

**Key Control Data Sheet**

Procedure Number: RSK-PRO-KCD-040

Scope of Application: Ok Tedi Mining Limited

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Document Owner: Manager – OHS & Training

**Why is the Control Important** –

Equipment or systems using and storing water, under the right environmental conditions, has the potential to be a source for Legionella bacteria growth if they are not disinfected and maintained.

Legionaries’ disease is a severe form of pneumonia – lung inflammation and is caused when an individual breathes in water droplets containing Legionella bacteria.

The following non-exhaustive list identifies potential sources of aerosols which may contain Legionella bacteria:

* Cooling Towers
* Humidification systems to maintain relative humidity
* Water filled cooling conveyors
* Office buildings air conditioning systems

Inspections, thoroughly cleaning, disinfection and water treatment are key to preventing legionella

**Exemption** – No exemptions permitted.

**Operational Requirements**

## Performance Metrics

|  |  |
| --- | --- |
| All equipment with the potential for generating Legionella (such as cooling towers and associated equipment, air-handling systems, air conditioning, humidifiers) are identified and listed on a register. | Where Legionella is measured above action limits, equipment is disinfected and then retested between two and seven days later to confirm the effectiveness of the treatment. |
| Legionella registered equipment are included in a Preventative Maintenance and cleaning program.  | Maintenance program for chemical dosing equipment/system is managed by approved service provider.  |
| Legionella bacteria monitoring program is in place and being followed.  | Testing and management of dosing rates are done by an approved service provider.  |
| Testing water reservoir for Legionella bacteria is carried out according to the schedule. Test results are recorded and reviewed. | Maintenance people wear approved PPE (e.g. respiratory protection and goggles). |
| The temperature of water in equipment with the potential to generate legionella is kept between 20 and 50°C. Temperature is recorded and reviewed. | Maintenance personnel that may be exposed to legionella are trained in the hazards associated with Legionella bacteria and Legionaries’ disease. |

## Utilisation

Used for all equipment or systems using and storing water with the potential for generating Legionella bacteria.

## Safety Critical Defeat Requirements

No defeats permitted.

## Testing & Verification

Supervisor on a monthly basis verifies water-based equipment/system preventive maintenance and cleaning is carried out according to the Maintenance Program.

Supervisor, on a monthly basis, reviews results of the measurements of Legionella in the equipment water reservoirs and the actions taken when these results are above the action limits.

## Maintenance

All equipment with the potential for generating Legionella bacteria (such as cooling towers and associated equipment, air-handling systems, air conditioning, humidifiers) are part of the Maintenance Program and include:

* Cleaning and bacterial monitoring programs
* Dosing rates
* Testing water
* Chemical dosing equipment /system

Monitoring Devices like flow meters, level & conductivity sensor, pH sensors & Control Devices like timers, dosing pumps, motorized valves must be calibrated and maintained according to manufacturer’s recommendations.

Daily inspections must be done by an on- site person trained for this purpose to identify problems with the water treatment system for the cooling tower or any Legionella registered equipment and may include:

* Check that any dosing devices are operating (e.g. by observing if there are any alarm messages on the monitoring display)
* Confirming that delivery tanks/containers contain sufficient volume of treatment chemical to last to the next inspection
* Confirming that the required volume of treatment chemical has been delivered from the reservoir container
* Confirming any float devices still contain treatment tablets.

## Training & Competency

People performing maintenance, inspection, cleaning and maintenance of water-based equipment / system must be trained, and assessed competent in:

* Management relevant Biological Hazards and their controls
* Working Instructions, including the use and maintenance of protective equipment
* Hazards related to aggressive and toxic chemicals used to treat water
* Environmental conditions for Legionella bacteria to growth (e.g. water temperature, presence of sediment, sludge, scale)

**Task Requirements**

The following are the key day to day requirements operators/maintainers and supervisors must follow to ensure the control is being used correctly.

## Task Requirements

|  |  |  |
| --- | --- | --- |
| No. | Supervisor | Operator/Maintainer |
| 1 | Verify maintenance or cleaning activities are carried out according to the schedule. | Follow Service Provider Work Instructions when carrying out equipment maintenance and cleaning of Legionella registered equipment. |
| 2 | Review the results of every measurement of bacterial-monitoring program and actions taken for above limits (e.g. disinfection of the equipment). | Wear designated PPE, including respiratory protection when carrying out equipment maintenance and cleaning of Legionella registered equipment. |
| 3 | Verify that re-tests are carried out between two and seven days later to confirm the effectiveness of the treatment. | Complete daily check list for Legionella registered equipment to verify normal operation. Report any abnormal operations to Supervisor. |
| 4 | Verify people performing maintenance or cleaning activities from service provider are certified in the task.  | Monitor and register water temperature daily and report to Supervisor any temperature out of the range (outside of the 20 – 50°C).  |
| 5 | Verify the use of approved chemicals only by service provider.  | Flush equipment water storage when water has become stagnated according to established in the Work Instructions.  |

## Skills Requirements

Maintenance program for water-based equipment / system is managed by an approved service provider.

## Permits

Permit to Work is issued prior commencing maintenance water-based equipment / system.

## Task Specific PPE Requirements

Respiratory protective equipment must be used during maintenance and cleaning of water based equipment/system.

## Special Task Related Tooling

No additional requirement.

**Design Requirements**

## Design Standard

Health (Infectious Diseases) Regulations 1990: Division 3- Prevention of Legionella.

Occupational Health and Safety Act 2004.

Guidelines for the Control of Legionnaire's Disease 1989 (Vic. Government).

Legionnaire's Disease and Cooling Towers, Information for Owners and Managers 1996 (Vic. Government).

Evaporative Coolers, An Operation and Maintenance Guide for Owners 1997 (Vic. Government).

Australian/New Zealand Standards AS/NZS 3666.

Building (Legionella) Act 2000, Building (Legionella Risk Management) Regulations 2001 and Building (Cooling Tower Systems Register) Regulations 2001.

Plumbing (Cooling Towers) Regulations 2001.

Health Act 1958.

Health (Legionella) Regulations 2001.

##  Safety Parameters

According to the 2007 book Legionella and the prevention of legionellosis from the World Health Organization, temperature affects the survival of Legionella as follows:

Above 70 °C (158 °F) - Legionella dies almost instantly

At 60 °C (140 °F) - 90% die in 2 minutes (Decimal reduction time (D) = 2)

At 50 °C (122 °F) - 90% die in 80–124 minutes, depending on strain (Decimal reduction time (D) = 80-124)

48 to 50 °C (118 to 122 °F) - can survive but do not multiply

32 to 42 °C (90 to 108 °F) - ideal growth range

25 to 45 °C (77 to 113 °F) - growth range

Below 20 °C (68 °F) - can survive but are dormant, even below freezing

Safety Data Sheet (SDS) used in water treatment process must be provided by water treatment services providers and included in the operation and maintenance manual. SDS and relevant warning / safety label must be provided on the surface of water treatment chemical bucket. The SDS and labels must be properly protected against water and chemical damage.

## Design Life

Chemicals used to treat the water must be compatible with materials of construction and piping used in the system.

## Safe Separation

Fresh air intakes should not be built close to cooling towers since contaminated aerosols may enter the ventilation system. Air filters should be examined, cleaned and/or replaced periodically and tested for leaks. Cooling towers should be positioned so the drift or evaporate does not enter the fresh air intake. Hot water tanks, which might provide ideal conditions for the growth of Legionella, should be cleaned regularly. The water system should be flushed out on a regular basis to prevent the water from stagnating.

## Special Requirements

The use of chromium-based treatment chemicals shall be subject to approval and authorisation by the Safety & Environment Managers.

For large cooling tower systems (over 100 tons) is better to install automated chemical feed systems. The automated feed system should control blowdown/bleed-off by conductivity and then add chemicals based on make-up water flow. These systems minimize water and chemical use while optimizing control against scale, corrosion, and biological growth.

Organic debris management must be aligned with water treatment dosage levels and made integral to the maintenance process to avoid the probability of the tower becoming a health and safety hazard. When organic debris such as cottonwood seed, leaves, insects, pollen, grass, birds and their droppings, etc. get into the water and decompose, it along with the relatively warm temperatures of the water create a nutrient rich environment for bacterial growth including Legionella. Then, it is important to recognize that if the volume of decomposing debris exceeds the chemical dosage’s ability to provide control, the cooling tower will silently grow dangerous even while chemical dosing continues.

Facilities or equipment for eye washing should be located near the point of chemical dosing.