

Attachment 3

Model Service Report

At a minimum, the written service report should include the following components:

- Date of service or inspection.
- Identification of the cooling tower system.
- Identification of particular towers.
- Name of person and organisation conducting the inspection or service.
- Type/make/model of cooling tower(s).
- Water storage volumes for dosing calculations.
- Details of the inspection, for example what was purpose/scope?
- Details of any actions such as:
 - What if any chemicals were added and in what volumes?
 - Whether the bleed-off rate was checked?
 - Whether the tower(s) was cleaned?
 - Whether the cooling tower water was tested for chemical levels and what were the results for key parameters such as pH?
 - Whether the cooling tower water was tested for bacteria? What tests were requested? What is the name of the laboratory? What were the results?

Note that it is advisable for the desired or target range for each parameter to be listed as part of the result and a statement as to whether the test was within the range. Comments should be noted.

Attachment 4

Key Elements of a Model Service Contract

Disclaimer

This document only seeks to describe the key elements that ought to be considered in a contract for the treatment and servicing of a cooling tower system in order to manage the risk of *Legionella* infection. The precise terms and conditions of the contract, including its duration, price and the conditions under which it may be terminated, will need to be determined by the contracting parties themselves. The document is not intended to replace the need for contracting parties to obtain their own specialist commercial or legal advice.

Introduction

This specification deals with the best practice management of corrosion and microbiological control for (*insert name of company*).

The service required will include the supply of chemicals and services for treatment of the cooling tower at (*insert address of site*) This includes the full cleaning of the tower, including disinfection.

The attached plan shows the cooling tower systems covered by the contract and the piping layout for the system.

Scope of Work

The contractor shall supply all necessary chemicals and provide all necessary technical services to:

- Maintain the cooling tower in accordance with the attached maintenance schedule.
- Ensure our staff, contractors or the public are not affected by the water treatment maintenance or the operation of the cooling tower.
- Meet all occupational health and safety obligations.
- Note and report any mechanical faults associated with the cooling tower to the contract manager.

Quarterly Meetings

The contractor shall attend a meeting each quarter with the contract manager to review compliance with the following indicators: Australian Standards (AS/NZS 3666, AS 2031.2, AS 4276.3.1, AS/NZS 3896) and legislation (this includes the Health (*Legionella*) Regulations 2001) and discuss the performance of the cooling tower and the contractor including any works program that may be required.

Indicators

The contractor shall ensure that:

- The Heterotrophic Colony Count complies with the Health (*Legionella*) Regulations in at least 95 per cent of tests over a 12-month period and that *Legionella* is not detected in any samples.
- Corrosion is at low levels. No visible signs of corrosion should be present¹.
- Chemical control in accordance with an agreement to be reached prior to the commencement of the contract but the following ranges are provided for guidance:

¹ Note: you may need to seek engineering advice as to an acceptable rate of corrosion for your business operation.

Indicative Water Quality Target Ranges

Indicative Water Quality Target Ranges	
Bacteria	
<i>Legionella</i>	Not detected (<10 CFU/mL) ³
HCC	Less than 100,000 CFU/mL ⁴
Solids	
Total dissolved solids	Less than 1000 ppm
Conductivity	Less than 1500 µS/cm
Suspended solids	Less than 150 ppm
Calcium hardness	Less than 180 ppm
pH	
pH (for bromine compounds)	7 – 9
pH (for chlorine based compounds)	7 – 8
Total alkalinity	80 – 300 ppm
Other additives	
Biodispersant	Follow the manufacturers' specifications
Corrosion inhibitor	Follow the manufacturers' specifications

Where the results are outside the requirements of the Health (*Legionella*) Regulations 2001, the contractor must immediately notify the contract manager.

Occupational Health and Safety

The contractor is responsible for the safety of their employees while on-site, in all matters over which the contractor has control. All equipment brought on site by the contractor or its employees must fulfil occupational health and safety legislative requirements.

Quality Assurance

The contractor shall have a formal quality assurance system in place and provide evidence that the quality assurance system has been audited each year.

Insurance

Contractors shall have both professional indemnity and public risk insurances in place for the supply of services for the term of this contract. The contractor shall provide an annual confirmation of the continued existence of the policies.²

² The level of insurance should be at levels that you are comfortable with recognising the worst case scenario where your tower is demonstrated to have been the source of an outbreak of *Legionella*.

Attachment 5

Model Procedure for Cooling Towers Detected with *Legionella*

Background

State regulations require cooling tower systems to be continuously and effectively treated with biocide to control microorganisms including *Legionella*. *Legionella* bacteria are the bacteria responsible for Legionnaires' disease. *Legionella* should not be detected in a sample from the cooling tower system. The detection limit for *Legionella* is 10 CFU/mL.

The responsible person within our company for the operation of the cooling tower system is¹

The maintenance, cleaning and bacterial testing of the cooling tower system is contracted to²

Sampling for Heterotrophic Colony Counts (a measure of total bacterial levels in the water) is carried out³ on a routine basis and depending on the results additional testing is sometimes required.

Legionella testing is currently performed We also follow a standard preventative disinfection procedure where after each sample is taken for legionella testing we disinfect the system.

This company will telephone and then send an email or fax to⁴ with the results of the bacterial testing for the cooling towers.

If the company's responsible person is absent the⁵ is to be contacted. The cooling tower system contractors know whom to contact if the regular contact is not available.

Safety

Detection of *Legionella* may indicate that the biocide is not controlling the growth of the bacteria in the water system. Other possible explanations are that there may be lengths of disused pipework that are acting as reservoirs for *Legionella*.

Procedure

If *Legionella* is detected, the following actions shall be performed without delay:

1. Immediately upon the receipt of a test result indicating the presence of *Legionella*, contact the water treatment contractor to arrange to meet on-site as a matter of urgency.
2. Advise people in the manner described and listed in the attachment.
3. The water treatment company should follow the procedure as specified in the Operational Program.
4. Liaise closely with the water treatment company about test results.
5. Continue to communicate results to the parties mentioned above.
6. In the event that the disinfection and cleaning does not eliminate the *Legionella*, consider shutting down the cooling tower system.

1 Insert name and title of the person nominated by the company as being responsible for the safe operation of the cooling tower.

2 Insert company name and all contact details including after hours telephone number, fax and email.

3 Insert frequency of bacterial testing (refer 'Guide to Developing Risk Management Plans for Cooling Tower Systems') produced by the Department.

4 Insert name and title of the person nominated by the company as being responsible for the safe operation of the cooling tower.

5 Insert title of the person nominated by the company as being responsible for the safe operation of the cooling tower in the absence of the first named person.

Attachment 5

Positive *Legionella* Test Notification List

Details			
Category	Name/Title	Telephone	Method of Notification/ Responsibility for Notification
Staff			To be advised by ⁶
Elected Health and Safety representatives			To be advised by.....
Occupational Health staff/contractors			To be advised by.....
Unions			To be advised by.....
Building owner			To be advised by.....
Other building occupiers			To be advised by.....
Medical officer			To be advised by.....
Staff counsellors			To be advised by.....
Department of Human Services Public Health Division		1800 248 898	To be advised by.....
Local Council (Environmental Health Officer)		To be advised by.....
Media Liaison Officer			To be advised by.....
Company spokesperson			To be advised by.....
Chief Executive			To be advised by.....

⁶ Once the decision to notify has been made, consideration must be given to the method. This will work best where staff (in particular) have had some explanation of the procedures and significance of the cooling tower and the test results significance well in advance of the adverse result notification. The procedure should also clearly advise who is responsible for notifying the parties.

Attachment 6

Reference Sources

Australian Standards

AS/NZS 3666 Air-handling and water systems of buildings – Microbial Control

AS/NZS 3666.1 Part 1: Design, installation and commissioning

AS/NZS 3666.2 Part 2: Operation and maintenance

AS/NZS 3666.3 Part 3: Performance-based maintenance of cooling water systems

AS 4276.3.1 Water microbiology - Heterotrophic colony count methods - Pour plate method using plate count agar

AS/NZS 3896 Waters – examination for legionellae including legionella pneumophila

AS 2031.2 Selection of containers and preservation of water samples for chemical and microbiological analysis Part 2-Microbiological

AS/NZS 1715: Selection, use and maintenance of respiratory protective devices

AS/NZS 1716: Respiratory protective devices

AS/NZS 1336: Recommended practices for occupational eye protection

AS/NZS 1337: Eye protectors for industrial applications

AS/NZS 4360 Risk Management

Australian Institute of Refrigeration, Air-Conditioning and Heating (Inc.) DA 17 Cooling Towers and DA 18 Water treatment

Organisations

Organisations	Telephone	Email	Internet
Department of Human Services Public Health Division	1800 248 898	lrmp@dhs.vic.gov.au	http://www.legionella.vic.gov.au
Building Control Commission	9285 6400		http://www.buildcc.com.au
Plumbing Industry Commission	9889 2211		http://www.pic.vic.gov.au
Victorian WorkCover Authority	1800 136 089	info@workcover.vic.gov.au	http://www.workcover.vic.gov.au
National Water Treatment Group	02 457 76800		
Australian Standards	1300 65 46 46	sales@standards.com.au	http://www.standards.com.au
National Association of Testing Authorities	9329-1633		http://www.nata.asn.au

Attachment 7

Indicative Water Quality Target Ranges

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Bacteria	
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Calcium hardness	Less than 180 ppm
pH	
pH (for bromine compounds)	7 – 9
pH (for chlorine based compounds)	7 – 8
Total alkalinity	80 – 300 ppm
Other additives	
Biodispersant	Follow the manufacturer's specifications
Corrosion inhibitor	Follow the manufacturer's specifications

Attachment 8

Procedure for the Decontamination of the Cooling Water System

Background

Decontamination may be required in cooling tower systems linked to a case or cases of Legionnaires' disease, as described in the Health (*Legionella*) Regulations 2001.

Procedure

The following process is considered by the Department of Human Services to meet the intent of the Regulations. Other processes can be used, providing they meet the requirements of the Regulations.

1. Follow all relevant occupational health and safety procedures, including the use of personal protective equipment.
2. Cease any chemical treatment. Isolate any electrical equipment except the water treatment pump.
3. Add a low foaming chlorine-compatible biocidal to the recirculating water.
4. Disinfect the system by dosing the water with either:
 - A chlorine-based compound, equivalent to at least 10mg/L of free chlorine for at least one hour, while maintaining the pH of the water between 7.0 and 7.6 or
 - A bromine-based compound, equivalent to at least 20mg/L of free bromine for at least one hour, while maintaining the pH of the water between 7.0 and 8.5.
5. Add the disinfectant slowly, over five to ten minutes, to a turbulent zone of the tower basin to promote its rapid dispersion. Use an anti-foaming agent if excessive foaming occurs.
5. Switch off equipment and drain cooling tower to waste in a manner approved by the local water authority. The entire cooling water system should be drained¹. The use of a wet vacuum cleaner can make it easier to remove waste material from the basin floor.
6. Refill with clean water and switch on the recirculating pump.
7. Repeat Step 4, but maintain the specified concentrations for three hours. Then switch off the recirculating pump. Drain cooling tower system to waste in a manner approved by the local water authority.
8. Inspect the drift eliminators and clean, repair or replace as necessary. If the eliminators are moved, ensure they are correctly installed on replacement. Suitable precautions should be taken to minimise the release of aerosols during cleaning operations.
9. Thoroughly clean the internal shell, fill and tower sump by brushing and gently hosing all surfaces. Remove all debris. Avoid damage to the tower and accessories during this operation.

¹ Where this is not practicable, a very high bleed-off rate should be used during step 4. This will facilitate removal of suspended particulate matter from the system and the partial replacement of cooling water with clean make-up water.

Attachment 8

10. Thoroughly internally clean all water filters, strainers, separators, water nozzles and fittings associated with the water distribution system.
11. Re-assemble all components and hose with clean water.
12. Repeat Step 4, but maintain the specified concentrations for three hours. Then switch off the recirculating pump. Drain cooling tower system to waste in a manner approved by the local water authority.
13. Refill with clean water and switch on the recirculating pump.
14. Repeat Step 4 and then Step 13 if the water is not visually clear. Clean the water filters, strainers and repeat Step 13. Repeat this sequence until the water quality is satisfactory.
15. Immediately reinstate comprehensive effective water treatment including biocide(s), anti-corrosives and scale control.
16. Record all actions in maintenance logbook.

Attachment 9

Routine Inspection of a Cooling Tower System

A routine inspection by a competent person as described in the Guide can include manual checks of:

- Power supply.
- Connection and integrity of chemical dosing lines.
- Water clarity.
- Levels of dosing chemicals within tanks.
- Observations and recording of control measures, such as chemical parameters.
- Obvious visible corrosion.
- Obvious physical defects or damage.
- Pump operation.

Attachment 10

Responsibilities of Stakeholders

Stakeholder	Responsibility
Landowner	<p>To register all cooling tower systems on the land</p> <p>To take all practicable steps to ensure that a risk management plan is developed for all cooling tower systems</p> <p>To take all practicable steps to ensure that a risk management plan is developed for all cooling tower systems and reviewed annually</p> <p>To take all practicable steps to ensure that an audit of the risk management plan is performed annually for all cooling tower systems</p> <p>To ensure that reasonable steps are being taken to minimise the risks</p>
System Owner	<p>Allocate sufficient resources to manage the risks of Legionella</p> <p>Ensure that the Health (<i>Legionella</i>) Regulations 2001 are complied with</p>
System Manager	<p>Ensure that the Health (<i>Legionella</i>) Regulations 2001 are complied with</p> <p>Management of contracts which relate to system</p> <p>Ensuring any reports from contractors requiring action are actioned promptly</p> <p>Reporting to senior management of any capital expenditure requirements</p> <p>To ensure that reasonable steps are being taken to minimise the risks</p>
Property Manager	<p>Management of contracts which relate to system</p> <p>Ensuring any reports from contractors requiring action are actioned promptly</p> <p>Reporting to client of any capital expenditure requirements and any significant public health or safety issues</p>
Property Maintenance Contractor	<p>Management of contracts which relate to system</p> <p>Ensuring any reports from contractors requiring action are actioned promptly</p> <p>Reporting to client of any capital expenditure requirements and any significant public health or safety issues</p>
Mechanical Services Maintenance Contractor	<p>Management of contracts which relate to system</p> <p>Ensuring any reports from contractors requiring action are actioned promptly</p> <p>Reporting to client of any capital expenditure requirements and any significant public health or safety issues</p>
Water Treatment Provider	<p>Comply with the Health (<i>Legionella</i>) Regulations 2001</p> <p>Provide advice to clients on water treatment related issues</p> <p>Treat water to minimise risks of <i>Legionella</i> growth</p>
Risk Management Plan Consultant	<p>Perform comprehensive risk assessment that identifies risks to the client and recommends corrective actions to minimise those risks</p> <p>Drafts RMP to meet legal requirements for client acceptance</p>
Cooling Tower Supplier	<p>Confirms that tower meets AS/NZS 3666</p>
Cooling Tower System Designer	<p>Ensure system meets AS/NZS 3666 and reduces risks of 'dead legs' and <i>Legionella</i> growth in general wherever possible</p>

Attachment 11

Decommissioning a Cooling Tower System

Where an existing cooling tower system is no longer required, the following actions should be taken:

- Drain the cooling tower system to sewer, in accordance with any advice from the local water authority.
- Remove chemical dosing tanks.
- Disconnect power supply to the system.
- Disconnect water supply to the system.
- Remove the tower and preferably the other components of the system.

Ideally, the system including the tower should be removed, but where this is not practical, place a sign on the tower indicating that the system must not be re-activated.