WORKSAFE
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HSWA

QUICK GUIDE

October 2022

Preventing Legionnaires' disease from cooling towers and evaporative condensers

This quick guide provides advice to persons conducting a business or undertaking (PCBUs) who have cooling towers or evaporative condensers (cooling plant).

This includes (but is not limited to) cooling plant that is part of: any building air conditioning system, commercial premises with refrigeration plant (for example, bulk storage of chilled or frozen food), or industrial process.

Legionella bacteria grow on the wet surfaces of cooling towers, evaporative condensers (cooling plant) and scrubbers, and can cause a pneumonia called Legionnaires' disease. Legionnaires' disease is often severe and can be fatal. Those at higher risk of becoming infected are adults over 50, males, smokers, people with lung disease or low immunity.

Legionella become airborne when fine water droplets (aerosols) carrying the *Legionella* bacteria are expelled from the exhaust fans of this equipment and may be inhaled by those nearby. Poorly positioned air intakes for air conditioning units can also capture the bacterial plume and draw it into buildings.

PCBUs whose work involves buildings, industrial or commercial premises that operate one or more cooling towers or evaporative condensers (cooling plant) must eliminate the risks from *Legionella* colonisation and dissemination so far as is reasonably practicable. If a risk cannot be eliminated, it must be minimised, so far as is reasonably practicable.

In relation to cooling plant, there will be different PCBUs with overlapping health and safety duties. When this happens, PCBUs must, so far as is reasonably practicable, consult, cooperate and coordinate activities.

The extent of the duty to manage risks depends on the ability of each PCBU to influence and control the matter. Table 1 describes the different types of PCBUs that may be involved, their duties and likely extent of their influence or control.

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ROLE	DUTY	EXTENT OF INFLUENCE/CONTROL
PCBUs that are designers, manufacturers, importers and suppliers of the plant and structures	– ensure plant, substances, or structures are without health and safety risks so far as is reasonably practicable – test to make sure the plant designed/manufactured/ supplied is without health and safety risks so far as is reasonably practicable (or arrange the carrying out of such tests) – give adequate information to people who are given the design/plant, substance or structure.	Upstream PCBUs can influence and often eliminate health and safety risks through designing, manufacturing or installing plant that is safe for the operator. Designers of cooling plant are in a unique position in that they have the opportunity to eliminate or minimise risks by adopting the principles of health and safety in design. The elimination or minimisation of risks after installation of plant is usually less effective, and more costly.
PCBUs that are installers, constructors and commissioners of plant and structures	– ensure the way plant or structures are installed, constructed or commissioned are without health and safety risks so far as is reasonably practicable.	
PCBUs that manage or control the workplace	– ensure that, so far as is reasonably practicable, the workplace and anything else arising from the workplace are without health and safety risks to any person – ensure, so far as is reasonably practicable, the provision and maintenance of safe plant and structures.	These PCBUs have influence and control over who manages, maintains or services the cooling plant. These PCBUs could carry out these actions themselves or contract someone else to do it. For new buildings or renovations, These PCBUs will have significant influence or control over the type of cooling plant installed.
PCBUs that manages, maintains or services the cooling plant	– ensure, so far as is reasonably practicable, the health and safety of workers, and that others (for example, visitors to the workplace or members of the public not associated with the premises) are not put at risk by its work (the managing, maintaining or servicing the cooling plant) – ensure, so far as is reasonably practicable, that any fixtures, fittings or plant they manage or control are without risks to the health and safety of any person.	These PCBUs have influence and control over eliminating or minimising the day-to-day health and safety risks from *Legionella* in cooling plant. They should have effective systems in place to maintain, monitor, treat and report on their sampling/testing/reporting procedures.
PCBUs that are solely tenants in buildings with cooling plant as part of air conditioning system	– ensure, so far as is reasonably practicable, the health and safety of workers, and that others (including visitors to the workplace or members of the public not associated with the premises) are not put at risk by its work.	These PCBUs are likely to have limited influence or control over health and safety risks. The extent of this duty will likely involve: – confirming that the PCBU that manages or controls the workplace has a maintenance schedule and monthly water quality testing programme in place – either receiving these reports or being notified if *Legionella* is detected and what actions are being taken to address this – keeping workers informed when *Legionella* is detected.

TABLE 1: Different PCBUs with overlapping duties

Recommended actions

Tables 2 and 3 describe recommended actions when intending to install new cooling plant, and when dealing with cooling plant on an ongoing basis.

Seek the views of your workers about the ways to eliminate or minimise the risks from *Legionella* in cooling plant.

When installing new cooling plant

ROLE	RECOMMENDED ACTION
PCBUs that are designers, manufacturers, importers and suppliers of the plant	Design, manufacture, import and supply cooling plant: – use processes that restrict bacterial growth (for example, a hot water unit with mixing valves instead of a warm water storage system) – have parts that avoid sludge build-up. *Legionella* grow better in sludge – avoid dead legs in pipe work so bacteria cannot grow in them – use well designed drift eliminators for effective capture of aerosols – have easy access for maintenance and cleaning – use a continuously-operating disinfection process to kill bacteria – use a closed-circuit system instead of an open circuit – this removes bacteria growth surfaces.
PCBUs that are installers, constructors and commissioners of plant and structures	– Install and construct cooling plant following relevant specifications. – Install cooling plant so that potentially contaminated aerosols from other discharges are not drawn into the building air intakes. – Do not start up cooling plant until all water treatment systems are operational.
PCBUs that manage or control the workplace	– Use a plant design based on air-cooling rather than water cooling. This eliminates the risk of *Legionella* growth. – If the above is not reasonably practicable, use water cooling plant that is designed to minimise the risk of *Legionella* growth. Such plant should be easy to access and kept clean.

TABLE 2: Recommended actions when intending to install new cooling plant

Note: Buildings (including their air-conditioning systems) must comply with the requirements under the Building Act. See: building.govt.nz

For existing and newly installed and commissioned cooling plant

ROLE	RECOMMENDED ACTION
PCBUs that manage or control the workplace	– Ensure the water cooling plant is kept clean and well maintained. Make enquires to ensure the PCBU used to manage, maintain or service the cooling plant is competent and qualified to complete the task. – Insist on timely receipt of water quality reports with clear explanations of findings. The PCBU should keep written records to demonstrate ongoing compliance to relevant authorities. The records should also show actions taken when results indicate an increased microbial growth in the water. – After consulting with the PCBU that manages, maintains or services the cooling plant, decide the actions to be taken to protect workers and others when microbial growth is found. – Provide copies of all water quality reports to building tenants or provide reports to tenants/visitors when levels of *Legionella* requiring action are found.
PCBUs that manages, maintains or services the cooling plant	– Keep the water cooling plant clean and well maintained. Consider steam cleaning as part of maintenance schedule of wetted surfaces. – Treat the water with chemicals – if needed, use specialist advice for help with: - selecting and running the chemical dosing equipment - the design of bleed-off techniques to avoid chemical residue build-up - choosing biocides – effectiveness versus ecotoxicity - regular water sampling, testing, and reporting of findings (in accordance with *AS/NZS3666.3 Air handling and water systems of buildings – Microbial control – Part 3: Performance based maintenance of cooling water systems*). – Ensure the person who monitors, tests or treats water or records microbial growth is competent and qualified to complete the task. – If the cooling plant is in a start-up phase after being shut down, more frequent sampling may be initially needed. – If earth works are occurring in the vicinity to the cooling plant, more frequent sampling may be needed. – Provide the PCBU that manages or controls the workplace with water quality reports as soon as possible. - the reports should contain clear explanations of the findings (see *AS/NZS3666.3* and the *New Zealand Building Code*). – Alert the PCBU that manages or controls the workplace immediately if results indicate an increased microbial growth in the water and inform them what actions should be taken to address this. **Note**: The Institute of Environmental Science and Research's guidelines Environmental Sampling for Legionella Bacteria provide procedures for collecting samples from cooling plant for testing.

TABLE 3: Recommended actions for day-to-day operations

More information

What the Hazardous Substances Regulations mean for you

worksafe.govt.nz

Environmental Sampling for Legionella Bacteria

The Prevention of Legionellosis in New Zealand: Guidelines for the Control of Legionella Bacteria

NSW Code of Practice for the Control of Legionnaires' Disease

The following standards are available from: Standards New Zealand

- *AS/NZS3666.3 Air handling and water systems of buildings – Microbial control – Part 3: Performance-based maintenance of cooling water systems*
- *NZS4302 Code of practice for the control of hygiene in air and water systems in buildings*
- *AS/NZS4020 Testing of products for use in contact with drinking water*