Underoccupied Buildings: Risks to Remember

Occupying our Buildings Safely

MEMBER OF THE PINCHIN GROUP

TODAY'S PRESENTERS

David Muise, OHST

National Practice Leader, Indoor Environmental Quality

Adam Crawford, B.Sc., DOHS, CIH

National Practice Specialist, Legionella

SESSION GOALS

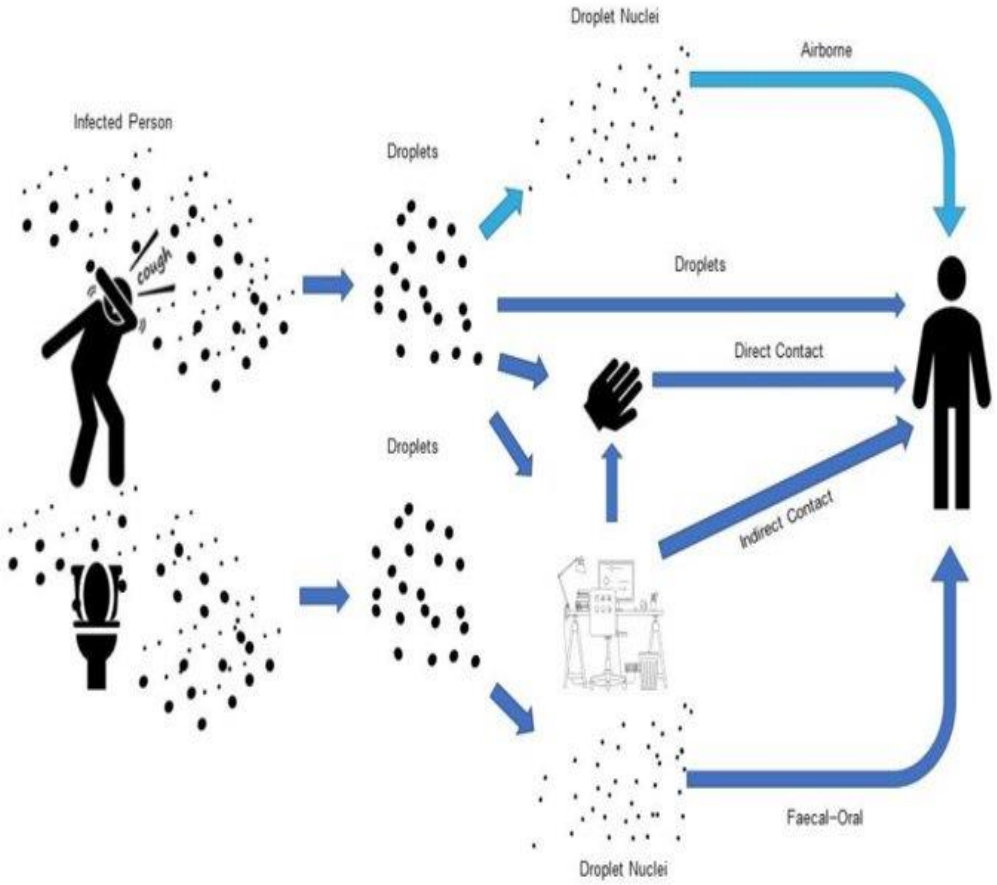
- Discuss from an environmental perspective, how buildings may have been effected from reduced capacity during COVID
- Why do we even care?
- Is Legionella a Risk?
- Is System Start up a Risk?
- Is Mould a Risk?
- What is the role of Maintenance?

Why should we care?

SOMETIMES THE REAL RISK DOESN'T MATTER

TRANSMISSION RISKS

- High Risk
- Droplet & Direct Contact
- Medium Risk
- Indirect Contact
- Low Risk
- Airborne / fecal-oral



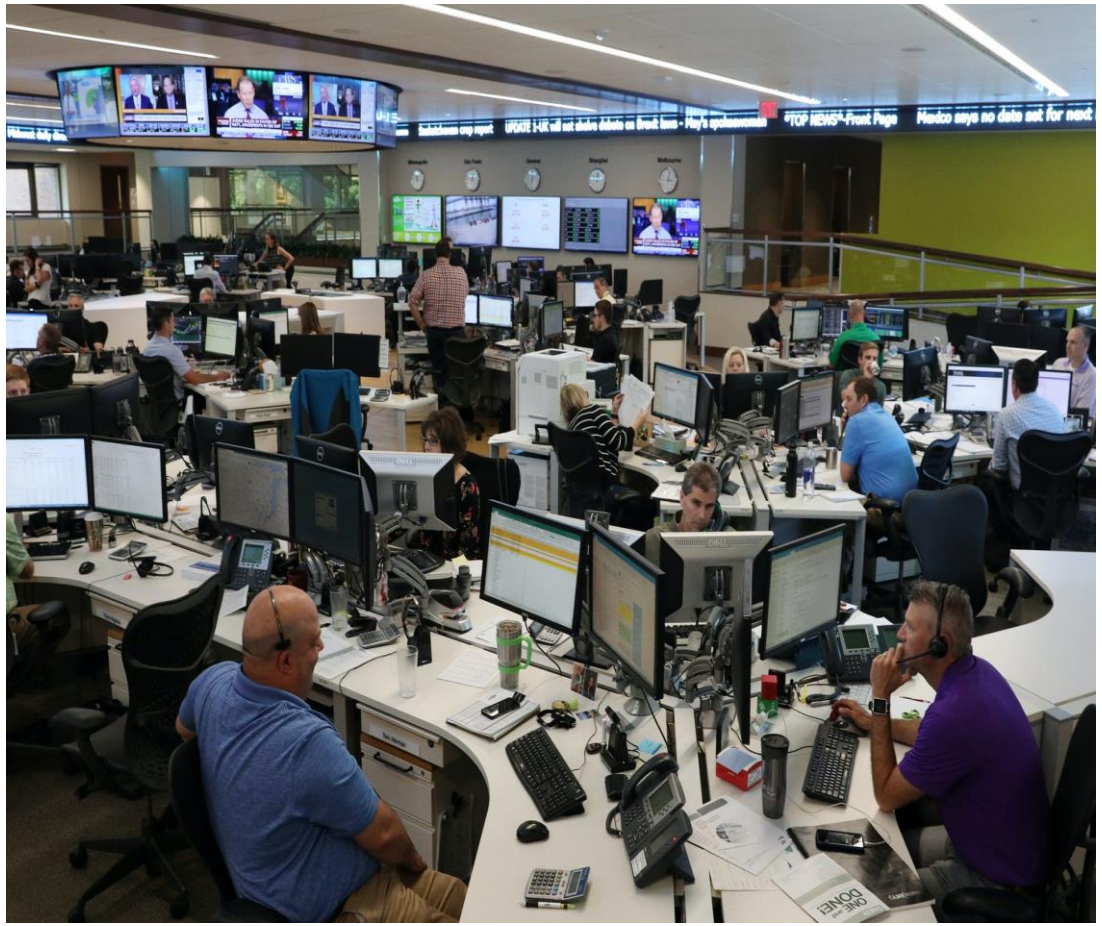
HOW DO YOU KNOW IT'S SAFE TO RE-OCCUPY?

- Unprecedented times
- Uncharted territory
- Evolving science
- How do you….

- Take all reasonable precautions?
- Demonstrate due diligence?

COVID-19 RE-OCCUPANCY PLAN

Underoccupied vs Unoccupied



MOST WILL BE IN BETWEEN (UNDEROCCUPIED)

CDC BREAKS HAZARDS INTO THREE CATEGORIES

- Mould
- Legionella
- Lead and Copper

Mould is it Lurking in Hidden Spaces

Maybe it’s Not so Hidden

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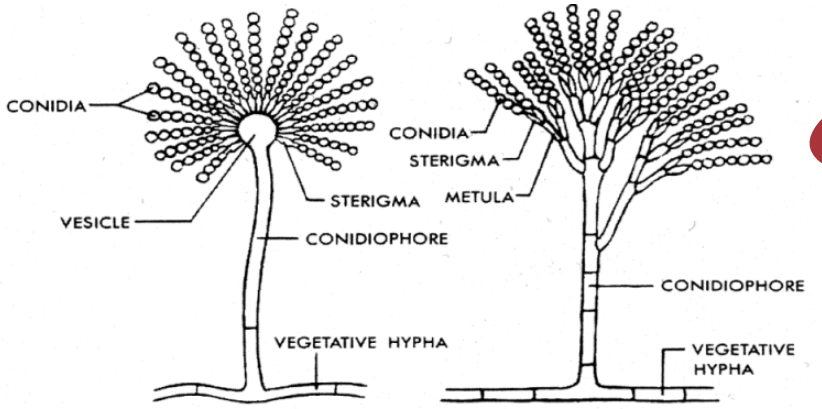
WHAT IS MOULD?



- Rapidly growing micro-organism, usually shallow, part of Fungi kingdom of living matter:
  - Yeast
  - Mould
  - Mushrooms
- Reproduce chiefly through spores
- Mould = microfungi = mildew

RAPID GROWTH

- Spores germinate rapidly. Hyphae begin to be formed within 12 hours of wetting. Spores typically formed within 3-10 days.

- Guidelines give 24-48 hours to dry out, otherwise must suspect mould growth.

6 days after water loss:

GROWTH SURFACES FOR MOULD IN BUILDINGS

Organic substrate with suitable nutrients:

- Cellulose:
  - Drywall
  - Wood
  - Ceiling tiles
  - Cardboard, building paper
  - Paper
  - Pipe wrap
- Soil in carpets
- Soil in crawlspaces
- Textiles
- Plastics
- Dust on inorganic surfaces
- Many, many other surfaces

ROOF LEAK MOULD

PLUMBING LEAK MOULD

CONDENSATION MOULD

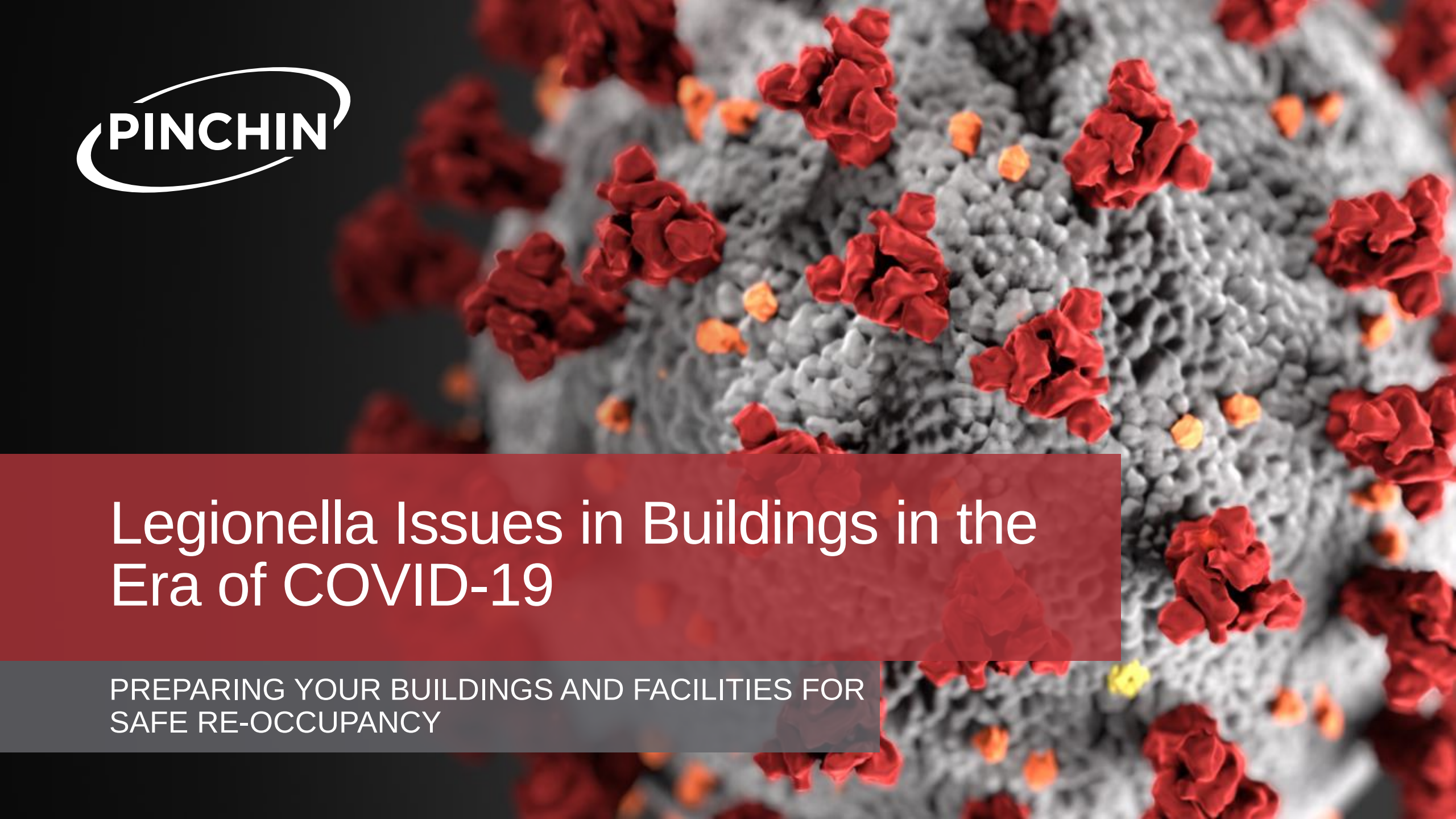
THERMAL BRIDGING

SURFACE MOULD

80% OF MOULD GROWTH WILL BE HIDDEN

- Walls, ceilings, crawlspaces, attics, but surface mould often not noted.
- Can still contribute spores to the occupied space if pathways present. Significance depends on location.

Water Quality Should we be testing for Legionella?



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Legionella Issues in Buildings in the Era of COVID-19

PREPARING YOUR BUILDINGS AND FACILITIES FOR SAFE RE-OCCUPANCY

ORIGIN OF LEGIONNAIRES' DISEASE

- 1976 in Philadelphia, American Legion Convention, Bellevue Hotel
- 221 cases of unusual respiratory disease, headaches, high fever, difficulty breathing
- 35% hospitalized, 34 deaths
- Centre for Disease Control identified a bacteria, *Legionella pneumophila*
- Source was hotel cooling tower

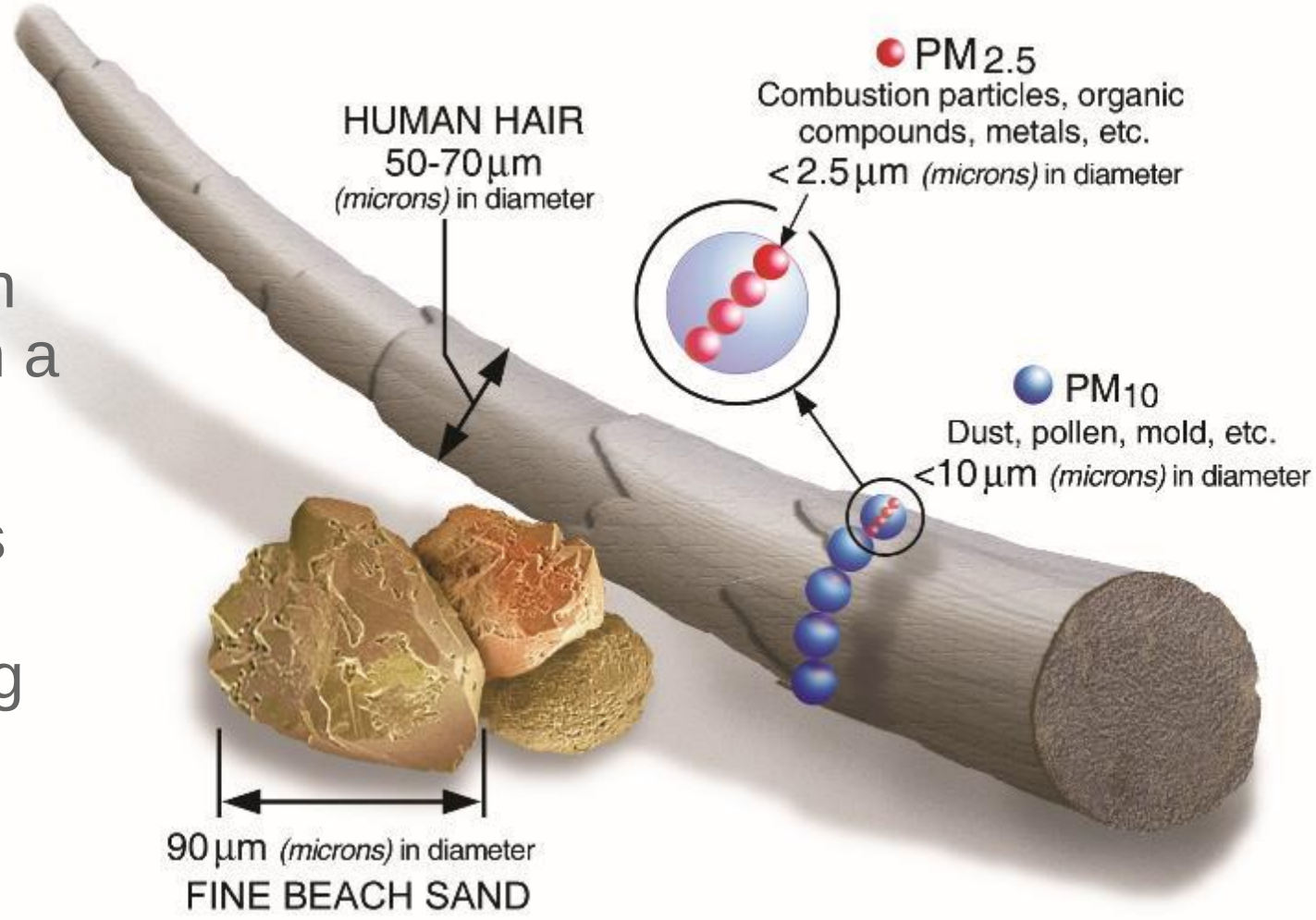
WHAT IS LEGIONNAIRES' DISEASE?

- Bacterial pneumonia
- Caused by inhalation of aerosols containing Legionella bacteria
- Disease develops within 2 to 10 days of exposure
- Flu-like symptoms, chest pains, high fever, pneumonia, death
- Can be treated effectively, if caught early
- Fatality rate of approximately 10% to 15%
- A Legionella infection is not contagious
- 6,000 Legionnaires' disease cases are reported each year in the U.S.
- The most recent U.S. population-based study estimated that 8,000-18,000 people are hospitalized each year with Legionnaires' disease. Because patients with Pontiac Fever usually get better on their own, cases may not be routinely recognized or reported

RISK FACTORS

ROUTES OF EXPOSURE

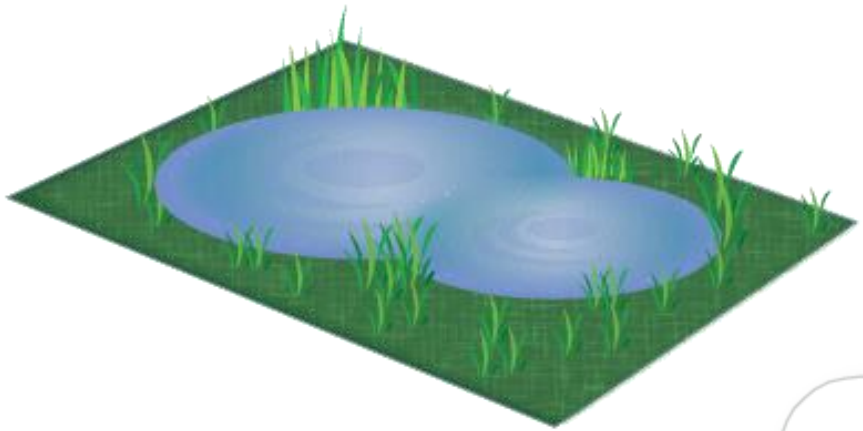
- Contaminated water presents greatest risk when airborne and aerosolized in a **size of 1 to 5** micrometers
- This size can be inhaled as an aerosol (fine water droplet) deeply into the lung



BACTERIA RESPONSIBLE

- Legionella can be found in all surface water such as lakes, streams etc.
- *Legionella pneumophila* is one species of the family of Legionella which is the causative species of more than 90% of reported cases
- *Legionella pneumophila* has several strains, Serogroups
  - **Serogroup 1**, most frequently associated with Legionnaires' disease
  - **Serogroup 4 and 6** are the second and third types linked to Legionnaires' disease

CHAIN OF TRANSMISSION



Water Supplies

Reservoir

Aerosol

Infected Host

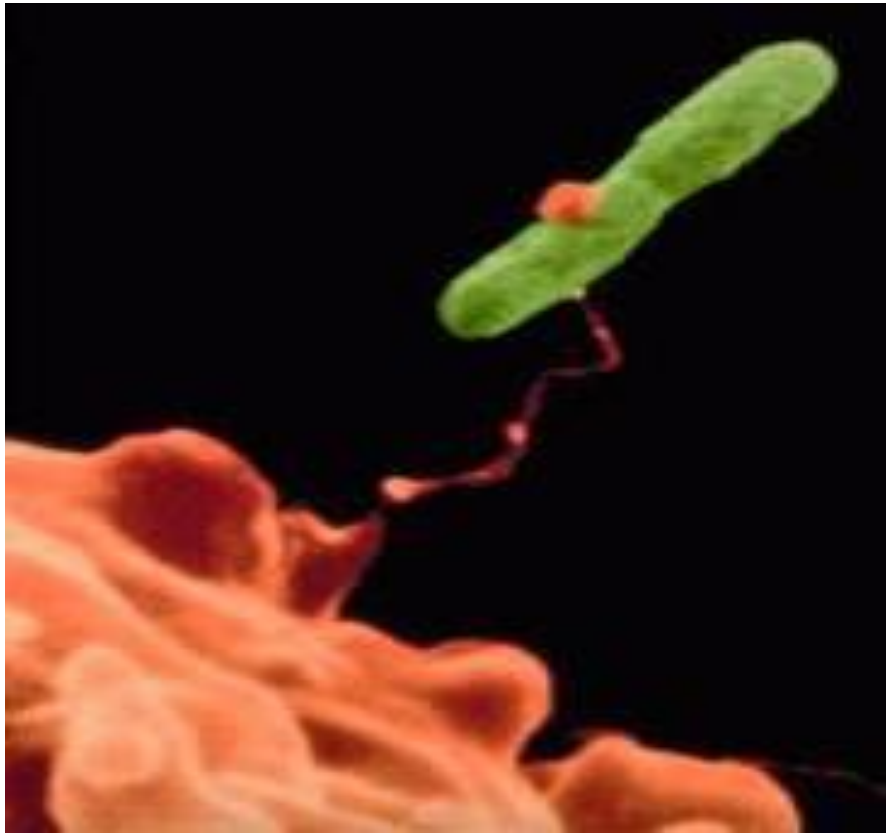
Host

INFLUENCE OF WATER TEMPERATURE

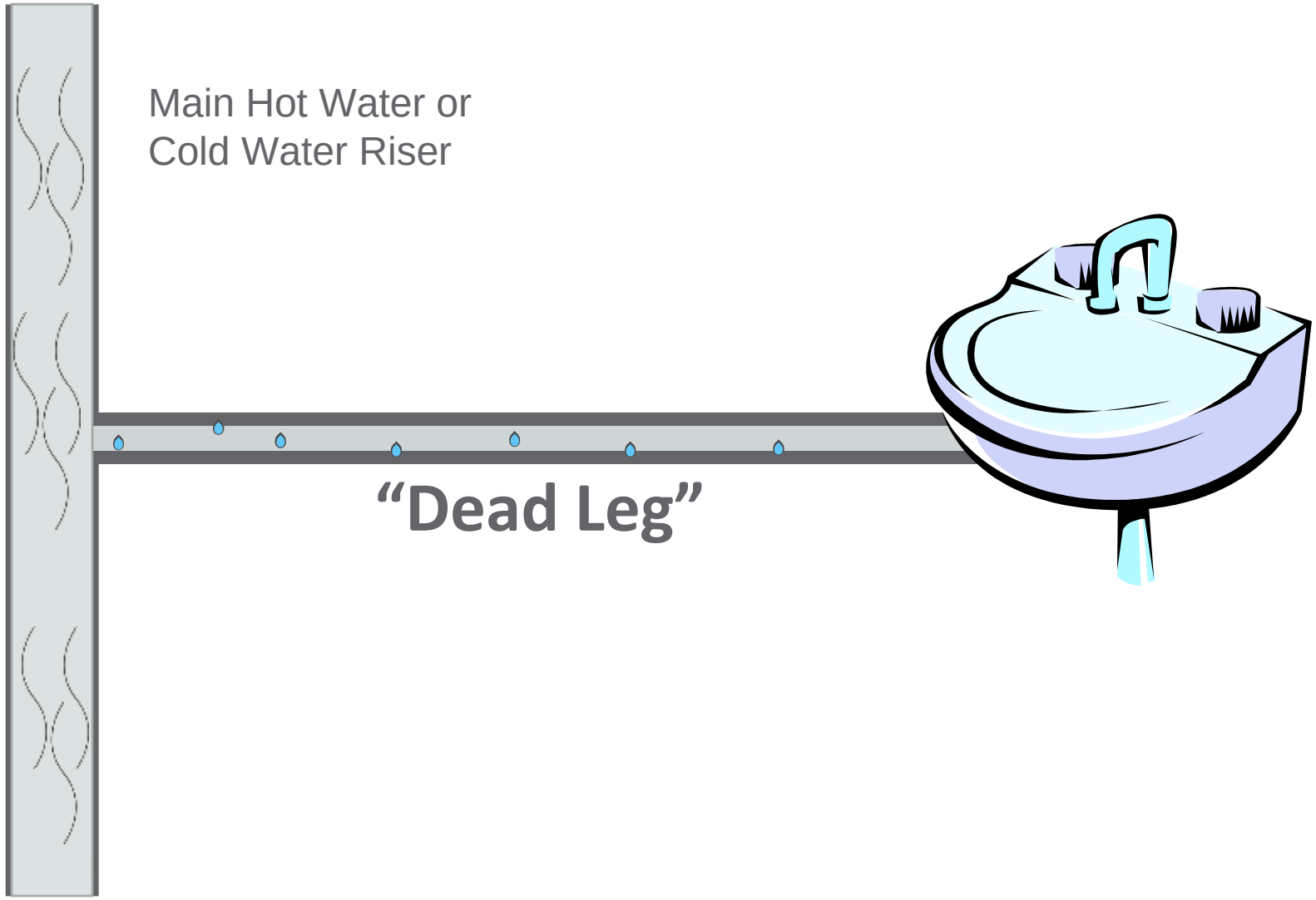
- Legionella growth range 20ºC to 49ºC
- As water temperatures increases above 49ºC, growth slows and bacteria begin to die with rapid death at or above 70ºC
- **Ideal growth range is 30ºC to 42ºC**

BIOFILM

- Primary contributor to outbreaks
- Protects bacteria
- Can release large quantities of Legionella if disturbed
- Particularly an issue on corroded surfaces e.g., domestic hot & cold water systems



DEAD LEG



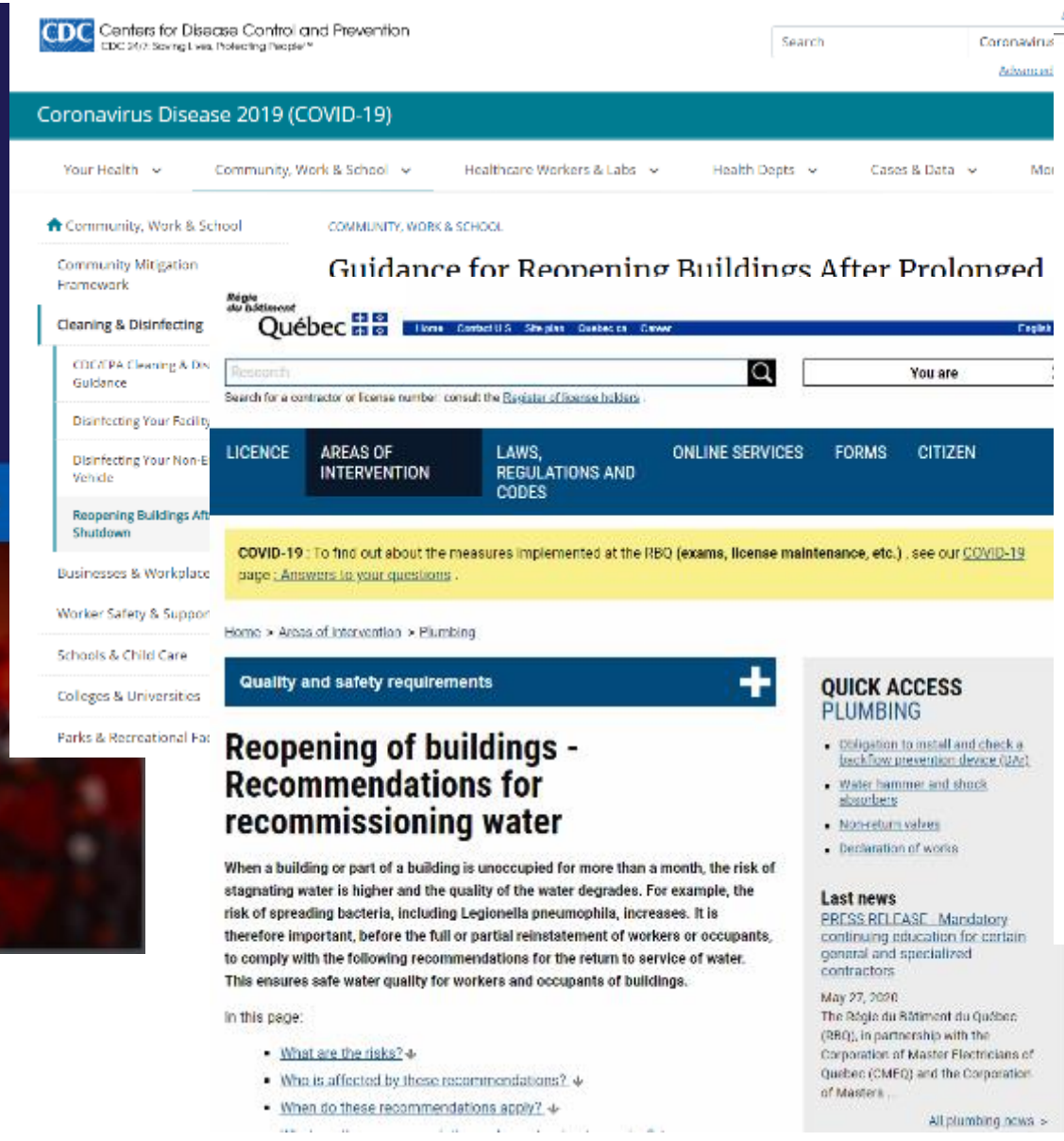
DRINKING WATER

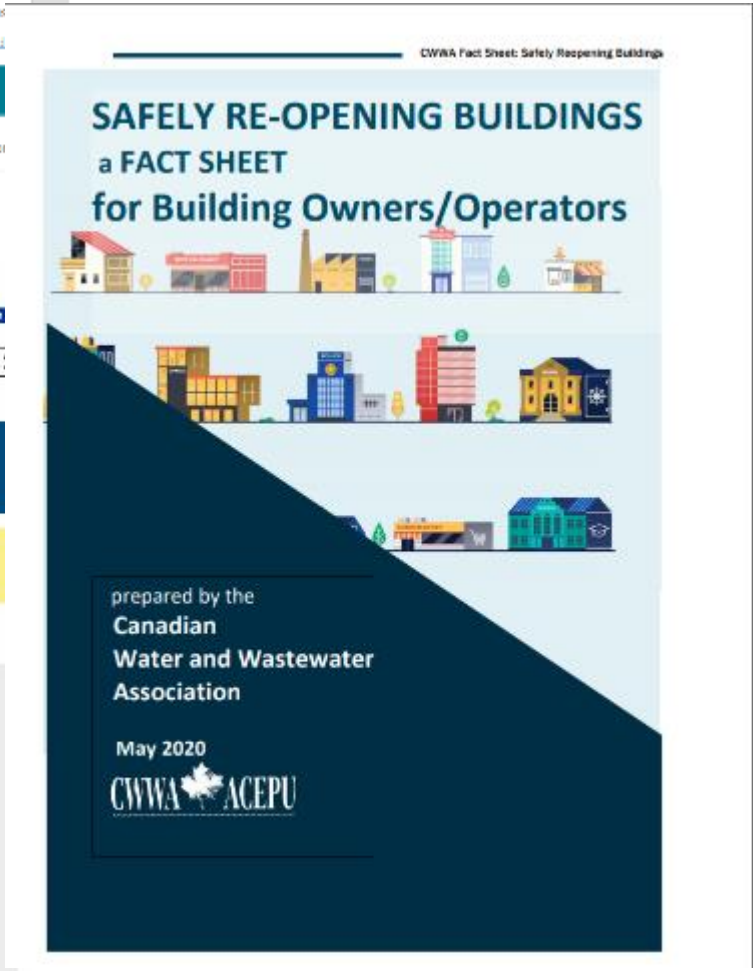
- Don’t forget about potential drinking water issues related to stagnant water
    - Lead and other metals
    - Bacterial contamination

RECENT QUESTIONS

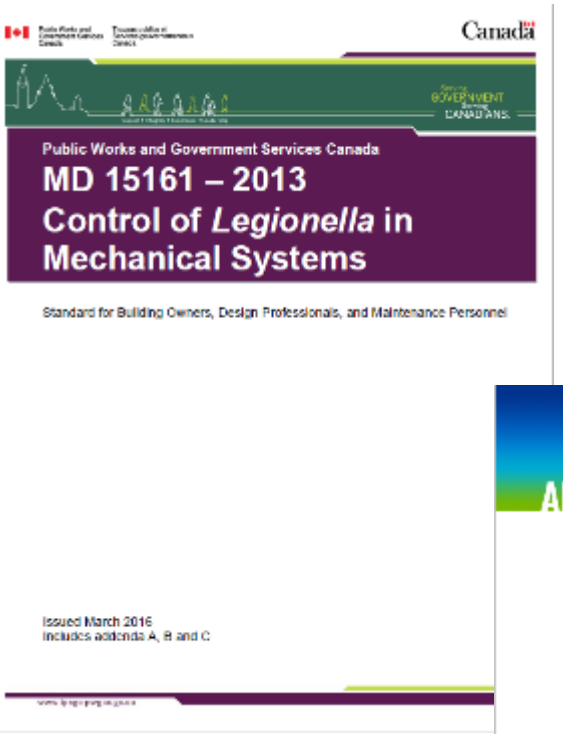
- Do I have Legionella bacteria in my building?
- My building has been vacant or had low occupancy due to the ongoing pandemic, what do I need to do?
- How do I flush my building?
- Do I need to do any testing?
- What criteria do I compare the results to?

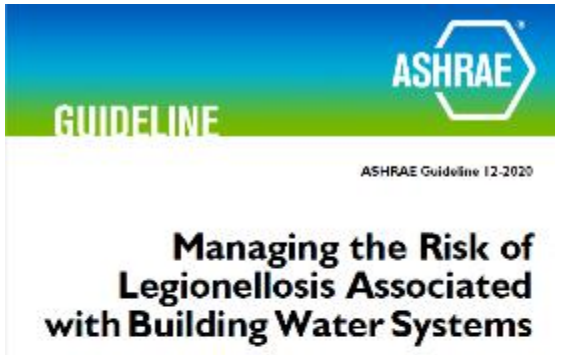
FLUSHING GUIDANCE

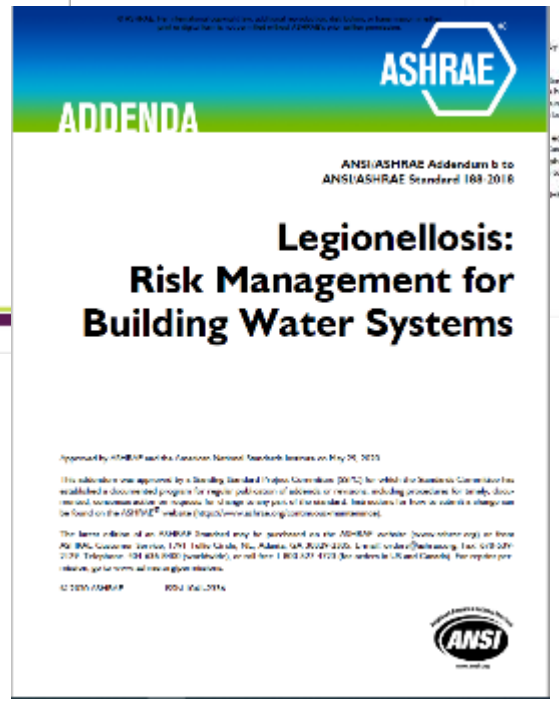


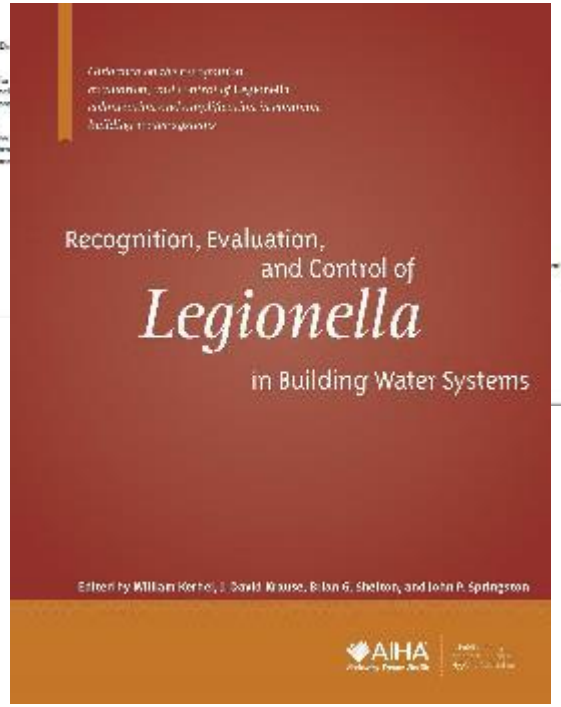


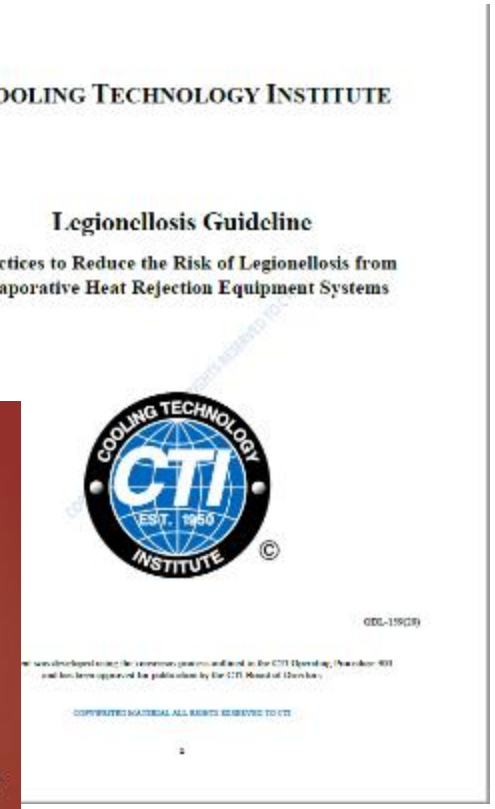
GUIDELINES AND STANDARDS





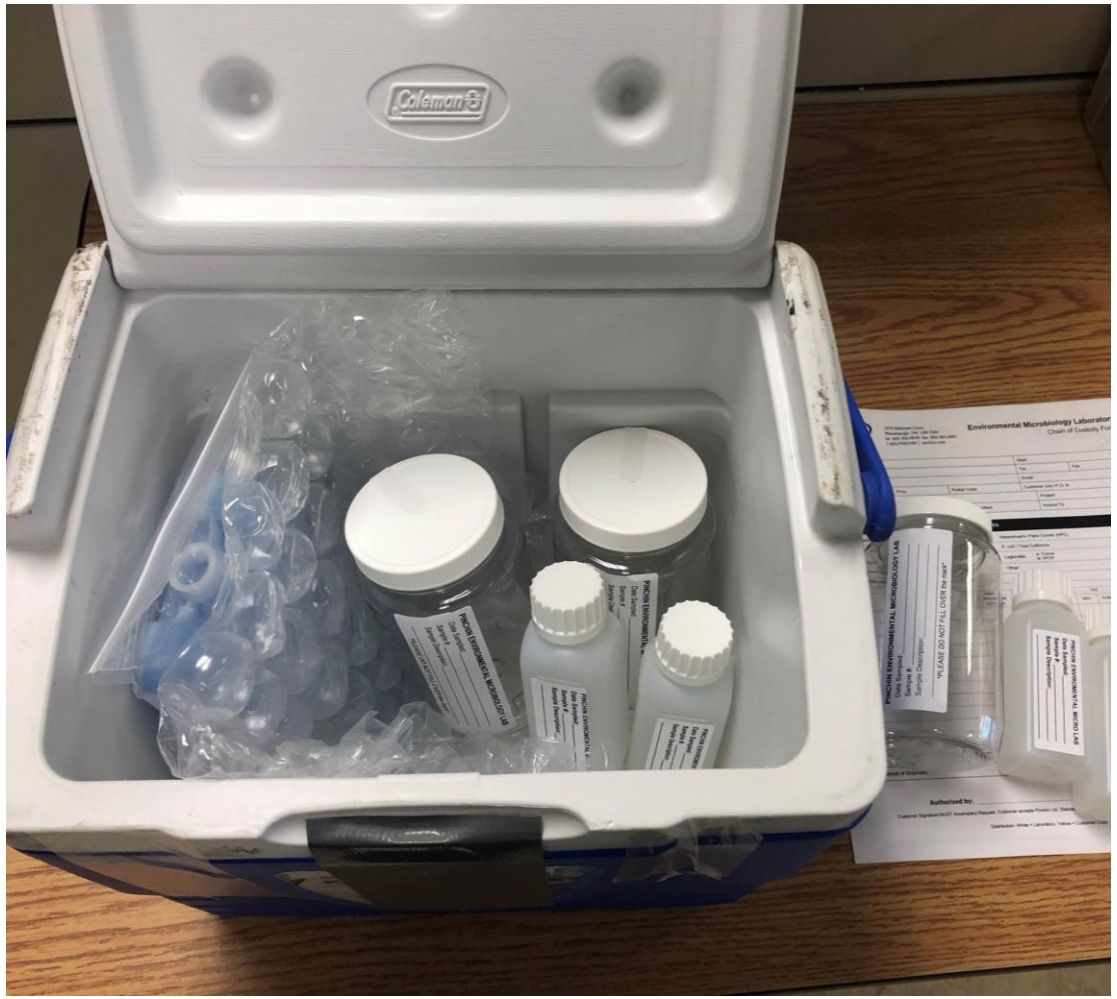






SAMPLE TRANSIT TO LABORATORY

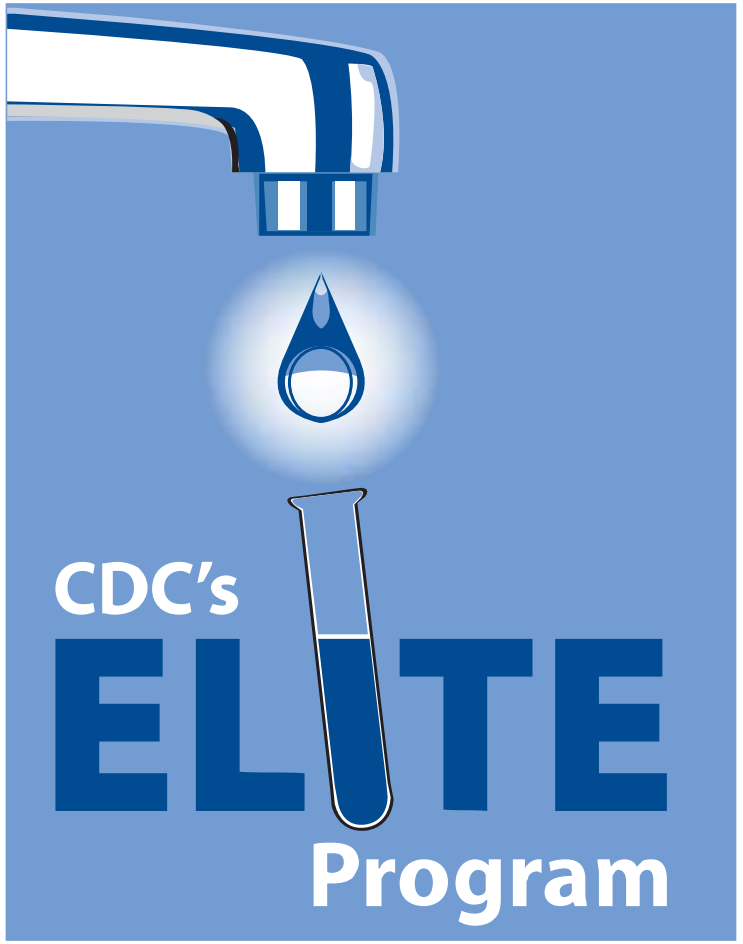
- Use sterile bottles (min. 100 ml for cooling tower, 500 ml for other samples)
- Pack in insulated containers/coolers with freezer packs
- Complete chain of custody documents
- Deliver/courier to laboratory within 48 hours of collection



LABORATORY SELECTION

Select laboratory with demonstrated skills on environmental sample analysis

- ISO 17025 compliant and accredited for Legionella analysis
- CDC program certification for the analysis of Legionella bacteria by **E**nvironmental **L**egionella **I**solation **T**echniques **E**valuation (ELITE)
- Laboratory which is proactive - gives advance notice for presence of high counts of Legionella



LEGIONELLA ANALYTICAL METHODS

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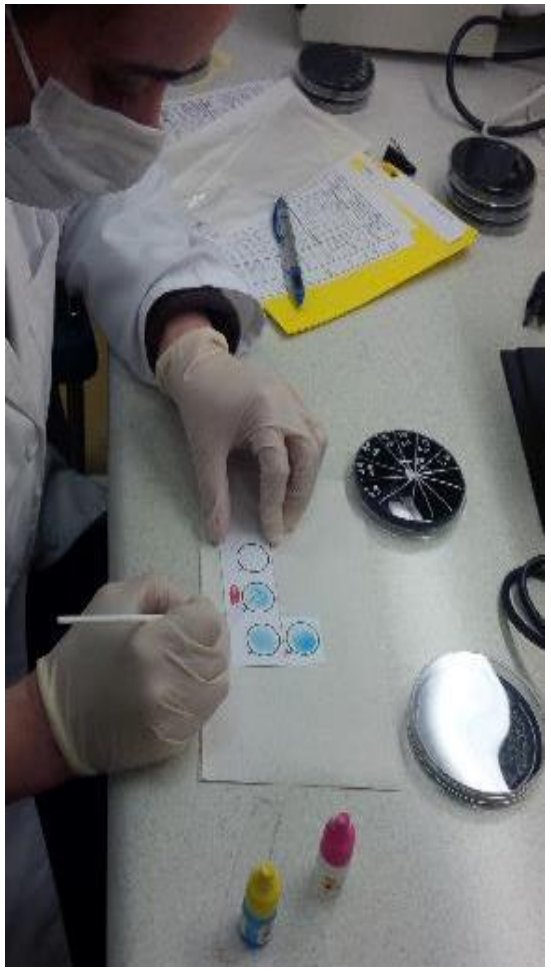
Table 1. Analytical methods when dealing with Legionella

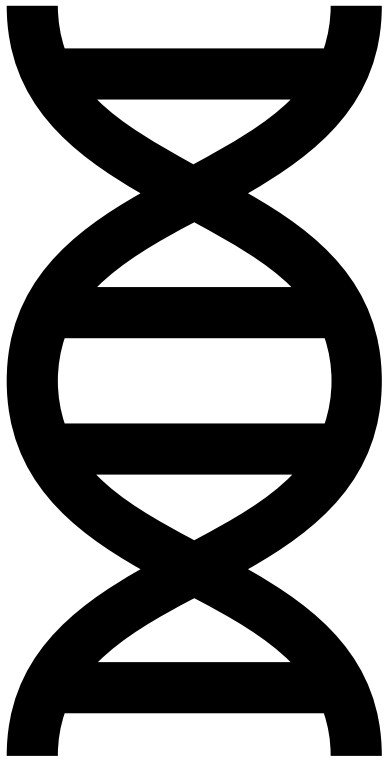
		
Culturing Methods • ISO 11731 - most widely used, CDC, AFNOR/Quebec	**Molecular Methods** • qPCR analysis – ISO 12869 method	**DIY Test Kits** • Spartan Cube, Nephros PluraPath, Accepta, LegionellaFast

WHICH METHOD TO CHOOSE FOR SAMPLES FOLLOWING LOCKDOWN?



- Go for the “Gold Standard” **Culturing** - most widely used and recommended method worldwide
- Identifies and quantifies **viable** colonies of *Legionella pneumophila* (and its serogroups), other Legionella species
- Suitable for all water (faucets, showers, fountains) and cooling tower samples
- Results within 7 -10 days, preliminary ones as early as the 5th day

ANALYTICAL METHODS QPCR FOR LEGIONELLA



- When to use?
  - Monitoring efficiency of disinfection
  - Investigating an outbreak of Legionnaires disease
  - Running cooling towers on emergency mode
- Fast (results in 4 hours) efficient way of detecting and quantifying *Legionella pneumophila* or Legionella spp.
- Drawback - detects both viable and nonviable Legionella DNA, inhibition issues due to presence of other DNA and residual chemicals

SUMMARY

- Do your due diligence: maintain and monitor building water systems to bring down the frequency of detecting Legionella
- Sample and test water systems for Legionella before reopening buildings
- Go for culture method of analysis - gives you all the information you need to reopen safely
- Use qPCR method to monitor efficacy of decontamination

Systems: Safe vs Unsafe Startup

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What systems should we be most concerned with at start up?

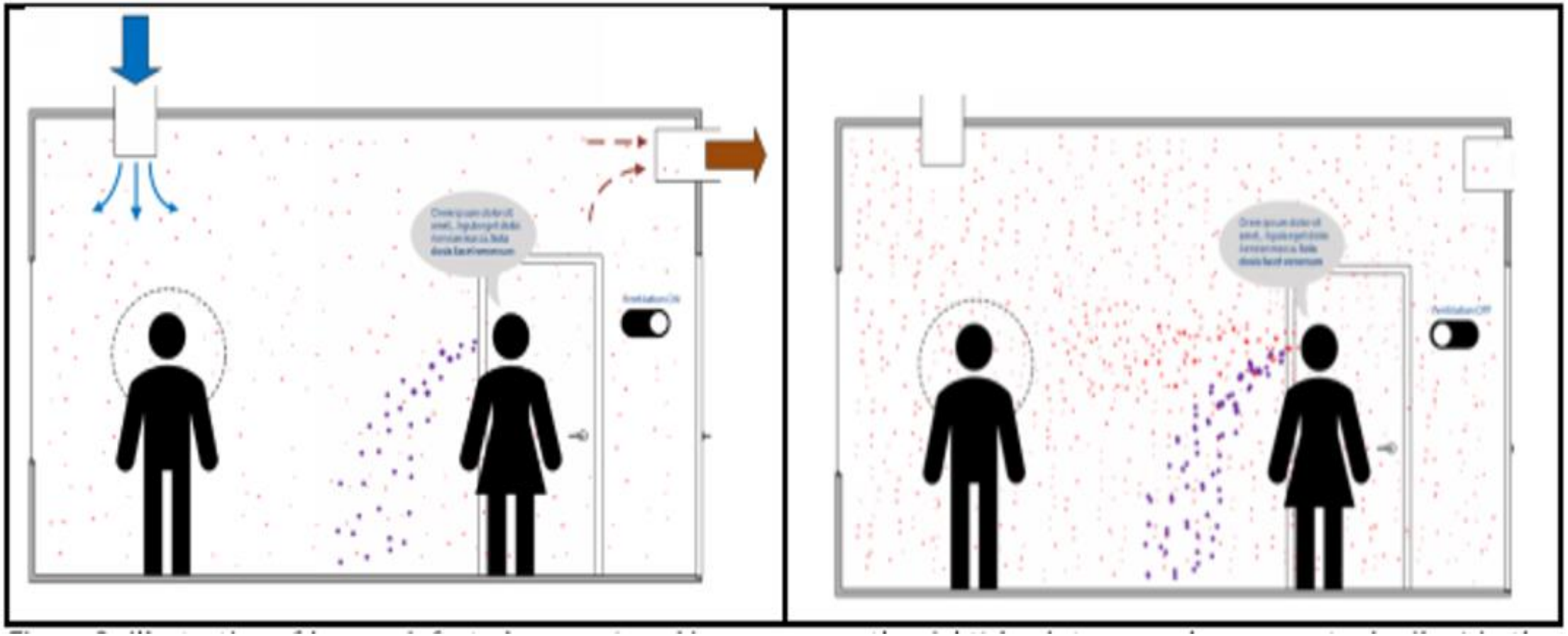
HVAC AND POTABLE WATER

HVAC

ASHRAE STATEMENT

- **ASHRAE's statement on operation of heating, ventilating, and air-conditioning systems to reduce SARS-CoV-2/COVID-19 transmission**
- *Ventilation and filtration provided by heating, ventilating, and air-conditioning systems can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air.....*
- ***HVAC filters, along with other strategies, help to reduce virus transmission while removing other air contaminants that may have health effects.***

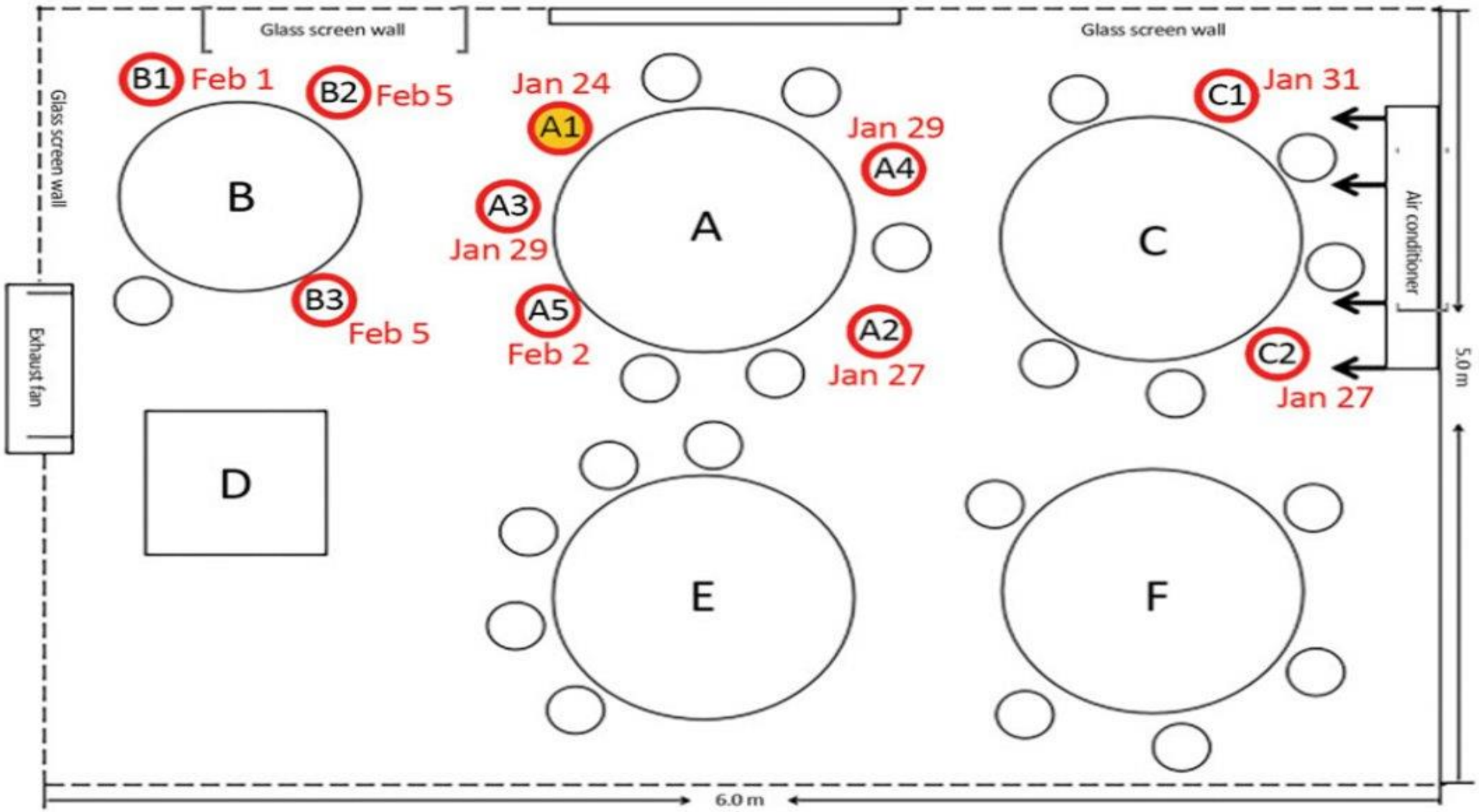
POOR VENTILATION AND HIGH INFECTION RATES



HVAC AND COVID

- What should we be knowledgeable about when it comes to using HVAC to reduce COVID risk?
  - Drafts
  - Filtration
  - Relative Humidity
  - Maintenance
  - Air Exchange

WHY ARE DRAFTS IMPORTANT



HOW DOES THIS APPLY TO OUR WORLD

Desk Fan
AC Unit (wall)
HVAC Balancing

FILTRATION

- ASHRAE states to upgrade filters to a MERV 13 or better if possible. If not then the highest MERV Rating the system can handle.

MONITOR FILTER PERFORMANCE

REAL-TIME MONITORING SOLUTION

Elements to monitor (per ASHRAE):

Relative Humidity - RH

Levels between 40%-60% airborne spread of infectious particles and decrease infectivity of viruses.

HVAC BEST PRACTICE PRIOR TO START-UP

- Visually inspect all Equipment for:
  - Leaks
  - Dust
  - Dirt accumulation
  - Damaged insulation
  - Mould on coils
  - Mould in drain pans, etc.
- Check outdoor air intakes for damage and/or obstructions
- Ensure outdoor and indoor dampers are working fine
- Inspect heat recovery equipment to be sure that leakages are under control
- Adjust fan coil settings to operate so that fans are continuously on

HVAC BEST PRACTICE CONT.

Carry out all regularly scheduled maintenance activities

POTABLE WATER SYSTEM START UP

CORROSION IN POTABLE WATER SYSTEMS
HOW DOES THIS HAPPEN?

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Guidance for Reopening Buildings After Prolonged Shutdown or Reduced Operation

Ensure the safety of your occupants and building water system and devices

https://www.cdc.gov/coronavirus/2019-ncov/php/building-water-system.html

BUILDING MAINTENANCE:

How critical is it really in an empty building?

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PREVENTATIVE MAINTENANCE

The preventative Maintenance Program may not have to be as robust as when the building was at 100% capacity

BUT

At a minimum the systems talked about today need to be addressed on an ongoing basis

LIABILITY

- There will always be liability in not addressing conditions that could potentially cause harm to the building user.
- Each province will have its own general duty clause in their Health and Safety Act that is worded in some way and; requires employers to keep the workplace safe from recognized hazards.

THANK-YOU. QUESTIONS?

David Muise
dmuise@pinchin.com

Adam Crawford
acrawford@pinchin.com