

## Approved Form 1: Risk Management Plan (RMP)

### Purpose of the approved form

The *Public Health Regulation 2012* (the Regulation) requires a risk assessment to be carried out every five years (or more frequently if required), and documented in a Risk Management Plan (RMP). This RMP document is provided to assist the competent person in carrying out the risk assessment.

The purpose of the Risk Management Plan (RMP) is to apply and document best practices to effectively control the growth and transmission of *Legionella* bacteria while considering the risks that are unique to the cooling water system being assessed. It is an important safeguard in preventing Legionnaires' disease and the basis for managing cooling water systems in NSW. Additional documentation, including worksheets and evidence, can be attached at the end of this form.

The RMP document is an approved form under clause 13N of the Regulation. It must be provided to the local government authority within 7 days of completion. Further guidance on how to carry out a risk assessment is provided in the *NSW Guidelines for Legionella Control in Cooling Water Systems* (the Guidelines), available at [www.health.nsw.gov.au/environment/legionellacontrol](http://www.health.nsw.gov.au/environment/legionellacontrol)

### Using the RMP document

The RMP document must be completed by a competent person as defined in the Regulation and Australian Standard (AS/NZS) 3666 Part 3. The Regulation allows a person working under the supervision of a competent person to undertake a risk assessment, provided that the competent person ultimately confirms the effectiveness and takes responsibility for the risk assessment and resulting RMP.

A risk assessment should involve:

- Site visits to the cooling water system being assessed, including inspection of cooling towers
- Interviews with personnel involved in the installation, operation or maintenance of the cooling water system
- Reviews of existing documentation, including monthly reports of inspection, maintenance (including servicing), chemical analysis and microbial testing; and operating and maintenance manuals
- Other activities that help determine the risk factors that are unique to the cooling water system being assessed.

The competent person should complete the tables that follow; assign a risk level (low, medium or high) for each of the five risk categories; and specify control strategies to reduce the risk of *Legionella* growth and transmission posed by the cooling water system. It is important to base the risk assessment on data and evidence gathered on- and off-site; these findings should be documented in the "observation" section for each risk factor.

## Site and contact details

Provide the name, phone numbers (business hours, after hours and mobile numbers), email address, and postal address for each of the contact persons listed below.

Record	Details
Site address	
Cooling water system details (number of cooling towers, and unique identification number for each cooling tower)	
Local government authority (where this system is located)	
Location of cooling towers within building or site (describe and attach a site map)	
Occupier name and contact details (the person or entity who owns the system)	
Building manager name and contact details (the person who manages the system on behalf of the occupier)	
Competent person name and contact details (the person who signs the RMP)	
Duly qualified person name, employer and contact details (person managing the system on a day to day basis)	
Water treatment provider name and contact details (if different to duly qualified person)	
Water sampling contractor name and contact details (if different to duly qualified person)	
Mechanical services contractor name, employer and contact details (person who manages the system in aspects other than water treatment)	
Laboratory (name and NATA accreditation details)	

## Technical details

Provide the technical details of the cooling water system.

Record	Details
Plant served by the system	
Type of heat rejection device	
Make and model	
Heat rejection duty	
Year of construction and installation	
Heat exchanger or condenser served	
Likely design water temperatures (°C)	
Materials used in the basin, casing, fill, drift eliminators, and other equipment	
Drift eliminators drift loss performance (%)	
System water volume (m <sup>3</sup> )	
Approximate submerged wet area (m <sup>2</sup> )	
Ratio of wet area to water volume	
Description of the water treatment system and chemicals in use	

## Risk analysis

Assign a risk level (low, medium or high) for each of the five risk categories that follow.

The risk assessment should provide control strategies which reduce the risk posed by the cooling water system. For example, a risk factor can move from “high” inherent (or initial) risk to “medium” or “low” residual (or remaining) risk. If the control strategy or mitigation measure is permanent, the risk no longer exists and can be marked as “low” inherent risk in future RMPs. If the control strategy is temporary, ongoing, or incomplete, then it may only be possible to reduce a “high” inherent risk to a “medium” residual risk. If there is no control strategy to address a “high” residual risk, then the occupier should consider removing or replacing the water cooling system in the longer term.

The overall risk of *Legionella* growth and transmission from a cooling water system is calculated by considering the residual (or remaining) risk for each risk factor, within each risk category, to determine the overall risk evaluation for the system. This overall residual risk determines how often a risk assessment of the cooling water system is required. Further guidance is provided in the “Risk evaluation” section below and the Guidelines.

Risk level	Explanation and actions required	RMP frequency
Low	<p>This level indicates a low risk of <i>Legionella</i> transmission from this cooling water system.</p> <p>Continue to manage the cooling water system using the existing maintenance and monitoring procedures. Continue using the existing water treatment system.</p>	Five years
Medium	<p>This level indicates a medium risk of <i>Legionella</i> transmission from this cooling water system. This level suggests that the ability of the system to inherently discourage bacterial growth is reduced.</p> <p>Urgently review the effectiveness of the maintenance procedures and water treatment system. Review the results of monitoring (including monthly chemical analysis and microbial testing), deterioration of equipment, and safe access for maintenance. Determine the actions to be taken and allocate priority.</p>	One to five years
High	<p>This level indicates a high risk of <i>Legionella</i> transmission from this cooling water system. This level suggests that the system may be actively encouraging growth and transmission of microorganisms.</p> <p>Immediately review the effectiveness of the maintenance procedures and water treatment system. Correct any deficiencies and implement remedial actions. Consider whether the cooling water system is at the end of its useful life and whether it needs to be replaced.</p>	Every year

The tables below indicate key performance indicators (KPIs) with an asterisk. KPIs in relation to cooling water systems are risk factors that are testable, assessable and controllable for the performance, monitoring and verification of the system. Not all KPIs are important risk factors for *Legionella* growth and transmission; however, they are readily measurable and provide an overall assessment of the system’s performance.

## Risk category 1: Stagnant water

Consider the consequence and likelihood associated with each of the risk factors identified below. Include any additional risk factors identified in this risk category. Key performance indicators are marked with an asterisk.

Risk factor	Observation	Inherent risk (L, M, H)	Control strategy	Residual Risk (L, M, H)
Presence of water in dead legs				
System not in use due to intermittent operation or seasonal usage				
<b>Overall risk level (L, M, H) for this risk category (stagnant water)</b>				
<b>Additional comments</b>				

## Risk category 2: Nutrient availability and growth

Consider the consequence and likelihood associated with each of the risk factors identified below. Include any additional risk factors identified in this risk category. Key performance indicators are marked with an asterisk.

Risk factor	Observation	Inherent risk (L, M, H)	Control strategy	Residual Risk (L, M, H)
Presence of nutrients (from air and water intake)				
Presence of biofilm (slime)				
Water temperature favourable to microbial growth*				
Direct sunlight (which promotes algal growth)				
<b>Overall risk level (L, M, H) for this risk category (nutrient availability)</b>				
<b>Additional comments</b>				

### Risk category 3: Poor water quality

Consider the consequence and likelihood associated with each of the risk factors identified below. Include any additional risk factors identified in this risk category. Key performance indicators are marked with an asterisk.

Risk factor	Observation	Inherent risk (L, M, H)	Control strategy	Residual Risk (L, M, H)
Concentration of <i>Legionella</i> bacteria (summarise test results over previous RMP period if available)*				
Concentration of other heterotrophic bacteria (summarise test results over previous RMP period if available)*				
Presence of protozoa and algae				
Water quality (cleanliness)*				
Water quality (pH)*				

Risk factor	Observation	Inherent risk (L, M, H)	Control strategy	Residual Risk (L, M, H)
Water quality (presence of corrosion products)*				
Water quality (presence of scale, fouling)				
Water quality (conductivity and total dissolved solids)*				
Water quality (other chemical control limits out of range)*				
Water quality (suspended solids, e.g. from nearby construction work)				
Water quality (control of water treatment chemicals)				



Risk factor	Observation	Inherent risk (L, M, H)	Control strategy	Residual Risk (L, M, H)
Water quality (control of bleed)				
Characteristics of makeup water (physical, chemical, microbiological)				
Microbial control program (dual biocides, oxidising, non-oxidising)				
<b>Overall risk level (L, M, H) for this risk category (poor water quality)</b>				
<b>Additional comments</b>				

## Risk category 4: Deficiencies in the cooling water system

Consider the consequence and likelihood associated with each of the risk factors identified below. Include any additional risk factors identified in this risk category. Key performance indicators are marked with an asterisk.

Risk factor	Observation	Inherent risk (L, M, H)	Control strategy	Residual Risk (L, M, H)
System size (calculate ratio of surface area available for biofilm development compared to water volume).  Assign risk as "high" if ratio >20, "moderate" if ratio 10 to 20, "low" (desirable) if ratio <10				
Physical condition of system (e.g. poor quality construction materials, collapsed fill, uncontrolled water losses, holes)*				
Aerosol generation and drift elimination				
<b>Overall risk level (L, M, H) for this risk category (deficiencies)</b>				
<b>Additional comments</b>				

## Risk category 5: Location and access to cooling towers

Consider the consequence and likelihood associated with each of the risk factors identified below. Include any additional risk factors identified in this risk category. Key performance indicators are marked with an asterisk.

Risk factor	Observation	Inherent risk (L, M, H)	Control strategy	Residual Risk (L, M, H)
Aerosol dispersion and public access to system				
System location and environment (environmental contamination, and burden on water treatment chemicals)				
System access for inspection, maintenance, and cleaning				
<b>Overall risk level (L, M, H) for this risk category (location)</b>				
<b>Additional comments</b>				

## Risk evaluation

Summarise and compare the risk levels for each of the five risk categories in the previous tables. Assign an overall risk level for this cooling water system. The competent person must assign the overall risk level based on their judgement and technical understanding of the system; in some cases, a “high” residual risk level for one risk category may result in an overall “high” risk evaluation for the cooling water system.

Risk category	Residual risk level (L, M, H)
Stagnant water	
Nutrient availability and growth	
Poor water quality	
Deficiencies in the cooling water system	
Location and access to cooling towers	
<b>Overall risk level (L, M, H) for this cooling water system</b>	
Additional comments (including justification for “high” overall residual risk)	

## Maintenance plan

Outline the frequency for different maintenance activities associated with this cooling water system. The Regulation requires a minimum frequency of monthly inspection, maintenance (including servicing), chemical analysis, and microbial testing. More frequent maintenance (including servicing) can be required by the competent person, and justified below.

The Regulation does not specify a minimum frequency for cleaning; this must be determined by the competent person. While AS/NZS 3666 Part 2 requires cleaning to take place every six months, Part 3 does not specify the cleaning frequency. As a general guide, cleaning can take place every six months, and any variation to this frequency should be specified by the competent person and justified below.

Component	Normative interval	Specified interval
Inspection	Monthly (required by Regulation)	
Maintenance (including servicing)	Monthly (required by Regulation)	
Chemical analysis (including corrosion monitoring)	Monthly (required by Regulation)	
Microbial testing (for <i>Legionella</i> and HCC)	Monthly (required by Regulation)	
Cleaning (justify any variation from six monthly cleaning)	Six monthly (recommended)	

## Control range for risk factors

Outline the control range for risk factors identified in the previous tables. Example control ranges are provided below; the competent person should specify a target control range for the cooling water system.

Risk factor	Example control range	Specified control range
<i>Legionella</i> count	<10 cfu/mL, using AS/NZS 3896:2017 method	
Heterotrophic colony count (HCC)	<100,000 cfu/mL, using AS/NZS 4276.3.1:2007 method	
Total dissolved solids	<700 ppm preferred (but >200)	
Conductivity	<1,000 $\mu$ S/cm (but >300)	
pH, for bromine formulations	7.0-9.0	
pH, for chlorine and DBNPA formulations	7.0-8.5	
pH for non-oxidisers	Refer to supplier targets	
Total alkalinity	70 to 400 ppm for most localities	
Corrosion rate limits	0.15 mm per year (mild steel and iron), 0.005 mm per year with no pitting (stainless steel), 0.005 mm per year (copper)	
Suspended solids	Visually low	
Calcium hardness	<500 ppm	
Chlorides	<250 ppm for most localities	
Corrosion inhibitor	Refer to manufacturer limits	

The duly qualified person (DQP) must operate and maintain the cooling water system within these control ranges through an appropriate water treatment and maintenance program that meets the requirements of AS/NZS 3666 Part 3. The DQP must monitor and make changes to the water treatment program when any of the above risk factors fall outside the specified control range. This can be done using the control strategies listed in the previous tables.

## Action plan

Develop an action plan which ensures that the risks identified are adequately controlled, within an appropriate timeframe. The action plan should reference control strategies provided in previous five risk category tables, and state who will carry out these actions. Compliance with the requirements of the action plan will be reviewed by the independent auditor every year.

Risk category	Control strategy	Person responsible	Deadline

*Attach documents and photographs to support the RMP document after this page.*

## Certificate of Risk Management Plan (RMP) completion

### Outcome of risk assessment

Record	Details
Date of site inspection	
Date of RMP completion	
Date of notification to occupier	
Date when next RMP is required (maximum five years from date of this RMP)	
<b>Overall risk level (L, M, H) for this cooling water system</b>	

### Site and contact details

Provide the name, phone numbers (business hours, after hours and mobile numbers), email address, and postal address for each of the contact persons listed below.

Record	Details
Site address	
Cooling water system details (number of cooling towers, and unique identification number for each cooling tower)	
Local government authority (where this system is located)	
Location of cooling towers within building or site (describe and attach a site map)	
Occupier name and contact details (the person who owns the system)	
Building manager name and contact details (the person who manages the system on behalf of the occupier)	
Competent person name and contact details (the person who signs the RMP)	
Duly qualified person name, employer and contact details (person managing the system on a day to day basis)	
Water treatment provider name and contact details (if different to duly qualified person)	
Water sampling contractor name and contact details (if different to duly qualified person)	
Mechanical services contractor name, employer and contact details (person who manages the system in aspects other than water treatment)	
Laboratory name and contact details	

## Declaration by competent person

*I declare that I am a competent person and that this risk assessment and risk management plan (RMP) has been completed by me, or a person under my supervision, in compliance with the NSW Public Health Regulation 2012 and in accordance with Australian Standard 3666 Part 3.*

<b>Name of competent person</b>	<b>Contact details (phone number, email, postal address)</b>
<b>Signature of competent person</b>	<b>Date</b>
<b>Training, qualifications and experience</b>	<b>Employer (name of company or organisation)</b>

## Local government authority use

<b>Record</b>	<b>Details</b>
Date received	
Name and position of receiving officer	
Certificate of RMP completion received within 7 days of completion (date of declaration above)	
Certificate of RMP completion received by the date required by previous RMP	

<b>Action taken (date and time):</b>	
	Unique identification numbers confirmed
	Fee paid
	Register of cooling water systems updated
	Flagged for follow up
	Referred to authorised officer