Workplace Health Bulletin

Department of Labour
TE TARI MAHI

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Prevention of Legionnaires' Disease — Employers' Responsibilities

Introduction

Legionnaires' Disease is a lung infection (a type of pneumonia) that can be either mild or severe enough to cause death. In its mild form, it is called 'Pontiac fever'. The disease got its name in 1976 when an outbreak of pneumonia occurred in people attending an American Legion Convention in Philadelphia.

Legionnaires' Disease is caused by a bacteria called *Legionella*. These bacteria are usually found in water and soils, depending on the species. In New Zealand:

- *Legionella pneumophila* is the most common cause of the illness connected with hot water systems and cooling towers; and
- *Legionella longbeachae* is the next most common and is found in soils, compost, and potting mixes.

The bacteria *Legionella* can grow on wet surfaces of the cooling units that are part of some building air-conditioning systems and other industrial cooling equipment and scrubbers. This type of plant could include cooling units in the following industries:

- Food processing;
- Plastic moulding machinery;
- Plants that operate emission control scrubbers to prevent the release of environmental air contaminants;
- Cooling units for computer rooms or telephone exchanges; and
- Supermarket misting units.

Legionella can also grow in pools of water, and its growth is more rapid the higher the temperature of the water. It will not grow in water over 60 degrees centigrade.

In certain circumstances *Legionella* can become airborne and be ejected out of a cooling tower or scrubber in water droplets. The airborne bacteria can be dispersed by the wind to affect members of the public outside a building, or be captured by poorly positioned air intakes and affect employees through an air-conditioning system.

Some people are more at risk than others. Adults over the age of 50, smokers, people prone to lung disease and other people with low immunity are particularly vulnerable.

Legionnaires' Disease is treated with antibiotics.

Legionnaires' Disease is not contagious and outbreaks are localised. In New Zealand, Legionnaires' Disease is a notifiable disease under the Health Act 1956. This means that a doctor is required to notify the Medical Officer of Health at the Public Health Service if he/she suspects a patient suffers from, or is diagnosed with, Legionnaires' Disease.

The actions needed to prevent the growth of the bacteria are relatively simple.

This means that there are clear responsibilities for building owners, industrial cooling plant operators and employers of people who work in buildings with cooling towers in preventing the disease. These are listed at the end of this bulletin.

Comprehensive Codes of Practice e.g: the New Zealand *Guidelines for the Control of Legionellosis*[1] and the more recent NSW *Code of Practice for the Control of Legionnaires' Disease*[2] and Standards[3] describe the design, operation and maintenance and monitoring of air-conditioning systems.

The general approach to preventing Legionnaire's Disease

Preventing Legionnaires Disease is more likely if you:

1 Choose a system that minimises the opportunity for the bacteria to grow:
   - Design or select plant elements that are easy to clean and which minimise bacterial growth[4];
   - Select processes that allow minimal opportunities for bacterial growth (such as using a hot water system with mixing valves instead of a tepid water storage system);
   - Design components to avoid sludge build up (*Legionella* grow better in sludge);
   - Avoid dead-legs in pipework (so the bacteria cannot grow there);
   - Use drift eliminators (these are mechanical devices that prevent most droplets leaving a cooling tower);
   - Provide easy access for maintenance and cleaning;
   - Replace inefficient equipment;
   - Use a continuously operating disinfection process to kill any bacteria (see 3 below);

- Position air intakes so that any *Legionella* ejected from a cooling tower cannot be captured by them;
- Use an air-cooled system rather than a cooling tower (the absence of water eliminates opportunity for *Legionella* to grow[5]);
- Use a closed circuit system instead of an open circuit (this approach eliminates potential growth surfaces for *Legionella*).

2 Keep water-handling systems clean.

3 Treat the water with chemicals. Specialist advice from a water treatment company is again needed on the following matters:

- The dosing equipment – its selection and operation;
- Bleed off techniques (to avoid the accumulation of chemical residues);
- The choice of biocides (effectiveness vs. ecotoxicity);
- Water sampling and testing (regular quality control - in accordance with AS/NZS 3666.3: 2000 - *Performance based maintenance of cooling water systems*); and
- Routine cleaning.

4 Use the approach outlined in AS/NZS 3666.3 for monitoring water quality and interpreting the results of the monitoring. This standard also lists the actions that should be taken when these results indicate an increase of microbial growth in the water.

Legal status

These four points – and the individual bullet points in them – outline steps that it may be practicable to take in certain circumstances. It is up to the employer to decide which ones should be taken, given the risk posed in each different circumstance, by the hazards addressed or implied by each point.

When employers consider the age and condition of their cooling plants there may come a point where system renewal is indicated. This will require judgement on the part of the employer.

Specification of equipment/plant that avoids the use of wet cooling towers should be considered when planning new facilities.

Advice and information from specialists may be needed to make these judgements and choices. Contact the Institute of Refrigeration, Heating and Air Conditioning Engineers, New Zealand for a list of specialists in air conditioning and cooling. See www.irhace.org.nz.

Specific Practical Actions – for Building and Plant Owners/Operators and Employers

Owners/operators of buildings with mechanical ventilation systems, operators of cooling plant or equipment and employers will become involved in this issue when they commission buildings, purchase cooling equipment or select building space for occupation by their employees.

They should:

1. Ask for a condition report or specification on the safety and health of the air- conditioning system or cooling equipment.

   For general responsibilities of building owners under the Building Act refer to:

   - The Department of Building and Housing: www.dbh.govt.nz, in particular: http://www.building.dbh.govt.nz/e/publish/bc-28.shtml
   - For specific information about ventilation standards see: www.building.dbh.govt.nz/e/uploads/g4.pdf

2. Check the maintenance programme for the system/equipment.
3. Check water quality periodically. The final check for safety is to test for the presence of microbial growth in cooling water. This means that:

   - Building owners should ensure they receive monthly reports on water quality and that they are able to interpret or have interpreted the results (see AS/NZS 3666.3 and the New Zealand Building Code). This will enable employers to demonstrate ongoing compliance to local authorities.
   - Employers should satisfy themselves that the air-conditioning system remains safe - perhaps by seeking a copy of the monthly water quality report or requiring the building owner to report by exception.
   - Operators of cooling plant in industry should satisfy themselves that the cooling equipment remains safe. Since there are many similarities between air-conditioning units and cooling towers, monthly sampling and reporting of water quality is recommended.

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[1] Published by the Public Health Commission, Wellington, 1995. Available from the Ministry of Health.

[2] Download from: http://www.cityofsydney.nsw.gov.au/Business/documents/Health/LegionairresCodeofPractice.pdf)

[3] AS/NZS 3666. **Part 1: 2002**. *Air-handling and water systems of buildings - Microbial control - Design, installation and commissioning*. **Part 2: 2002.** *Air-handling and water systems of buildings - Microbial control - Operation and maintenance*. **Part 3: 2000.** *Air-handling and water systems of buildings - Microbial control - Performance-based maintenance of cooling systems*.

[4] AS 2345: 1992 *Dezincification resistance of copper alloys*

AS/NZS 4020: 2002 *Products for use in contact with drinking water*

[5] The Building Code suggests that air intakes should be 'as far away as practicable' from cooling towers.