council:

- a) in Sentence (1), strikes out "Appliances", and substitutes "Except when a clothes washer is supplied by an *alternate water source system*, appliances"; and
- b) in Sentence (2), strikes out "Clothes washers", and substitutes "Except when a clothes washer is supplied by an *alternate water source system*, clothes washers".

21. In Article 2.2.11.3. of Book II, Division B, Council:

- a) in Sentence (1), strikes out "The maximum", and substitutes "Except when a vehicle wash facility is supplied by an *alternate water source system*, the maximum";
- b) in Clause (2)(a), strikes out "a water recycling system", and substitutes "except when a vehicle wash facility is supplied by an *alternate water source system*, a water recycling system"; and
- c) adds a new Sentence (3) as follows:

"3) Where a vehicle wash facility is supplied by an *alternate water source system*, disinfection of the non-*potable* water shall be provided at the vehicle wash facility at point of use by ultraviolet light and conform to NSF/ANSI 55, "Ultraviolet Microbiological Water Treatment Systems," Class A.".

22. In Clause 2.2.11.4.(2)(b) of Book II, Division B, Council adds “a minimum of 8.5 in by 11 in in size and” before “securely fastened”.
23. In Book II, Division B, Council strikes out Article 2.2.11.6 and substitutes the following:

“2.2.11.6. Cooling Towers

(See Article 6.3.2.15. of Division B of Book I (General) of this By-law.)

- 1) An *operating permit* shall be obtained for the installation of a *cooling tower*, or the retention of an existing *cooling tower*.
- 2) In order to obtain an *operating permit* for the installation of a *cooling tower*, a service contract must be in place with a qualified service provider to perform maintenance of the *cooling tower* for a minimum of one year.
- 3) The *operating permit* number assigned to the *cooling tower* shall be posted on a sign or plate that is a minimum of 8.5 in by 11 in in size and securely fastened to the *cooling tower* in a location that is conspicuously visible and constructed of a durable, weather resistant material.
- 4) The *Chief Building Official* shall be notified, in the form prescribed by the *Chief Building Official*,
 - a) within 5 days of any start-up or shut down of a *cooling tower*,
 - b) within 5 days of any *Legionella pneumophila* test result from a *cooling tower*, or sooner as required by Sentence (8), and
 - c) within 30 days of any changes to the information that was last provided to the *City* with regard to the *operating permit*.
- 5) A maintenance log shall be maintained for each *cooling tower* and shall include
 - a) the address and location of the *cooling tower*,
 - b) the *operating permit* number assigned to the *cooling tower*,
 - c) emergency contact information and the name and contact information of the owner,
 - d) a description of the location of the operating manual for the *cooling tower*, and as applicable, the location of safety data sheets and the location of the water management plan,
 - e) a single line schematic plan, including water sampling locations, of the *cooling tower* system,
 - f) details of any changes or alterations made to the system at any time since January 1, 2021,
 - g) a record of inspections and any maintenance performed within the last 24 months,
 - h) a record of operational disruptions within the last 24 months and the corrective actions taken,
 - i) a record of chemical treatments applied and dosages within the last 24 months,
 - j) a record of all water quality results from analyses performed within the last 24 months, and for *Legionella pneumophila* test results, the name of the person and company collecting the sample and the name of the company conducting the laboratory test, and
 - k) if a laboratory result fails to meet a standard defined in Table 2.2.11.6., a description of the extent of the deviation from the standard, the corrective action taken, a record of any required notification, and the outcome of the corrective action, including all applicable dates and times.
- 6) The maintenance log shall be made available on such request to the *Chief Building Official*.
- 7) *Legionella pneumophila* testing shall be conducted
 - a) in accordance with Article 2.2.1.7.,
 - b) on water samples collected at a point in the recirculation loop just prior to the point where treatment chemicals are injected, or where this is not feasible, from a location representative of water in the system,

- c) no less than 48 hours and no more than 5 days after completion of system start-up and disinfection, and
- d) as required by Sentence (8).

8) If a laboratory test shows that a *Legionella* result exceeds a standard set out in Table 2.2.11.6., the response set out in Table 2.2.11.6 shall be undertaken. (See Note A-2.2.11.6.(8).)

Table 2.2.11.6. Required Response to Failure to Meet <i>Legionella</i> Standards for <i>Cooling Towers</i> Forming part of Sentence 2.2.11.6.(8)		
Test Type	Test Result	Required Response
<i>Legionella pneumophila</i> culture test ⁽¹⁾	10 or more CFU / mL and less than or equal to 1,000 CFU / mL	1. The owner shall give notice to the <i>Chief Building Official</i> within 24 hours. 2. The owner shall, within 24 hours, either a) shut down the <i>cooling tower</i> system and perform offline cleaning and disinfection, or b) perform online remedial treatment ⁽²⁾ and within 7 days shut down the <i>cooling tower</i> system and perform offline cleaning and disinfection. 3. The owner shall perform a <i>Legionella</i> culture test ⁽¹⁾ no less than 48 hours and no more than 5 days after cleaning and disinfection.
<i>Legionella pneumophila</i> culture test ⁽¹⁾	Greater than 1,000 CFU / mL	1. The laboratory shall immediately give notice to the owner, the <i>Chief Building Official</i> and the medical health officer ⁽³⁾ , and in addition, an owner who receives notice from the laboratory must give immediate notice to the <i>Chief Building Official</i> advising that the owner has been notified by the laboratory ⁽⁴⁾ . 2. The owner shall immediately implement measures that will eliminate water dispersion by aerosol from the affected <i>cooling tower</i> system and then perform offline cleaning and disinfection of the system before putting the system back into service. 3. The owner shall perform a <i>Legionella</i> culture test ⁽¹⁾ no less than 48 hours and no more than 5 days after cleaning and disinfection.

Notes to Table 2.2.11.6.:

(1) The *Legionella pneumophila* culture test shall conform to the requirements of Article 2.2.1.7.

(2) Online remedial treatment is also known as "running disinfection."

(3) See Sentence 2.2.1.7.(3).

(4) The person giving the immediate notice shall take all reasonable steps to give notice by speaking directly to or by telephone with each person required to be notified, a person designated for this purpose by the person required to be notified, or a person answering the telephone number designated for this purpose by the person required to be notified, and follow with notice in writing to each person within 24 hours.

- 9) Offline cleaning and disinfection of a *cooling tower* shall be carried out
 - a) a minimum of once every calendar year,
 - b) for any start-up at any time, and
 - c) as required by Sentence (8).

10) When a *cooling tower* has been shut down for more than 3 days, it shall be drained within 5 days of being shut down, or when this is not practical during shut downs of short duration, stagnant water shall be pre-treated with an appropriate biocide regimen before start-up, allowing for proper contact time according to the supplier's recommendations.

11) If a *cooling tower* is removed or its use is permanently discontinued, it shall be safely drained, thoroughly sanitized, and the make-up water line shall be disconnected and capped.”.

24. In the Notes to Part 2 in Book II, Division B, Council adds a new note as follows:

“Note A-2.2.11.6.(8). **Required Response to Failure to Meet *Legionella* Standards.** This Sentence is based on Public Services and Procurement Canada's standard MD 15161 – 2013 Control of *Legionella* in Mechanical Systems.”.

25. In Book II, Division B, Council strikes out Article 2.2.11.7. and substitutes the following:

“2.2.11.7. Decorative Water Features

(See Article 6.3.2.16. of Division B of Book I (General) of this By-law.)

1) An *operating permit* shall be obtained for the installation of a *decorative water feature*, or the retention of an existing *decorative water feature* except for a *decorative water feature* in a *building* used exclusively for residential occupancy containing no more than four principal *dwelling units*.

2) The following shall be posted in a location that is conspicuously visible:

- a) the *operating permit* number assigned to the *decorative water feature*, on a sign or plate that is a minimum of 8.5 in by 11 in in size, constructed of a durable, weather resistant material and securely fastened to the *decorative water feature* or its associated mechanical equipment, and,
- b) an advisory that the *decorative water feature* is not intended for human access, printed using a minimum letter height of 4 in and located around the perimeter of, or near an obvious access point to, the *decorative water feature*.

3) The *Chief Building Official* shall be notified, in the form prescribed by the *Chief Building Official*,
a) within 5 days of any start-up of a *decorative water feature* that had been shut down for 3 or more consecutive days,

b) within 5 days of any *decorative water feature* shut down for 3 or more consecutive days,

c) within 5 days of any *Legionella pneumophila* test result from a *decorative water feature*, or sooner as required by Sentence (8), and

d) within 30 days of any changes to the information that was last provided to the *City* with regard to the *operating permit*.

4) Where an outdoor *decorative water feature* is provided as an auxiliary system to a *building*, then the outdoor *decorative water feature* shall be considered part of the *building* for the purposes of this Article.

5) A maintenance log shall be maintained and shall include

- a) the address and location of the *decorative water feature*,
- b) the *operating permit* number assigned to the *decorative water feature*,
- c) emergency contact information and the name and contact information of the owner,

- d) a description of the location of the operating manual for the *decorative water feature*, and as applicable, the location of safety data sheets and the location of the water management plan,
 - e) a single line schematic plan, including water sampling locations, of the *decorative water feature*,
 - f) details of any changes or alterations made to the system at any time since January 1, 2021,
 - g) a record of inspections and any maintenance performed within the last 24 months,
 - h) a record of operational disruptions within the last 24 months and the corrective actions taken,
 - i) a record of chemical treatments applied and dosages within the last 24 months,
 - j) a record of all water quality results from analyses performed within the last 24 months, and for *Legionella pneumophila* test results, the name of the person and company collecting the sample and the name of the company conducting the laboratory test, and
 - k) if a laboratory result fails to meet a standard defined in Table 2.2.11.7., a description of the extent of the deviation from the standard, the corrective action taken, a record of any required notification, and the outcome of the corrective action, including all applicable dates and times.
- 6) The maintenance log shall be made available on such request to the *Chief Building Official*.
- 7) *Legionella pneumophila* testing shall be conducted
- a) in accordance with Article 2.2.1.7.,
 - b) on water samples collected at a point representative of water that is aerosolized, or where this is not feasible or aerosolization is not obvious, from a location
 - i) prior to the point where treatment chemicals are injected in a recirculating system, or
 - ii) representative of water in the system in a non-recirculating system, and
 - c) as required by Sentence (8).
- 8) If a laboratory test shows that the *Legionella* result exceeds a standard set out in Table 2.2.11.7., the response set out in Table 2.2.11.7 shall be undertaken.

Table 2.2.11.7. Required Response to Failure to Meet <i>Legionella</i> Standards for <i>Decorative Water Features</i> Forming part of Sentence 2.2.11.7.(8)		
Test Type	Test Result	Required Response
<i>Legionella pneumophila</i> culture test ⁽¹⁾	10 or more CFU / mL and less than or equal to 1,000 CFU / mL	1. The owner shall give notice to the <i>Chief Building Official</i> within 24 hours. 2. The owner shall, within 24 hours, shut down the system and perform offline cleaning and disinfection. 3. The owner shall perform a <i>Legionella</i> culture test ⁽¹⁾ no less than 48 hours and no more than 5 days after cleaning and disinfection.
<i>Legionella pneumophila</i> culture test ⁽¹⁾	Greater than 1,000 CFU / mL	1. The laboratory shall immediately give notice to the owner, the <i>Chief Building Official</i> and the medical health officer ⁽²⁾ , and in addition, an owner who receives notice from the laboratory must give immediate notice to the <i>Chief Building Official</i> advising that the owner has been notified by the laboratory ⁽³⁾ . 2. The owner shall immediately implement measures that will eliminate water dispersion by aerosol from the <i>decorative water feature</i> and then perform offline cleaning and disinfection of the system before putting the feature

		back into service. 3. The owner shall perform a <i>Legionella</i> culture test ⁽¹⁾ no less than 48 hours and no more than 5 days after cleaning and disinfection.
--	--	---

Notes to Table 2.2.11.7.:

(1) The *Legionella pneumophila* culture test shall conform to the requirements of Article 2.2.1.7.

(2) See Sentence 2.2.1.7.(3).

(3) The person giving the immediate notice shall take all reasonable steps to give notice by speaking directly to or by telephone with each person required to be notified, a person designated for this purpose by the person required to be notified, or a person answering the telephone number designated for this purpose by the person required to be notified, and follow with notice in writing to each person within 24 hours.

- 9) Offline cleaning and disinfection of a *decorative water feature* shall be carried out
- a) as recommended by the manufacturer, and at minimum of once every calendar year,
 - b) for any start-up after having been shut down for 3 or more consecutive days, and
 - c) as required by Sentence (8).

10) When a *decorative water feature* has been shut down for 3 or more consecutive days, it shall be drained within 5 days of being shut down.

11) If a *decorative water feature* is removed or its use is permanently discontinued, it shall be safely drained, thoroughly sanitized, and the make-up water line shall be disconnected and capped.”.

26. In Article 2.4.2.3. of Book II, Division B, Council:

- a) in Clause (1)(a), strikes out “and” at the end of the Clause;
- b) in Clause (2)(a), strikes out “and” at the end of the Clause;
- c) in Clause (3)(a), strikes out “and” at the end of the Clause;
- d) in Clause (1)(b), strikes out “.” and substitutes “, and”;
- e) in Clause (2)(b), strikes out “.” and substitutes “, and”;
- f) in Clause (3)(b), strikes out “.” and substitutes “, and”;
- g) adds a new Clause 1(c) as follows:

“c) is located within a single room or *suite*.”;

- h) adds a new Clause 2(c) as follows:

“c) is located within a single room or *suite*.”; and

- i) adds a new Clause 3(c) as follows:

“c) is located within a single room or *suite*.”.

27. In Book II, Division B, Council strikes out Article 2.4.2.4. and substitutes the following:

“2.4.2.4. Connections to Storm Drainage Systems

1) Except as provided in Sentence (2), all roof and paved areas shall drain to a *storm drainage system*.

2) *Building* and site drainage need not connect to a *storm drainage system* if on-site rainwater or *storm water* management practices are employed and

a) rainwater or *storm water* does not create a hazardous condition or discharge upon or impact other lands or sites and

b) overflow is drained to a *storm drainage system*. (See Sentence 2.4.2.2.(1).)”.
.”.

28. In Article 2.4.6.4. in Book II, Division B, Council:

- a) in Sentence (1), strikes out “(See Note A-2.4.6.4.(1).)”;
b) in Sentence (3), strikes out “a gate valve or”;
c) in Sentence (4), strikes out “Where the *fixture* is a floor drain, a removable screw cap is permitted to be installed on the upstream side of the *trap*.”, and substitutes “Deleted.”; and
d) in Sentence (5), strikes out “gate valve or”.

29. In the Notes to Part 2 in Book II, Division B, Council strikes out Note A-2.4.6.4.(1) “Backwater Valve or Gate Valve.”.

30. In Table 2.4.9.3. in Book II, Division B, Council strikes out the rows for “Shower Drain” and substitutes the following:

“

Shower drain		
Total volume of discharge from all <i>shower heads</i> :		
(a) < 9.5 LPM	1½	1½
(b) 9.5 LPM to 20 LPM	2	3
(c) > 20 LPM	3	6

”.

31. In Sentence 2.6.1.12.(1) in Book II, Division B, Council strikes out the word “electric”.

32. In the Notes to Part 2 in Book II, Division B, Council strikes out the text in Note A-2.6.1.12.(1) beginning with “Contemporary electric water heater tanks” to the end of the note.

33. In Book II, Division B, Council strikes out Article 2.6.3.3. and substitutes the following;

“2.6.3.3. Static Pressure
(See Sentence 2.2.11.2.(2).)

1) Where the static pressure at any *fixture* may exceed 550 kPa, a pressure-reducing valve shall be installed to limit the maximum static pressure at the *fixture* to 550 kPa.”.

34. In Book II, Division B, Council strikes out Section 2.7., and substitutes the following:

"Section 2.7. Non-Potable Water Systems

2.7.1. Connection

2.7.1.1. General

- 1) A *non-potable water system* shall not be connected to a *potable water system*.
- 2) For the purpose of this Section
 - a) all *non-potable water systems* shall comply with Subsections 2.7.1., 2.7.2. and 2.7.3.,
 - b) an *alternate water source system* installed prior to January 1, 2019 shall comply with Subsection 2.7.4., and
 - c) an *alternate water source system* installed on or after January 1, 2019 shall comply with Subsections 2.7.5., 2.7.6., 2.7.7., and 2.7.8.

2.7.1.2. Non-potable Water Sources

- 1) A *non-potable water system* shall collect only
 - a) rainwater from roof surfaces or similar areas:
 - i) that do not allow the passage of vehicular traffic,
 - ii) that are above grade, and
 - iii) where hydrocarbon-based fuels, hazardous materials, or fertilizers are not stored or used on such surfaces, or
 - b) *clear-water waste*, or
 - c) both.
- 2) A *non-potable water system* shall not collect *perimeter drainage water*, *groundwater*, *storm water*, *greywater*, or *blackwater*.

2.7.1.3. Non-potable Water Uses

- 1) Except as provided in Sentence (2), a *non-potable water system* may use treated *non-potable water* for any of the uses set out in Columns A or B of Table 2.7.1.3.
- 2) An *alternate water source system* shall use treated *non-potable water* in lieu of *potable water* for all of the uses set out in Column A of Table 2.7.1.3.
- 3) *Non-potable water* shall not be used in lieu of *potable water* for any other uses.

Table 2.7.1.3.
Uses for Treated Non-*potable* Water
Forming Part of Sentences 2.7.1.3.(1), (2) and (3)

Non- <i>potable</i> Water Source	Uses for Treated Non- <i>potable</i> Water	
	Column A	Column B
Rainwater as specified by Clause 2.7.1.2.(1)(a)	Water closets, urinals, and trap primers	Irrigation of non-food purpose plants, clothes washers, vehicle wash facilities ⁽¹⁾ , make-up water for hydronic systems, make-up water for <i>cooling towers</i> , and tempering of discharge.
<i>Clear-water waste</i>		
<i>Groundwater</i>	Not permitted	
<i>Perimeter drainage water</i>		
<i>Storm water</i>		
<i>Greywater</i>		
<i>Blackwater</i>		

Notes to Table 2.7.1.3.:

(1) See Article 2.2.11.3.

4) Where the static pressure at any *fixture* in a non-*potable water system* may exceed 550 kPa, a pressure-reducing valve shall be installed to limit the maximum static pressure at the *fixture* to 550 kPa.

2.7.2. Identification

2.7.2.1. Piping and Outlet Identification

1) All non-*potable* water distribution system piping shall be purple in colour and conform to the requirements of NSF-rw and NSF/ANSI 14, "Plastics Piping System Components and Related Materials."

2) All other non-*potable* water piping shall be identified and marked in accordance with CAN/CSA-B128.1, "Design and Installation of Non-Potable Water Systems."

3) Non-*potable* water outlets shall be identified by a sign or plate in a location that is conspicuously visible and constructed of a durable, weather resistant material.

2.7.3. Location

2.7.3.1. Pipes

- 1) Non-*potable* water piping shall not be located directly above
 - a) areas where food, drink or products that are intended for human consumption are prepared, handled, dispensed or stored, or
 - b) a non-pressurized or pressurized *potable* water tank.

2.7.3.2. Outlets

- 1) An outlet from a non-*potable water system* shall not be located where it can discharge into
 - a) a sink or lavatory,
 - b) a *fixture* into which an outlet from a *potable water system* is discharged, or
 - c) a *fixture* that is used for the preparation, handling or dispensing of food, drink or products that are intended for human consumption.

(See Note A-2.7.3.2.(1).)

2.7.4. Alternate Water Source Systems Installed Prior to January 1, 2019

2.7.4.1. Requirements for Alternate Water Source Systems Installed Prior to January 1, 2019

- 1) An *operating permit* shall be obtained.
- 2) The *operating permit* number assigned to the *alternate water source system* shall be posted on a sign or plate that is a minimum of 8.5 in by 11 in in size and securely fastened to the *alternate water source system* in a location that is conspicuously visible and constructed of a durable, weather resistant material.
- 3) The *Chief Building Official* shall be notified within 30 days of any changes to the information that was last provided to the *City* with regard to the operating permit, in the form prescribed by the *Chief Building Official*.
- 4) Water quality shall comply with the water quality standards, testing, documentation, and reporting requirements set out in Articles 2.7.7.1. and 2.7.7.2.
- 5) If a test result shows that the water quality fails to meet any of the standards set out in Table 2.7.7.1., the response set out in Table 2.7.4.1. shall be undertaken.

Table 2.7.4.1.
Required Response to Failure to Meet Water Quality Standards for *Alternate Water Source Systems* Installed
Prior to January 1, 2019
Forming Part of Sentence 2.7.4.1.(5)

Parameter	Test Result	Required Response
<i>E. coli</i> ⁽¹⁾	100 or more CFU per 100 mL or 100 or more MPN per 100 mL	1. The <i>owner</i> shall immediately supply the <i>alternate water source system</i> with <i>potable</i> water only; 2. The <i>owner</i> shall give notice to the <i>Chief Building Official</i> within 24 hours; and 3. The <i>owner</i> shall perform an <i>E. coli</i> test ⁽¹⁾ and a <i>Legionella</i> culture test ⁽¹⁾ within 5 days, but no less than 48 hours after any cleaning or disinfection.
<i>Legionella pneumophila</i> ⁽¹⁾	10 or more CFU per mL	
Turbidity	> 15 NTU	
Temperature	> 25°C	

Notes to Table 2.7.4.1.:

(1) See Article 2.2.1.7.

6) The *alternate water source system* shall be maintained in accordance with any manufacturer's specifications.

7) If the *alternate water source system* is in use, cross connection control tests shall be performed as required by CAN/CSA-B128.1, "Design and Installation of Non-Potable Water Systems."

2.7.4.2. No Other Requirements

1) *Alternate water source systems* installed prior to January 1, 2019 need not comply with any other requirements set out in Subsections 2.7.5. through 2.7.8.

2.7.5. Alternate Water Source Systems

2.7.5.1. Occupancy

1) Before occupancy of a *building* is permitted, an *alternate water source system* shall be commissioned in accordance with Article 2.7.5.2., and an *operating permit* shall be obtained in accordance with Article 2.7.5.3.

2.7.5.2. Commissioning

1) In order to commission an *alternate water source system*

- a) the treated non-*potable* water shall be tested for *E. coli*, turbidity and *Legionella pneumophila*,
 - i) in accordance with Article 2.2.7.1.,
 - ii) on water samples collected from the sampling port required by Article 2.7.6.6.,

- iii) weekly for a period of 4 weeks for *E. coli* and turbidity, and
- iv) once for *Legionella pneumophila*,

b) test results shall be provided to the *Chief Building Official*, and

c) written confirmation that the *alternate water source system* operates in conformance with the operating manual shall be provided to the *Chief Building Official* by the *registered professional of record*, and a cross connection control test shall be performed and witnessed by the *Chief Building Official*.

2) If a water sample required by this Article fails to meet the standards set out in Table 2.7.7.1., an additional water sample shall be collected no less than 48 hours after any cleaning or disinfection, tested, and reported.

2.7.5.3. Operating Permit

1) An *operating permit* shall be obtained for an *alternate water source system*.

2) The *operating permit* number assigned to the *alternate water source system* shall be posted on a sign or plate that is a minimum of 8.5 in by 11 in in size and securely fastened to the *alternate water source system* in a location that is conspicuously visible and constructed of a durable, weather resistant material.

3) The *Chief Building Official* shall be notified within 30 days of any changes to the information that was last provided to the *City* with regard to the *operating permit*, in the form prescribed by the *Chief Building Official*.

2.7.5.4. Continued Operation

1) Once an *operating permit* has been issued, an *alternate water source system* shall operate continuously unless written approval to discontinue its use has been obtained from the *Chief Building Official* or *City Engineer*.

2.7.6. Design

2.7.6.1. Professional Design

1) An *alternate water source system* shall be designed by a *registered professional* and shall be designed to prioritize the use of non-potable water.

2.7.6.2. Pipe Sizing

1) Except as required by Sentence (2), non-potable distribution piping shall be sized according to Subsection 2.6.3.

2) *Dwelling units* within a *building* with an *alternate water source system* shall be equipped with

a) tank type water closets, and

b) non-potable distribution piping sized in conformance with the IAPMO Water Demand Calculator.

2.7.6.3. Continuity of Supply and Backflow Prevention

- 1) A secondary water supply shall be provided.
- 2) An *air gap* at least two times the size of the discharge opening shall be installed for the *potable* water make-up supply.

2.7.6.4. Cisterns

(See Article 2.4.2.2. and Note A-2.7.6.4., 2.7.6.5. and 2.7.6.6.)

- 1) Provision shall be made upstream of the *cistern* to remove the accumulation of particulates and impurities before they enter the *cistern*.
- 2) *Cisterns* shall be secured to prevent tampering and unintended or unauthorized entry either by a lockable device or another *approved* method, and all penetrations shall be sealed to prevent insect or vermin entry.
- 3) Water shall be withdrawn a minimum of 0.3 m from the base of the *cistern*.

2.7.6.5. Water Metering

(See Note A-2.7.6.4., 2.7.6.5. and 2.7.6.6.)

- 1) A water meter shall be installed and located within 1.5 m of the *potable* water make-up supply and shall be capable of recording the volume of *potable* water being supplied.
- 2) A water meter shall be installed and located on the non-*potable* water outlet prior to distribution and shall be capable of recording the volume of non-*potable* water being supplied to the distribution piping.
- 3) Water meters required by Sentences (1) and (2) shall be capable of displaying volumes in units of L or cubic m.

2.7.6.6. Water Quality Sampling and Alerts

(See Article 2.2.1.7. and Note A-2.7.6.4., 2.7.6.5. and 2.7.6.6.)

- 1) A sampling port, and provision for continuous in-line measurements required in order to conform with Table 2.7.7.1., shall be installed and located downstream of the water meter at the non-*potable* water outlet and prior to distribution.
- 2) All monitoring devices referred to in Sentence (1) shall be capable of activating an *alert* that is designed to activate continuously for the duration of the *alert* condition whenever the water quality fails to meet the standards set out in Table 2.7.7.1.

2.7.6.7. Power Interruption

1) If a *building* is required to have an emergency system generator, provision shall be made for the continued operation of any mandatory uses for non-*potable* water described in Sentence 2.7.1.3.(2) in the event of a power interruption.

2.7.7. Water Quality Standards

2.7.7.1. Water Quality Standards, Testing, and Documentation

- 1) Water quality shall meet the standards set out in Table 2.7.7.1.
- 2) Water quality shall be tested as set out in Table 2.7.7.1.
- 3) All test results shall be documented as set out in Table 2.7.7.1., and documentation shall be retained for no less than 24 months.

Table 2.7.7.1.
Water Quality Standards, Testing, and Documentation
Forming Part of Sentences 2.7.7.1.(1), (2), and (3)

Applicability	Parameter	Standard	Testing Type and Frequency	Testing Result Documentation Requirement
Any non- <i>potable</i> water source	Temperature	< 20°C	Continuous	Daily ⁽¹⁾
Any non- <i>potable</i> water source	Turbidity	< 10 NTU	Daily ⁽¹⁾ , and 1 sample tested by a laboratory every 2 months with not more than 63 days between samples	Daily ⁽¹⁾ , plus all laboratory tests
Any non- <i>potable</i> water source	<i>E. coli</i> ⁽²⁾	< 100 CFU per 100 mL or < 100 MPN per 100 mL	1 sample tested every 2 months with not more than 63 days between samples	All laboratory tests
Any non- <i>potable</i> water source	<i>Legionella pneumophila</i> ⁽²⁾	< 10 CFU per mL	As required by Article 2.7.5.2.	All laboratory tests

Notes to Table 2.7.7.1.:

- (1) For the purpose of this Table, the term "daily" shall mean once per day when the *building* is normally occupied.
- (2) See Article 2.2.1.7.

2.7.7.2. Water Quality Reporting

1) Water quality reports shall be submitted to the *Chief Building Official* before the end of the second month following the issuance of an *operating permit*, and then every 2 months thereafter, and shall include

- a) all documentation required by Sentence 2.7.7.1.(3) and
- b) except as provided in Sentence 2.7.4.2.(1), readings from the water meters required by Article 2.7.6.5.

2.7.7.3. Required Response to Failure to Meet Water Quality Standards

1) If a test result shows that the water quality fails to meet a standard set out in Table 2.7.7.1., the response set out in Table 2.7.7.3 shall be undertaken.

Table 2.7.7.3.
Required Response to Failure to Meet Water Quality Standards for *Alternate Water Source Systems*
Forming Part of Sentence 2.7.7.3.(1)

Parameter	Test Result	Required Response
Turbidity	Between 10 and 15 NTU	The <i>owner</i> shall take the appropriate corrective action as set out in the operating manual.
Temperature	20°C to 25°C	
<i>E. coli</i> ⁽¹⁾	100 or more CFU per 100 mL or 100 or more MPN per 100 mL	1. The <i>owner</i> shall immediately supply the <i>alternate water source system</i> with <i>potable</i> water only; 2. The <i>owner</i> shall give notice to the <i>Chief Building Official</i> within 24 hours; 3. The <i>owner</i> shall take the appropriate corrective action as set out in the operating manual; and 4. The <i>owner</i> shall perform an <i>E. coli</i> test ⁽¹⁾ and a <i>Legionella</i> culture test ⁽¹⁾ within 5 days, but no less than 48 hours after any cleaning or disinfection.
<i>Legionella pneumophila</i> ⁽¹⁾	10 or more CFU per mL	
Turbidity	> 15 NTU	
Temperature	> 25°C	

Notes to Table 2.7.7.3.:

(1) See Article 2.2.1.7.

2.7.8. Operating Manual and Maintenance

2.7.8.1. Operating Manual

1) An operating manual shall be supplied to the *owner* or representative of the owner by the designer of the *alternate water source system* and shall be stamped by a *registered professional of record*, and shall include the following

- a) address and location of the *alternate water source system*,

- b) system designer contact details,
- c) a simplified process flow diagram,
- d) a schematic of the entire system showing locations of all system components,
- e) instructions on operating, maintaining, and inspecting the system,
- f) required frequency of maintenance and inspections,
- g) instructions on deactivating and restarting the system for repair or other purposes,
- h) details on the corrective action that shall be taken if the water quality fails to meet the standards set out in Table 2.7.7.1., and
- i) safety data sheets.

2.7.8.2. Maintenance

- 1) *Alternate water source systems* shall be maintained in accordance with the operating manual and any manufacturer's specifications.
- 2) Cross connection control tests shall be performed as required by CAN/CSA-B128.1, "Design and Installation of Non-Potable Water Systems."
- 3) A maintenance log shall be maintained and shall include
 - a) the address and location of the *alternate water source system*,
 - b) the name and contact information of the *owner*,
 - c) a record of inspections and any maintenance performed within the last 24 months,
 - d) details of any changes or alterations made to the system at any time after commissioning,
 - e) a record of water quality test results as set out in Article 2.7.7.1., including the name of the person and company conducting the test,
 - f) copies of water quality reports prepared and submitted in accordance with Article 2.7.7.2 within the last 24 months, and
 - g) if a water quality test fails to meet a standard defined in Table 2.7.7.1., a description of the extent of the deviation from the standard, the corrective action taken, a record of any required notification, and the outcome of the corrective action, including all applicable dates and times.

2.7.8.3. Request for Operating Manual or Maintenance Log

- 1) The operating manual and the maintenance log shall be made available on such request to the *Chief Building Official or City Engineer*."
35. In the Notes to Part 2 in Book II, Division B, Council rennumbers Note A-2.7.6.7, 2.7.6.8 and 2.7.6.9 as Note A-2.7.6.4, 2.7.6.5 and 2.7.6.6.
36. In Book II, Division B, Table 2.8.1.1., Council:
 - a) adds, in correct numerical order, as follows:

2.2.1.7. Microbiological Testing	
(1)	[F40,F41,F43,F81,F82-OS3.4,OH5]
(2)	[F40,F41,F43,F81,F82-OS3.4,OH5]
(3)	[F30,F40,F41,F43,F81,F82-

	OS3.1,OS3.4,OH1.1,OH2.1,OH2.3,OH5]
--	------------------------------------

”
,

- b) strikes out all of the rows for section “2.2.5.1. Asbestos-Cement Pipe and Fittings”, including the title, and substitutes as follows:

“

2.2.5.1. Fibrocement Pipe and Fittings	
(1)	[F20-OH2.1] [F20-OP5]
(3)	[F40-OH2.4] [F41,F43-OP5] as it applies to the installation of piping

”
,

- c) adds, in correct numerical order, as follows:

“

2.2.5.15. Cellular Core PVC Pipe and Fittings	
(1)	[F20-OH2.1,OH2.2,OH2.3] [F20-OP5]
(2)	[F20-OH2.1,OH2.2,OH2.3] [F20-OP5]

”
,

- d) adds a new row under the title “2.2.10.6. Supply and Waste Fittings”, in the correct numerical order, as follows:

“

(7)	[F40,F41,F43,F46,F71,F81,F82- OS3.4,OH1.1,OH2.3,OH5]
-----	---

”
,

- e) strikes out all of the rows for section “2.2.10.8. Direct Flush Valves”, including the title, and substitutes as follows:

“

2.2.10.8. Direct Flush Valves	
(1)	[F81-OH2.1] (a), (b) and (e) [F81-OP5]

”
,

- f) adds, in correct numerical order, as follows:

“

2.2.10.18. Flexible Water Connectors	
(1)	[F81-OP5] [F46-OH2.2]

”
,

- g) adds a new row under the title “2.2.11.3. Vehicle Wash Facilities”, in the correct numerical order, as follows:

“

(3)	[F40,F41,F43,F81,F82-OS3.4,OH1.1,OH5]
-----	---------------------------------------

”,
,

- h) strikes out all of the rows for section “2.2.11.6. Cooling Towers”, including the title, and substitutes as follows:

“

2.2.11.6. Cooling Towers	
(1)	[F40,F41,F43,F46,F81,F82-OS3.4,OH1.1,OH2.2,OH5,OP5]
(2)	[F40,F41,F43,F46,F81,F82,F130-OS3.4,OH1.1,OH2.2,OH5,OP5,OE1.2]
(4)	[F40,F41,F43,F46,F81,F82-OS3.4,OH1.1,OH2.2,OH5,OP5]
(5)	[F40,F41,F43,F46,F81,F82,F130-OS3.4,OH1.1,OH2.2,OH5,OP5,OE1.2]
(7)	[F40,F41,F43,F81,F82-OS3.4,OH1.1,OH5]
(8)	[F40,F41,F43,F81,F82-OS3.4,OH1.1,OH5]
(9)	[F40,F41,F43,F81,F82-OS3.4,OH1.1,OH5]
(10)	[F40,F41,F43,F81,F82-OS3.4,OH1.1,OH5]
(11)	[F40,F41,F43,F46,F81,F82,F130-OS3.4,OH1.1,OH2.2,OH5,OP5,OE1.2]

”,
,

- i) strikes out all of the rows for section “2.2.11.7. Indoor and Outdoor Decorative Water Features”, including the title, and substitutes as follows:

“

2.2.11.7. Decorative Water Features	
(1)	[F40,F41,F43,F46,F81,F82-OS3.4,OH1.1,OH2.2,OH5,OP5]
(2)	[F30-OS3.1,OS3.4,OH2.2,OH2.4,OH5]
(3)	[F40,F41,F43,F46,F81,F82-OS3.4,OH1.1,OH2.2,OH5,OP5]
(5)	[F40,F41,F43,F46,F81,F82,F130-OS3.4,OH1.1,OH2.2,OH5,OP5,OE1.2]
(7)	[F40,F41,F43,F81,F82-OS3.4,OH1.1,OH5]

(8)	[F40,F41,F43,F81,F82-OS3.4,OH1.1,OH5]
(9)	[F40,F41,F43,F81,F82-OS3.4,OH1.1,OH5]
(10)	[F40,F41,F43,F81,F82-OS3.4,OH1.1,OH5]
(11)	[F40,F41,F43,F46,F81,F82,F130-OS3.4,OH1.1,OH2.2,OH5,OP5,OE1.2]

”,
,

j) adds, in correct numerical order, as follows:

2.4.2.4. Connections to Storm Drainage Systems	
(2)	[F30,F62,F81,F82-OS3.1,OP5]

”, and

k) strikes out all of the rows commencing with “2.7.1.1. Not Permitted”, including the titles, up to and including the last row of the table, and substitutes as follows:

2.7.1.1. General	
(1)	[F46-OH2.2]
2.7.1.2. Non-potable Water Sources	
(1)	[F40,F43,F46,F81-OS3.4,OH2.1,OH2.2,OH5,OE1.2]
(2)	[F40,F43,F46,F81-OS3.4,OH2.1,OH2.2,OH5,OE1.2]
2.7.1.3. Non-potable Water Uses	
(1)	[F130-OE1.2]
(2)	[F130-OE1.2]
(3)	[F46,F70-OS3.4,OH2.2,OH2.3]
(4)	[F81-OS3.2]
2.7.2.1. Piping and Outlet Identification	
(1)	[F46-OH2.2]
(2)	[F46-OH2.2]
(3)	[F46-OH2.2]
2.7.3.1. Pipes	
(1)	[F46-OH2.2]
2.7.3.2. Outlets	
(1)	[F46-OH2.2]
2.7.4.1. Requirements for Alternate Water Source Systems Installed Prior to January 1, 2019	
(1)	[F46,F81,F82,F130-OS3.4,OH2.1,OH2.2,OH5,OE1.2]
(2)	[F81-OH2.2]
(3)	[F46,F81,F82,F130-OS3.4,OH2.1,OH2.2,OH5,OE1.2]
(4)	[F46,F81,F82,F130-

	OS3.4,OH2.1,OH2.2,OH5,OE1.2]
(5)	[F46,F81,F82,F130- OS3.4,OH2.1,OH2.2,OH5,OE1.2]
(6)	[F46,F81,F82,F130- OS3.4,OH2.1,OH2.2,OH5,OE1.2]
(7)	[F46,F81,F82-OS3.4,OH2.1,OH2.2,OH5]
2.7.5.1. Occupancy	
(1)	[F46,F81,F82,F130- OS3.4,OH2.1,OH2.2,OH5,OE1.2]
2.7.5.2. Commissioning	
(1)	[F46,F81,F82-OS3.4,OH2.1,OH2.2,OH5]
(2)	[F46,F81,F82-OS3.4,OH2.1,OH2.2,OH5]
2.7.5.3. Operating Permit	
(1)	[F40,F41,F43,F46,F81,F82,F130- OS3.4,OH2.1,OH2.2,OH5,OE1.2]
(3)	[F40,F41,F43,F46,F81,F82,F130- OS3.4,OH1.1,OH2.2,OH5,OE1.2]
2.7.5.4. Continued Operation	
(1)	[F81,F82,F130-OH5,OP5,OE1.2]
2.7.6.1. Professional Design	
(1)	[F46,F81,F82,F130- OS3.4,OH2.1,OH2.2,OH5,OE1.2]
2.7.6.2. Pipe Sizing	
(1)	[F71,F72-OH2.1,OH2.3]
(2)	[F71,F72-OH2.1,OH2.3]
2.7.6.3. Continuity of Supply and Backflow Prevention	
(1)	[F71,F72-OH2.1,OH2.3]
(2)	[F46,F81,F82-OS3.4,OH2.1,OH2.2,OH5]
2.7.6.4. Cisterns	
(1)	[F40,F81-OH2.1,OH2.3]
(2)	[F40,F81-OH2.1,OH2.3]
(3)	[F40,F81-OH2.1,OH2.3]
2.7.6.5. Water Metering	
(1)	[F130-OE1.2]
2.7.6.6. Water Quality Sampling and Alerts	
(1)	[F82-OS3.4,OH2.1,OH2.3,OH5]
(2)	[F82-OS3.4,OH2.1,OH2.3,OH5]
2.7.6.7. Power Interruption	
(1)	[F71,F72,F81-OS3.4,OH2.1,OH2.3,OH5]
2.7.7.1. Water Quality Standards, Testing, and Documentation	
(1)	[F40,F43,F71,F72,F81,F82- OS3.4,OH2.1,OH2.3,OH5]
(2)	[F40,F43,F71,F72,F81,F82- OS3.4,OH2.1,OH2.3,OH5]
(3)	[F40,F43,F71,F72,F81,F82- OS3.4,OH2.1,OH2.3,OH5]
2.7.7.2. Water Quality Reporting	
(1)	[F40,F43,F71,F72,F81,F82-

	OS3.4,OH2.1,OH2.3,OH5]
2.7.7.3. Required Response to Failure to Meet Water Quality Standards	
(1)	[F40,F43,F71,F72,F81,F82-OS3.4,OH2.1,OH2.3,OH5]
2.7.8.1. Operating Manual	
(1)	[F82-OS3.4,OH2.1,OH2.3,OH5,OE1.2]
2.7.8.2. Maintenance	
(1)	[F82-OS3.4,OH2.1,OH2.3,OH5,OE1.2]
(2)	[F46,F81,F82-OS3.4,OH2.1,OH2.2,OH5]
(3)	[F82-OS3.4,OH2.1,OH2.3,OH5,OE1.2]
2.7.8.3. Request for Operating Manual or Maintenance Log	
(1)	[F82-OS3.4,OH2.1,OH2.3,OH5,OE1.2]

37. In Book II, Division C, Council strikes out Article 1.6.3.7. and substitutes as follows:

“1.6.3.7. Authorization for Use

- 1) No person shall use a plumbing system or sprinkler system until it has been authorized for use by the *Chief Building Official*.”.

38. In Book I, Division B, Council strikes out in Table 1.3.1.2. the By-law References for the row “ASHRAE Guideline 12-2000” and substitutes as follows:

“6.2.1.1.(1)
6.3.2.15.(11)
6.3.2.16.(1)”.

39. In Book I, Division B, Council strikes out in Table 1.3.1.2. the By-law Reference “6.3.2.15.(1)” for the row “CSA CAN/CSA-Z317.2-10” and substitutes “6.3.2.15.(7)”.

40. In Book I, Division B, Council adds a new row in Table 1.3.1.2. in correct alphabetical order, as follows:

Issuing Agency	Document Number	Title of Document	By-law Reference
ANSI/ASHRAE	188-2018	Legionellosis: Risk Management for Building Water Systems	A-6.2.1.1.

41. In Sentence 6.2.1.1.(1) in Book I, Division B, Council:

- a) in Clause (h), strikes out “and” at the end of the Clause;
b) in Clause (i), strikes out “.” at the end of the Clause and substitutes “,” and”; and
c) adds a new Clause (j) as follows:

“(j) ASHRAE Guideline 12, “Minimizing the Risk of Legionellosis Associated with Building Water Systems.””.

42. In the Notes to Part 6 in Book I, Division B, Council adds the following new Note, in the correct numerical order:

“Note A-6.2.1.1. Good Engineering Practice.

Legionella Control

HVAC designers should either develop a water management plan or complete a formal risk and hazard assessment to determine what measures are required for the control of legionella. The risk and hazard assessment should include inspections of the building and its surroundings to locate potential sources of legionella and to identify equipment or systems that could promote the growth and spread of legionella. The assessment should also evaluate the risk to building occupants that is associated with any identified equipment or systems, taking into account their design, location and operating conditions.

Further information on minimizing the growth and spread of legionella can be found in the following publications:

- ANSI/ASHRAE 188-2018, “Legionellosis: Risk Management for Building Water Systems,”
- “Developing a Water Management Program to Reduce Legionella Growth & Spread in Buildings” (U.S. Centers for Disease Control and Prevention, 2017),
- “Legionella and Legionnaires’ Disease: A Policy Overview” (European Agency for Safety and Health at Work, 2011),
- “Legionella and the Prevention of Legionellosis” (World Health Organization, 2007),
- “Legionnaires’ Disease: Technical Guidance: Part 1: The Control of Legionella Bacteria in Evaporative Cooling Systems, and Part 3: The Control of Legionella Bacteria in Other Risk Systems” (U.K. Health and Safety Executive, 2013), and
- “Recognition, Evaluation and Control of Legionella in Building Water Systems” (American Industrial Hygiene Association, 2015).”.

43. In Sentence 6.3.1.6.(1) of Book I, Division B, Council strikes out “that are released”.
44. In Note A-6.3.1.6. Indoor Air Contaminants in the Notes to Part 6 in Book I, Division B, Council:

- a) strikes out “cafeteria dishwasher drainage leaks,”;
- b) strikes out “infectious”;
- c) strikes out “legionnaires’ disease” and substitutes “legionellosis”; and
- d) adds a new item (c) to the second paragraph as follows:

“c) HVAC systems that generate condensate or introduce liquid water into the airstream in the ducts require adequate drainage of excess water and, in some cases, a means of capturing air-entrained water droplets. These measures reduce the potential for bio-contaminants, including legionella, to proliferate in stagnant water and for water droplets containing bio-contaminants to be introduced into the airstream and contaminate the indoor environment. (See also Article 6.3.2.2.)”.

45. In Book I, Division B, Council strikes out Article 6.3.2.2. and substitutes the following;

“6.3.2.2. Drain Pans

(See Note A-6.3.2.2.)

- 1) HVAC systems that generate condensate or introduce liquid water into the airstream in the ducts shall be equipped with drain pans that are

- a) designed in accordance with Section 5.10, Drain Pans, of ANSI/ASHRAE 62.1, "Ventilation for Acceptable Indoor Air Quality,"
- b) provided with an outlet that is piped to the outside of the airstream in a location where condensate can be safely disposed of,
- c) installed so that water does not stagnate and drains from the pan, and
- d) designed and installed so as to be accessible for cleaning and maintenance.

2) Drain pans and associated piping shall be constructed of corrosion-resistant, non-porous materials that do not promote the proliferation of disease-causing micro-organisms.”.

46. In the Notes to Part 6 in Book I, Division B, Council adds the following new Note, in the correct numerical order:

“Note A-6.3.2.2. Stagnant Water in Drain Pans.

It is important to eliminate stagnant water as it can promote the proliferation of disease-causing micro-organisms, such as legionella. Of particular concern is the potential for legionella bacteria in water to become airborne in water droplets or mist that can be inhaled by humans or can contaminate other water sources or systems.”.

47. In Table 6.3.2.9. in Book I, Division B, Council adds “an evaporative heat rejection system such as an” before “evaporative cooling tower”.
48. In Book I, Division B, Council strikes out Article 6.3.2.15. and substitutes the following:

“6.3.2.15. Evaporative Cooling Towers, Evaporative Fluid Coolers and Evaporative Condensers (Evaporative Heat Rejection Systems)

(See Article 2.2.11.6. of Division B of Book II (Plumbing Systems) of this By-law.)

- 1) Evaporative heat rejection systems shall
 - a) incorporate a drift eliminator or other means to minimize the dispersion of entrained water droplets, and
 - b) have a design discharge velocity that does not exceed the maximum discharge velocity recommended by the manufacturer.
- 2) Evaporative heat rejection systems shall be designed so that water continuously circulates through all parts of the system that are normally wetted when the system is operating.
- 3) Evaporative heat rejection systems and their components shall be constructed of corrosion-resistant, non-porous materials that do not promote the proliferation of disease-causing micro-organisms and that are compatible with disinfectants, biocides and other cleaning agents.
- 4) Evaporative heat rejection systems shall be installed such that
 - a) no discharge air bypasses the drift eliminator or other means referred to in Clause (1)(a), and
 - b) the systems are accessible for cleaning, inspection and maintenance.
- 5) Deleted.

6) Except as provided in Sentence (7), air discharged from evaporative heat rejection systems shall discharge away from the building, so as to not re-enter it, to a distance not less than

- a) 2.15 m above sidewalks and driveways,
- b) 7.6 m from outdoor air intakes,
- c) 3 m horizontally or vertically from exterior doors and operable windows, and
- d) 3 m horizontally or vertically from occupiable outdoor spaces, excluding maintenance spaces.

(See Note A-6.3.2.15.(6) and (7).)

7) Air discharged from evaporative heat rejection systems in health care facilities shall discharge away from the building in compliance with CAN/CSA-Z317.2, "Special Requirements for Heating, Ventilation, and Air-Conditioning (HVAC) Systems in Health Care Facilities." (See Note A-6.3.2.15.(6) and (7).)

8) Deleted.

9) Air intakes of evaporative heat rejection systems shall incorporate protective measures to minimize the entrainment of vegetation and other organic matter.

10) Deleted.

11) Water treatment systems and equipment for controlling the proliferation of disease-causing micro-organisms shall

- a) be provided in accordance with Section 7.6.2. of ASHRAE Guideline 12, "Minimizing the Risk of Legionellosis Associated with Building Water Systems," and
- b) include means for drainage, dilution, cleaning, and application of chemicals for the control of scale, corrosion and biological contamination.

(See Note A-6.3.2.15.(11).)

12) Deleted.

13) Evaporative heat rejection systems shall be provided with access openings, service platforms, fixed ladders and fall-restraint connections to allow inspection, maintenance and testing, and a sampling port shall be installed at a point in the recirculation loop just prior to the point where treatment chemicals are injected."

49. In the Notes to Part 6 in Book I, Division B, Council adds the following new Notes, in the correct numerical order:

"Note A-6.3.2.15.(6) and (7) Minimum Distances.

Ensuring adequate distance between the air discharge locations of evaporative heat rejection systems and certain outdoor spaces and building components minimizes the potential for contamination of the air of occupiable spaces. For example, if a building's ventilation air intake were located too close to an air discharge location of an evaporative heat rejection system, warm discharge air and associated drift, which could contain biological contaminants, could be introduced to the indoor environment through the air intake.

The minimum distances stated in Sentences 6.3.2.15.(6) and (7) may need to be increased where warranted by local conditions such as prevailing winds, adjacent structures, or special processes being carried out, any of which would make further analysis necessary. (See also Sentence 6.3.3.1.(2).)

Note A-6.3.2.15.(11) Assessment of System and Make-Up Water.

The chemical characteristics of the water in the evaporative heat rejection system and of the make-up water should be assessed to select a suitable water treatment system.”.

50. In Book I, Division B, Council strikes out Article 6.3.2.16. and substitutes the following;

“6.3.2.16. Evaporative Air Coolers, Misters, Atomizers, Air Washers and Humidifiers

(See Article 2.2.11.7. of Division B of Book II (Plumbing Systems) of this By-law.)

- 1) Evaporative air coolers, misters, atomizers, air washers and humidifiers shall be designed in accordance with Sections 8 and 9 of ASHRAE Guideline 12, “Minimizing the Risk of Legionellosis Associated with Building Water Systems.”
- 2) Systems referred to in Sentence (1) shall
 - a) be designed so that water continuously circulates through all parts of the system that are normally wetted when the system is operating, and
 - b) incorporate a method of preventing water stagnation within the system itself and the internal plumbing when the system is not operating.(See Note A-6.3.2.16.(2).)
- 3) All components of systems referred to in Sentence (1), including filters and evaporation media, shall be constructed of corrosion-resistant, non-porous materials that do not promote the proliferation of disease-causing micro-organisms.
- 4) Associated sumps shall
 - a) be constructed of corrosion-resistant, non-porous materials that do not promote the proliferation of disease-causing micro-organisms,
 - b) include auxiliary drains to prevent the overflow of water into ductwork, and
 - c) be installed so that they can be flushed, drained, cleaned and disinfected.
- 5) Where misters, atomizers or air washers are used in ductwork, the affected duct section shall be
 - a) designed to ensure drainage of unevaporated and accumulated water, and
 - b) constructed of corrosion-resistant, non-porous materials that do not promote the proliferation of disease-causing micro-organisms.
- 6) Deleted.”.

51. In the Notes to Part 6 in Book I, Division B, Council adds the following new Notes, in the correct numerical order:

“Note A-6.3.2.16.(2) Prevention of Water Stagnation.

Common strategies to prevent water stagnation include flushing, providing an inactivity drain, and periodic activation even with no load.

Note A-6.3.2.16.(6) Assessment of Make-Up Water.

The chemical characteristics of the make-up water should be assessed to ensure that any chemicals added to a system referred to in Sentence 6.3.2.16.(1) for precipitation control, disinfection or another purpose will not adversely affect the system.”.

52. In Book I, Division B, Table 6.10.1.1., Council

- a) strikes out all of the rows for section “6.2.1.1. Good Engineering Practice”, including the title, and substitutes as follows:

“

6.2.1.1. Good Engineering Practice	
(1)	(a) to (e) [F31,F51-OP1.1]
	(a) to (c) and (e) to (i) [F40,41,F50,F51,F54,F63-OH1.1]
	(a), (b), (c), (e), (f), (g), (h) [F50,F51,F52,F54,F63-OH1.2,OH1.3]
	[F31,F50,F51,F52,F54,F63-OS3.2,OS3.4]
	(d) [F01-OS-1.1]

”;

- b) strikes out all of the rows for section “6.3.2.2. Drain Pans”, including the title, and substitutes as follows:

“

6.3.2.2. Drain Pans	
(1)	[F40,F41,F44,F50,F82-OH1.1]
(2)	[F40,F41,F44,F50-OH1.1]

”;

- c) strikes out all of the rows for section “6.3.2.15. Evaporative Cooling Towers, Evaporative Fluid Coolers and Evaporative Condensers”, including the title, and substitutes as follows:

“

6.3.2.15. Evaporative Cooling Towers, Evaporative Fluid Coolers and Evaporative Condensers	
(1)	[F40,F41,F50-OH1.1]
(2)	[F40,F41,F50-OH1.1]
(3)	[F40,F41,F50-OH1.1]
(4)	[F40,F41,F50-OH1.1]
(6)	[F40,F41,F50-OH1.1]
(9)	[F40,F41,F50-OH1.1]
(11)	[F40,F41,F50-OH1.1]
(13)	[F40,F41,F50,F82-OH1.1]
	[F82-OS3.1]

”;

and

- d) strikes out all of the rows for section “6.3.2.15. Evaporative Cooling Towers, Evaporative Fluid Coolers and Evaporative Condensers”, including the title, and substitutes as follows:

“

6.3.2.16. Evaporative Air Coolers, Misters, Atomizers, Air Washers and Humidifiers	
(1)	[F40,F41,F50-OH1.1]
(2)	[F40,F41,F50-OH1.1]
(3)	[F40,F41,F50-OH1.1]
(4)	[F40,F41,F50-OH1.1]

”;

	[F40,F41,F50,F82-OH1.1]
(5)	[F40,F41,F50-OH1.1]

”.

53. In Sentence 2.2.11.6.(6) of Book II, Division B, Council:
- a) in Clause (c) strikes out “and” at the end of the Clause;
 - b) rennumbers Clause (d) as Clause (e); and
 - c) inserts a new Clause (d) as follows:

“d) at minimum, while the *cooling tower* is in operation, each calendar month of operation, with not more than 33 days between sample, and”.

54. In Sentence 2.2.11.6.(7) of Book II, Division B, Council:
- a) in Clause (b) strikes out “and” at the end of the Clause;
 - b) rennumbers Clause (c) as Clause (d); and
 - c) inserts a new Clause (c) as follows:

“c) at minimum, while the *decorative water feature* is in operation, every 2 calendar months of operation, with not more than 63 days between samples, and”.

55. In Book II, Division B, Council strikes out Article 2.7.7.1 and substitutes the following:

“2.7.7.1. Water Quality Standards, Testing, and Documentation

- 1) Water quality shall meet the standards set out in Table 2.7.7.1.
- 2) Water quality shall be tested as set out in Table 2.7.7.1.
- 3) All test results shall be documented as set out in Table 2.7.7.1., and documentation shall be retained for no less than 24 months.

Table 2.7.7.1.
Water Quality Standards, Testing, and Documentation
Forming Part of Sentences 2.7.7.1.(1), (2), and (3)

Applicability	Parameter	Standard	Testing Type and Frequency	Testing Result Documentation Requirement
Any non- <i>potable</i> water source	Temperature	< 20°C	Continuous	Daily ⁽¹⁾
Any non- <i>potable</i> water source	Turbidity	< 10 NTU	Daily ⁽¹⁾ , and 1 sample tested by a laboratory every 2 months with not more than 63 days between samples	Daily ⁽¹⁾ , plus all laboratory tests
Any non- <i>potable</i> water source	<i>E. coli</i> ⁽²⁾	< 100 CFU per 100 mL or < 100 MPN	1 sample tested every 2 months with	All laboratory tests

		per 100 mL	not more than 63 days between samples	
Any non-potable water source	<i>Legionella pneumophila</i> ⁽²⁾	< 10 CFU per mL	1 laboratory sample tested every 2 months, with not more than 63 days between samples	All laboratory tests

Notes to Table 2.7.7.1.:

(1) For the purpose of this Table, the term "daily" shall mean once per day when the *building* is normally occupied.

(2) See Article 2.2.1.7."

56. In Book II, Division C, Council strikes out Article 1.6.9.3. and substitutes the following:

"1.6.9.3. Application Requirements

1) To obtain an *operating permit*, the *owner* shall file an application in writing in the form prescribed by the *Chief Building Official* and be certified under the Environmental Operators Certification Program."

57. In Part C – Operating Permits, in the Schedule of Fees of Division C of Book II, Council strikes out:

"For each OPERATING PERMIT.....\$00.00"

and substitutes:

"For the first OPERATING PERMIT relating to equipment or systems in a BUILDING.....\$250.00
For each additional OPERATING PERMIT relating to equipment or systems in the same BUILDING.....\$100.00".

* * * * *

**DRAFT By-law to amend Gas Fitting By-law No. 3507
Regarding the Safety Standards Act and the Gas Safety Regulation**

Note: A By-law will be prepared generally in accordance with the provisions listed below, subject to change and refinement prior to posting.

1. This By-law amends the indicated provisions of Gas Fitting By-law No. 3507.
2. Council strikes out sections 2 through 11 and substitutes the following:
 - “2. In this By-law, unless the context otherwise requires:

“appliance” has the same meaning as in the *Gas Safety Regulation* (BC);

“fully detached dwelling” has the same meaning as in the *Gas Safety Regulation* (BC);

“gas” has the same meaning as in the *Gas Safety Regulation* (BC);

“gas equipment” has the same meaning as in the *Gas Safety Regulation* (BC);

“gas system” has the same meaning as in the *Gas Safety Regulation* (BC);

“homeowner” has the same meaning as in the *Gas Safety Regulation* (BC);

“meter” has the same meaning as in the *Gas Safety Regulation* (BC);

“regulated work” has the same meaning as in the *Safety Standards Act* (BC);

“safety manager” has the same meaning as in the *Safety Standards Act* (BC);

“safety officer” has the same meaning as in the *Safety Standards Act* (BC); and

“service meter” has the same meaning as in the *Gas Safety Regulation* (BC).
3. A person must obtain a gas permit before performing the following kinds of regulated work in respect of gas equipment or gas systems:
 - (a) regulated work in a fully detached dwelling serviced by an individual service meter and supplied with gas at a pressure of 14.0 kPa gauge or less; and
 - (b) regulated work in any premises other than a fully detached dwelling, if:
 - (i) the meter is supplied with gas at a pressure of 14.0 kPa gauge or less, and
 - (ii) the total connected load for the meter is 120 kW or less.
4. Gas permits will only be issued to individuals who are authorized to perform the regulated work under the *Gas Safety Regulation* (BC).

5. Despite section 4, a gas permit may be issued to a homeowner to perform regulated work with respect to gas equipment in a fully detached dwelling if:
 - (a) no person is being paid to do, or assist the owner in doing, the work; and
 - (b) no part of the dwelling is rented to any person.
6. At the time of applying for a gas permit, an applicant must pay the applicable fee as set out in the Fee Schedule attached to this By-law.
7. On payment of any additional required fee, a safety manager or safety officer may amend a permit to allow additional regulated work to be performed under the permit.
8. If a reinspection of any work performed under the permit is required for any reason, including reinspections required due to faulty work or materials, or incomplete work, a permit holder must pay the reinspection fee as set out in the Fee Schedule attached to this By-law.
9. A permit may be revoked if, in the opinion of a safety manager or a safety officer:
 - (a) the work authorized by the permit is not commenced within ninety days from the date of the issue of the permit;
 - (b) the work authorized by the permit, though commenced, is not continuously and actively carried out thereafter; or
 - (c) the work authorized by the permit has been substantially discontinued for a period of 180 days.”.
3. Council renumbers sections 12, 12A, and 12B as sections 10, 11 and 12, respectively.
4. Council strikes out the Fee Schedule in Appendix A, and substitutes the Fee Schedule set out in Appendix A attached to this By-law.

Appendix A

Fee Schedule

Installations

One, two or three appliances	\$212.00
Each additional appliance	\$67.00
Each replacement water heater, gas range, furnace or boiler	\$50.00

Each additional gas meter of a multifamily dwelling (same appliance count)	\$50.00
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Piping Permits (no appliances)

For first 60 m of piping or part thereof	\$212.00
Every 30 m or part thereof exceeding the first 60 m	\$81.90

Reinspections

For each reinspection	\$212.00
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Letters of Support



**BUILDING
OWNERS AND
MANAGERS
ASSOCIATION**
British Columbia

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May 8, 2020

Mr. Sadhu Johnston
City Manager
City of Vancouver
453 W 12th Avenue
Vancouver, BC V5Y 1V4

By email: sadhu.johnston@vancouver.ca

Re: Council Report RTS 13842 (*Legionella* Prevention – Vancouver Building By-law Amendments)

Dear Mr. Johnston,

On behalf of our members, I am writing to thank you for consulting with us on the proposed amendments to the Vancouver Building By-laws to prevent *Legionella*. This is a topic of great interest to our members, indicated by two sold-out education sessions earlier this year. Thank you to Christopher Radziminski and Phillip White for attending these sessions to provide information from the City, as well as their outreach to engage directly with us.

In general, we support the recommendations for building mechanical systems, including the phased implementation for regular verification testing for *Legionella* and the online reporting of results. We hope this requirement will result in more, and more cost-effective, testing options available in the Lower Mainland.

We appreciate the City recognizing the need to minimize additional costs on buildings and support the recommendation for an \$250 annual Operating Permit fee for the first device, and a \$100 annual Operating Permit fee for each additional device in the same building. We also support deferring Operating Permit fees to January 1, 2022.

We would encourage the City's to finalize a consistent process to provide notifications to building owners and managers regarding water distribution system disruptions. These disruptions can cause significant health and safety issues for our members.

Thank you again for the opportunity to provide input to these amendments. If you have any questions, please feel free to get in touch. We would be happy to provide feedback on any future amendments.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Stathonikos".

Damian Stathonikos, CAE
President

Copies:

Jessie Adcock, General Manager, Development, Buildings and Licensing
(jessie.adcock@vancouver.ca)

Patrick Ryan, P.Eng., Chief Building Official (patrick.ryan@vancouver.ca)



Sadhu Johnston, City Manager
City of Vancouver, 453 W 12th Avenue, Vancouver BC V5Y 1V4
Email: sadhu.johnston@vancouver.ca

May 12th 2020

RE: RTS 13842 (*Legionella* Prevention — Vancouver Building By-law Amendments)

Dear Mr Johnston,

On behalf of the Members of Tourism Vancouver I am writing to express our support for the City of Vancouver By-Law amendments regarding *Legionella* prevention. More than ever before we see public health protection improvements for both residents and visitors to the City as vital to maintaining a thriving and resilient city.

On October 30 2019, in partnership with the Vancouver Tourism Facility Managers Association, Tourism Vancouver co-hosted a member education workshop at Science World with speakers from NSF, Fraser Health and Public Services and Procurement Canada to share water quality management best practices and lessons learned from past outbreaks in the United States and Canada. We are pleased to note that since that workshop, many of our members have shared that they are proactively taking measures to manage water quality such as preventative measures like running taps and shower heads in rooms that have been left vacant for more than a few days. As a result, we believe hotels and other tourism facilities in Vancouver are proactively implementing best practices for water quality management.

We now know, all too well, the costs of a public health outbreak to our industry. Should a preventable event like a *Legionella* outbreak were to occur now in Vancouver, it would seriously impact public health and recovery of our city and tourism industry from the COVID-19 pandemic. This underscores the importance of establishing a minimum standard for all buildings. We are encouraged that these proposed changes would align Vancouver with leading practices for cities to manage *Legionella* and other opportunistic water pathogen risks and keep our residents and visitors safe.

We look forward to collaborating further with the City of Vancouver to ensure that we continue to be the safe and welcoming place we are grateful to be able to share with the world.

Regards,

A handwritten signature in black ink, appearing to read "Gwendal Castellan".

Gwendal Castellan

Manager, Sustainable Destination Development

CC: Jessie Adcock, General Manager, Development, Buildings & Licensing, jessie.adcock@vancouver.ca
Patrick Ryan, P.Eng., Chief Building Official, patrick.ryan@vancouver.ca

Tourism Vancouver
The Metro Vancouver
Convention & Visitors Bureau

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Office of the Chief Medical Health Officer

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May 27, 2020

Mayor and Council
City of Vancouver
453 West 12th Avenue
Vancouver, BC V5Y 1V4

To the Mayor and Council:

RE: VCH support for Bylaw Amendment: Vancouver Plumbing Bylaw 2019 (Div. B, Pt 2)

I am writing in my role with Vancouver Coastal Health (VCH) to support proposed amendments to the Vancouver Plumbing Bylaw to prevent *Legionella* disease in our community. Specifically, we encourage policy changes to require regular testing for *Legionella pneumophila* bacteria in cooling towers and decorative water features.

Legionella outbreaks can have severe impacts on health, particularly among vulnerable older adults who have a high risk of death when infected with the disease-causing bacteria. Public health investigations of such outbreaks aim to identify reservoirs of the causal bacteria, often in water systems such as cooling towers and decorative fountains. Without information on the locations and operational histories of water systems, public health programs are challenged to pinpoint the sources of outbreaks and stop the spread of disease. A requirement for regular testing and reporting of results can contribute to decreased risk of outbreaks, and in the event of outbreaks, this data will support rapid identification and remediation of infection sources.

VCH has worked in close partnership with City of Vancouver personnel to bring a public health perspective to policy development on this topic. Our Regional Water Safety Committee has studied and strongly supports the proposed by-law amendment, and we have liaised with the BC Centre for Disease Control to confirm the scientific underpinning of the proposal from a laboratory perspective.

VCH is committed to working with the City of Vancouver in support of policies and environments to promote health and prevent disease. We support this proposed by-law amendment, which reflects a leading-edge approach to preventing *Legionella* disease in an urban context. We appreciate your ongoing attention to the health, safety, and wellbeing of Vancouver residents.

Sincerely,

A handwritten signature in black ink, appearing to read "MS", is placed above the printed name of the signatory.

Michael Schwandt, MD MPH FRPC
Medical Health Officer
Vancouver Coastal Health

Cc:

Jesse Adcock, General Manager, Development, Buildings and Licensing, City of Vancouver
Patrick Ryan, Chief Building Official, Development Services, Building and Licensing, City of Vancouver

A service of the Provincial Health Services Authority

PHSA Laboratories

BCCDC Public Health Laboratory

May 11, 2020

Mr. Sadhu Johnston
City Manager
City of Vancouver
453 W 12th Avenue Vancouver, BC V5Y 1V4
By email: sadhu.johnston@vancouver.ca

Re: Council Report RTS 13842 (*Legionella* Prevention – Vancouver Building By-law Amendments)

Dear Mr. Johnston,

We are writing to inform you that the BC Centre for Disease Control (BCCDC) and BCCDC Public Health Laboratory (PHL) supports the proposed amendments to the Vancouver Building By-laws to prevent *Legionella*. As you know, we are very supportive of the City of Vancouver's leadership in this area. *Legionella* outbreaks can be devastating for a community. We feel that routine testing of cooling towers and decorative water features can identify problematic systems for effective remediation, reducing the risk of an outbreak. Likewise, if an outbreak were to occur, an up to date registry would support and accelerate the outbreak investigation, saving public health efforts and resources and ultimately reducing the burden of illness in the community. We are particularly impressed with the consultation process that was carried out in the development of these By-Laws, having been involved with many of the expert and public consultations that were scheduled.

We have worked closely with Christopher Radzinski and Phillip White over the past two-years to support their development of these proposed amendments. They reflect best practices in the engineering, microbiology and public health fields with respect to *Legionella* detection and prevention in building mechanical systems.

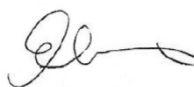
As we continue to experience the impacts of climate change, growing pressure on our water systems and aging infrastructure, the risks of *Legionella* illnesses increase. Measures such as registries and routine testing and reporting are critical at addressing this increased risk and essential for controlling legionellosis.

Thank you again for the opportunity to provide input to these amendments. Please be in touch if you require any clarification or further detail.

Sincerely,



Natalie Prystajecy, PhD SCCM
Environmental Microbiologist
BCCDC Public Health Laboratory



Eleni Galanis, MD, MPH, FRCPC
Physician Epidemiologist
BCCDC



Correspondence address: BCCDC Public Health Laboratory, 655 West 12th Avenue, 2nd floor, Vancouver, BC V5Z 4R4
1 877 PHSA LAB (1-877-747-2522)



Montreal, May 10th 2020

TO: Sadhu Johnston, City Manager
City of Vancouver, 453 W 12th Avenue, Vancouver BC V5Y 1V4

CC: Jessie Adcock, General Manager, Development, Buildings & Licensing
Patrick Ryan, P.Eng., Chief Building Official

RE : Letter of support for Vancouver's *Legionella* initiatives

Dear Mr. Johnston,

I would like to express my support of the various initiatives to limit the risks of Legionnaires disease currently considered by the City of Vancouver. I have monitored with interest your initiatives to limit the risks associated with Legionella and am aware of the excellent cooling tower regulations put in place by the City of Vancouver. Following the terrible outbreak that occurred in Québec city in 2012, I was involved in drafting the provincial regulations on cooling tower regulations. I am acutely aware, as you were during the Surrey outbreak, of the need to be proactive to be able to respond in a timely manner during an outbreak. Even more so, I am also aware of the benefit of such regulations to avoid these preventable outbreaks.

As a member of the recent of the National Academies of Science, Engineering and Medicine NASEM committee that authored the Management of Legionella in Water Systems, I was called to identify key actions that could decrease the risk for community acquired and outbreak related legionellosis cases. The consensus report released in mid 2019 covers an array of recommendations covering all engineered systems from the main distribution systems, to hot water systems and cooling towers. I am also a standing a member of the CSA Z317.1 technical committee drafting the revised special requirements for plumbing installations in health care facilities.

I understand that the recommendations put forward for consideration to your administration are in line with the consensus recommendations that NASEM formulated in 2019. Several of these recommendations are already integrated in the existing version of the CSA Z317.1 standard for health care facilities, while others will be integrated in the 2020 revision.

Some of the recommendations such as the requirement for hot water to be stored at 60°C (140 F) minimum are already part of the code and should be enforced. Limitations on showerhead and faucet flow rate should not be considered because of their unintended consequences of water efficiency in buildings with vulnerable populations (Group B occupancy). The introduction of these devices in such buildings has been shown to cause outbreaks of several pathogens such as *Legionella* and *Pseudomonas aeruginosa*.



Additional safeguards in building mechanical systems are justified, especially focusing on the very critical period of their early commissioning and the continued monitoring of operations. Quebec elected for mandatory logs, reporting and remedial actions as did PSPC. I am currently leading the analysis of the federal and provincial cooling tower databases and can testify that these regulatory features are extremely important to prevent crisis situations. They also represent incredibly powerful management tools to identify what is effective in preventing the occurrence of Legionella in these water systems.

As our ability to quantify the burden of disease associated with Legionella in water systems increases, future efforts will be directed to identify potential sources of community acquired cases. Utilities across Canada have learned that the divide between the public and private side of water supplies is blurred when considering water quality issues such as lead and Legionella. In the case of Legionella, the potential role of municipal water systems in promoting Legionella growth in buildings is receiving attention. Water quality, residual maintenance and interruptions of service are under investigation. Numerous investigations and case studies have been completed or are underway to show how the management of water quality and disruptions can contribute to the control of Legionella in buildings.

I hope that this letter will reach you in time. I have been extremely busy drafting the new Quebec Covid recommissioning guidelines that were issued last week. As several times before, I had the pleasure of interacting with your very knowledgeable staff while completing this task. I was not surprised to see that Vancouver had already reacted in a proactive manner by quickly issuing guidance to ensure that all water systems were managed in a way to prevent Legionella during the shutdown.

Finally, I must say that Vancouver already stands as a leader across Canadian municipalities in addressing this important problem. I hope that Vancouver will continue to serve as an example of proactive evidence-based regulations and guidance to minimize the risk of Legionella in engineered water systems,

A handwritten signature in black ink, appearing to read "M. Prévost".

Michèle Prévost, Ph.D.

Professor and Principal Chairholder, NSERC Industrial Chair on Drinking Water

Department of Civil, Geological and Mining Engineering



THE LEGIONELLA EXPERTS®
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May 11, 2020

Sadhu Johnston, City Manager
Jessie Adcock, General Manager, Development, Buildings & Licensing
Patrick Ryan, Chief Building Official

Dear Members of the Standing Committee on City Finance and Services,

Please accept this letter of support for Official Council Report RTS 13842 Legionella Prevention – Vancouver Building By-law Amendments, to be presented at the June 9, 2020 City Council meeting.

This amendment addresses an important public health issue – preventing building-associated Legionnaires' disease through appropriate and limited water management actions.

I am a public health microbiologist and have spent my career as an advocate for the prevention of Legionnaires' disease. I am gratified to see the progressive measures the City of Vancouver, BC is taking for your citizens. You are setting a wonderful example for other cities to follow.

RTS 13842 includes the single most useful metric for control, requiring *Legionella pneumophila* testing and reporting. The frequency proposed is modest:

- Monthly for cooling towers.
- Every 2 months for decorative water features and non-potable water systems.

Prescribed corrective actions are based on the federal MD 15161 - 2013 standard.

Education and certification of knowledge assures that the program and its implementation will be done professionally. Building Water System Operator certification is included in RTS 13842.

Thank you for your leadership in maintaining safe buildings and prevention of Legionnaires' disease.

Sincerely,

A handwritten signature in black ink, appearing to read 'Janet E. Stout'.

Janet E. Stout, PhD
Microbiologist
President, Special pathogens Laboratory
and Research Associate Professor, University of Pittsburgh



May 11, 2020

Re: LETTER OF SUPPORT - RTS 13842 (*Legionella* Prevention — Vancouver Building By-law Amendments)

Attn: City of Vancouver Council

Thank you for the opportunity to provide this letter of support to the suggested By-Law Amendments.

My experience with cooling towers and *Legionella* risk mitigation is based on 23 years of water treatment experience. We were also involved with cooling tower monitoring, *Legionella* sampling, and data analysis following the Quebec City outbreak. The data collected allowed me to publish some papers on the subject of *Legionella*, and the impact of *Legionella* sampling, including:

1. AT-19-C042 -- LEGIONELLA REGULATION, COOLING TOWER POSITIVITY AND WATER QUALITY IN THE QUEBEC CONTEXT ([link](#)) – ASHRAE Paper
2. TP19-06 -- Impact of Legionella Regulations on Water Treatment Programs and Control - An Observational Prospective Survey – Cooling Technology Institute Paper

The two papers that followed 323 cooling towers over 3.5 years were quoted by the US National Academies of Sciences Engineering and Medicine (NASEM) in their 2019 report. NASEM stated that:

The analysis suggests that the introduction of the Quebec regulations raised the level of awareness and accountability in the management of cooling tower treatment programs, which led to a reduction in levels and incidences of Legionella positivity over the three-year period (see Figure 5-2). The study suggests that a regular review of the cooling tower treatment program and monitoring results, including L. pneumophila sampling, leads to a willingness to continue implementing control measures.

It is my opinion that the proposed changes in the City of Vancouver will make it a leader in minimizing risk to public health by using a proactive, evidence-based approach to risk mitigation. I would be happy to discuss this further with the City.

Some of my affiliations:

- Chair of ASHRAE TC03.06 – Water Treatment Technical Committee
- Co-Author of the water treatment chapter of the ASHRAE Hand Book
- Member of ASHRAE SSPC 188 that authored Standard 188 and the upcoming Guideline 12:2020
- Vice-Chair of the American Boiler Manufacturer's Association Water Treatment Sub-Committee
- Past Chair of the Canadian Boiler Society

It is critical to state that I am not speaking on behalf of ASHRAE or its members.

A handwritten signature in black ink, appearing to read 'Patrick Racine'.

Patrick Racine, P.Eng., CEM
Regional Vice President
DuBois Chemicals Canada

DuBois Chemicals Canada



NSF International

May 11, 2020

Sadhu Johnston, City Manager

Jessie Adcock, General Manager, Development, Buildings & Licensing

Patrick Ryan, P.Eng., Chief Building Official

I would like to express my support of RTS 13842 (*Legionella* Prevention — Vancouver Building By-law Amendments) and the proactive initiatives to limit the risks of Legionnaires disease currently considered by the City of Vancouver.

What we know is that there has been a significant increase the in number of confirmed *Legionella* cases in North America since 2000. The United States has seen a 10-fold increase to more than 9,000 reported cases a year. <https://khn.org/news/record-number-of-legionnaires-cases-in-2018-risk-lives-cause-cleanup-headaches/> We also know that Legionella cases are widely under reported. An important study by the U.S. National Academies of Science, Engineering and Medicine NASEM committee on the Management of Legionella in Water Systems estimated the true disease burden to be 52,000 to 70,000 cases per year. <https://www.nationalacademies.org/our-work/management-of-legionella-in-water-systems>

We also know that the lack of regulatory oversight of building water systems and the lack of specific design, operating, maintenance, testing and independent validation practices to reduce the opportunity of these engineering systems from spreading disease is the main driver for largely preventable illnesses and deaths. The U.S. CDC has found that 9 out of 10 outbreaks it evaluated could have been avoided if a properly designed water management plan had been in place. <https://www.cdc.gov/vitalsigns/legionnaires/index.html>

Vancouver has been a thought leader that has played a crucial role in helping Cities from across North America evaluate how they can meet sustainability and public health goals through proper oversight and management of building water systems. I was pleased to work with the City of Vancouver in bringing together over 20 public agencies from across North America to create a template for creating electronic cooling tower registration systems that can speed the response to reported disease, streamline the management of information presented by private sector to local governments, and improve the conservation and resiliency efforts of water utilities through efficient allocation of effort/resources to cooling towers that can account for 50% or more of total water demand. A link to the final report of this effort can be found at https://www.usdn.org/uploads/cms/documents/deliverable_3_cooling_towers_technical_paper_lt_012_0_digital.pdf

The proposals before the City Council continue Vancouver's leadership in demonstrating how Cities can adopt practical strategies to solve pressing public health and sustainability challenges. The proposal aligns broadly with approaches recommended in the NASEM report and adopted by Germany, the United Kingdom, France, Australia, Portugal, and Spain for example.

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NSF International

I encourage the City Council to support these practical measures and compare the modest risk management expectations in this proposal to the those of other building systems that if improperly managed can injure and kill. For example, consider the detailed expectations for specific management plans for Elevators. <https://www.technicalsafetymc.ca/elevating-devices/b44-16-elevating-safety-code-and-mcp-requirements>.

Thank you for the opportunity to present my support for RTS 13842 (*Legionella* Prevention — Vancouver Building By-law Amendments). Vancouver's adoption of requirements that protect all residents from illness and death associated with higher risk building water systems, not just those lucky enough to live in or near a building where the owner has voluntarily adopted health and safety measures, will impact practices well beyond its borders.

All the best,

Chris Boyd
General Manager
Building Water Health Program
Legionella Risk Assessment / Water Safety Plans / Regulatory Compliance / Research
NSF International
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6 May 2020

Mr. Sadhu Johnston
City Manager
City of Vancouver
453 W 12th Avenue
Vancouver BC V5Y 1V4

Sent Via Email: sadhu.johnston@vancouver.ca

Dear Sadhu

Re: Proposed By-Law Amendments Related to Alternative Water Systems and Permitting Requirements for Certain Building Water Systems

The Environmental Operators Certification Program (EOCP) has been classifying facilities and certifying Operators in British Columbia and Yukon since 1966. When legislation related to wastewater was promulgated in 1993, and related to drinking water in 2003, the EOCP was named in both regulations to support compliance related to facility classification and Operator certification. Time and time again, the research proves that the best way to protect public health and the environment is by ensuring Operators in charge of water and wastewater systems are trained and certified.

The EOCP is pleased to collaborate with the City of Vancouver and Vancouver Coastal Health on the EOCP's new 'Building Water Systems' (BWS) certification program. The City of Vancouver's proposed bylaw amendments will enable these systems to be safer for the public by ensuring that the growth of pathogenic bacteria such as *Legionella pneumophila* in cooling towers is appropriately controlled, and water treatment chemicals are administered by appropriately trained Operators.

The EOCP will launch the BWS program in September 2020, and will include it within its Customer Relationship Manager whereby individuals interested in the certification can meet necessary prerequisites, apply for exams, gain certification upon successful completion of the exam, and complete the necessary continuing education requirements to maintain certification. There is a great deal of interest in this new certification, and the EOCP expects that it will be adopted by other cities in Canada and the United States.

If you need any further information or clarification of the aforementioned, please contact me at ksolanki@eocp.ca

With best regards,

A handwritten signature in blue ink, appearing to read "K. Solanki", is written over a light blue horizontal line.

Kalpna Solanki BSc MBA CPHI(C)
Chief Executive Officer

cc Jessie Adcock Patrick Ryan Lon LaClaire Daniel Roberge

* * * * *