Investigating Legionnaires' disease

Legionella pneumophila cases

The Investigation

All water systems identified at the exposure location, and in the vicinity, should be investigated and sampled if deemed to be potential sources of infection. Sampling may not be necessary if the premises routinely conducts sampling and can demonstrate results were clear prior to/during the incubation period, or the system is routinely and well maintained with no recent issues or faults. It should be noted that even if the patient did not have direct contact with a potential source, the transmission of the bacteria is **airborne** and so it should still be investigated.

Potential Sources

Types of water source/systems that should be investigated include any that may create sprays or mists, including (but not limited to);

- Domestic warm-water systems, this includes properties connected to scheme water.
    - E.g., showerheads, handwash basins or reticulation.
- Humidifiers, CPAP machines or nebulisers.
- Water systems that allow water to stagnate in lines, especially those with flexible hoses.
    - E.g., fire sprinkler systems, eye washes or dental water lines.
    - This may also apply to residences that have been vacant such as mining camps, caravans, or holiday homes.
- Cooling towers, evaporative air conditioners, condensers, or coolers, particularly commercial sized systems.
- Carwashes and equipment likely to generate aerosols, particularly those using recycled water.
    - E.g., high pressure hose, fountains.
- Misting systems used with outdoor fans or in supermarket vegetable sections.
- Ice machines.
- Irrigation systems, particularly those connected to bore or rainwater.
- Hydrotherapy pools and spas.

Sampling

The sampling procedure is similar to routine bacteriological samples taken during monitoring of aquatic facilities or drinking water, there are some minor variations, i.e.

1. Ensure personal safety during sampling.
   - Avoid generating aerosols.
   - Run taps gently to reduce splashing.
   - Wear gloves and a mask if you suspect the water is highly contaminated.
   - Individuals at increased risk should not be involved in sampling.
2. Pre and post flush samples may be required to demonstrate the source of the contamination (for example, the shower head fitting or the water supply).
   - Take an initial sample from the outlet, and then allow the water to run for 1-2 minutes before taking a second sample.
3. A water sample may not be possible from certain sources, if that is the case then you may consider using swabs. Please note that the swab testing protocol is not NATA accredited, so water samples are preferred.

Sampling Equipment

- 250mL Sterile Bacteriological Water Sample Bottles – with thiosulphate added.
- Heatproof gloves (e.g., rubber dishwashing gloves) may be needed for taking hot water samples.
- Esky with ice-bricks
- Path West Sample Form
  - Site code: 6, i.e., XX6-999 (XX being the Local Government prefix).

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Results

The following tables have been adapted from AS/NZS 3666.3 and can be used to determine the level of remediation required.

Table 1. Control strategies for the presence of *Legionella*

Test Result (cfu/mL) ***Legionella***	**Required Remediation**
Not detected (<10)	• System under control, maintain monitoring and treatment program
Detected (≥10)	• Immediate decontamination • Review control strategies • Retest within 3-7 days, and assess if further remediation is necessary

Table 2. Control strategies for the presence of heterotrophic microorganisms

Test Result (cfu/mL) HPC (heterotrophic plate count)	**Required Remediation**
<100,000	• System under control, maintain monitoring and treatment program
≥100,000	• Immediate decontamination • Review control strategies • Retest within 3-7 days, and assess if further remediation is necessary

NB: A detection of "Legionella species (not L. pneumophila)" may mask the presence of L. pneumophila, and highlights that the conditions are conducive to bacterial growth. We recommend that remediation is undertaken within residential properties, however, the owner is not required to do this as the legislation does not apply to Class 1, Class 2 or Class 10 buildings.

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Decontamination and Remediation

Recommended decontamination protocols for cooling towers and warm water systems can be found here. A property owner may wish to hire a plumber to conduct remediation, particularly for complex systems, such as a carwash. In addition to decontamination, there are other steps individuals can take to reduce the risk of exposure such as;

- Replacing outlets e.g., taps, showerheads, or mixer tap aerators.
- Deep cleaning outlets by soaking them in boiling water or disinfectant e.g., showerheads, mixer taps.
- Changing showerheads to a type without a flexible hose or without aeration (low-flow shower heads).
- Ensuring outlets are operated weekly e.g., workplace emergency shower & eyewash stations.
- Ensuring the hot water system temperature is set to the maximum.
- Emptying the system to clean it regularly e.g., a water storage tank, humidifiers.
- Servicing systems routinely e.g., evaporative air conditioners.
- Implementing a cleaning and maintenance schedule in line with manufacturers specifications e.g., water misting systems.
- Setting irrigation/sprinkler systems to run overnight rather than during the day.
- Appropriately maintaining a spa/hydropool's pH and Chlorine.
- Appropriately treating rainwater and bore water systems.

Further Information

Please contact WA Health's Biological & Environmental Health Hazards' Applied Unit by email EH.Legionnaires@health.wa.gov.au or phone (08) 9285 5500, for further assistance with the investigation

For further information regarding sampling and to obtain equipment such as sample bottles or swabs, please contact PathWest Waters Laboratory info.pathwest@health.wa.gov.au

If the recommended decontamination and remediation steps within this document do not resolve the issue, further advice may be sought from WA Health's Water Unit, on 9222 2000

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