ESTATES

THE UNIVERSITY OF READING

CONTROL OF LEGIONELLA BACTERIA WITHIN WATER SYSTEMS

POLICY

This Document sets out the University of Reading Policy and Procedures for managing and dealing with Legionella in water systems. Approved by Facilities Management Committee and the Health and Safety Committee.

LEGIONELLA MANAGEMENT POLICY

Statement of Intent

To define how the Duty Holder manages the potential risk from legionella contamination in accordance with current legislation and good practice.

The University of Reading Legionella Policy conforms to the Health and Safety at Work Act 1974 etc.; The Control of Substances Hazardous to Health (COSHH) Regulations 2002 (as amended); the H.S.E Approved Code of Practice L8, 4th edition, 2013: Legionnaires' disease "The Control of Legionella Bacteria in Water Systems" (ACOP L8) and the guidance documents HSG274.

This Policy and Procedures will apply to all buildings and all individuals employed and/or engaged by the University **without exception**.

The University of Reading Policy on Legionella:

To comply with its legal duties, the University will:

- Identify and assess sources of risk.
- Prepare a scheme for preventing or controlling the risk.
- Ensure suitable and sufficient resources are available.
- Implement, manage and monitor all precautionary control measures identified.
- Keep records of all such measures.
- Nominate employees and others with responsibility for implementing this policy.
- Review this Policy at least every 2 years.

Signed : ……..……..

Date ……..

Duty Holder Title ……..

Name: ……..

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PROCEDURES

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PROCEDURES FOR LEGIONELLA MANAGEMENT

1.0 LEGIONELLA BACKGROUND

Legionnaires' disease is a potentially fatal form of pneumonia which can affect anybody, but which principally affects those who are susceptible because of age, illness, immunosuppression, smoking etc. It is caused by the bacterium ***Legionella pneumophila,*** and related bacteria. Legionella bacteria can also cause less serious illnesses, which are not fatal or permanently debilitating. The collective term used to cover the group of diseases caused by Legionella bacteria is Legionellosis.

Legionnaires' disease is normally contracted by an individual inhaling Legionella bacteria either in tiny droplets of water or in droplet nuclei (particles left after the water has evaporated).

The incubation period is 2-10 days (usually 3-6 days).

General

It is possible that occupants of the University of Reading may be exposed to Legionella bacteria, which may be present in the water system.

The presence of Legionella bacteria in water does not itself constitute a danger. However, the mode of contracting the disease is by inhalation of water in an aerosol. An aerosol may be caused by spraying, showering, running taps etc.

Factors to be considered in the risk assessments

- contamination
- amplification
- transmission
- exposure
- host susceptibility

NB: it is not possible to contract legionella if one of the above is not present

Potential areas of contamination

Risk assessments have identified a number of groups that are potentially at risk;

- Staff
- Students
- Visitors
- General public

Areas of risk, where control is necessary

4.1 Cooling towers/Air Conditioning (AC) equipment
4.2 Showers and spray taps
4.3 Domestic hot water system
4.4 Tank/s and tank fed cold water systems
4.5 Infrequently used outlets
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2.0 RESPONSIBILITIES AND DUTIES

General

The University of Reading has responsibility for compliance with The Health and Safety at Work etc. Act. (1974) and all associated legislation. This includes specific legislation relating to Legionella, as set out in Appendix 1. This document should be read in conjunction with University of Reading Health and Safety Policy.

The management of Legionella in water is now controlled by a variety of different legislation. Responsibility for ensuring compliance with this legislation within the University of Reading for fixed water systems has been delegated to the Estates. Schools/Directorates are responsible for any non-fixed equipment that they own. "Safety Note 43 – Control of Legionella in Departmental Equipment" provides guidance on this aspect of Legionella control.

Responsibility for the implementation of the Control of Legionella bacteria within water systems (Policy and Procedures), along with the management of Legionella rests with the Duty Holder. The Duty Holder will appoint other 'duty holders' who will be responsible for management of the control of Legionella.

The Legionella Duty Holder/Responsible person will ensure that all appropriate personnel are familiar with the contents of the Control of Legionella bacteria within water systems (Policy and Procedures), insofar as it is relevant to their roles and responsibilities.

Legionella Duty Holder/Responsible Person

Ensure compliance with L8 policy, and HSG274
Ensure the monitoring regime is adhered to.
Ensure the Inspection regime is adhered to.
Order works from providers as necessary.
Update records as appropriate.
Maintain Web based data (Electronic & Web Portal).
Ensure compliance with policy and specification.
Facilitate any monitoring or inspection work.
Facilitate and ensure completion of any remedial work identified.
Ensure all necessary documentation is completed.
Responsible for the day to day operation of Legionella management programme.

Water Quality Consultant (Deputy Responsible Person)

Advise on all university water quality matters in order with the ACOP L8 document, and HSG274
Audit performance of contract (Using audit check list to review Risk Assessment, Schematic, Chlorination and other activities by contactor, reporting to Legionella Duty Holder).
Ensure compliance with policy and specification.
Provide cover for Legionella Duty Holder when not available.

Specialist Water Treatment Contractor

Ensure compliance with L8 policy, and HSG274
Carry out Risk Assessments, Chlorination & Schematics.
Carry out tests, as required, on water systems.
Carry out investigations and remedial works as instructed.
Carry out all weekly/monthly inspection/monitoring/maintenance tasks as instructed.
Ensure all necessary documentation is completed
Provide documentation in electronic format as directed by Legionella Duty Holder.

Head of Projects & Design

Ensure systems are designed to ensure compliance with the L8 document, and HSG274
Ensure systems are installed to ensure compliance with the L8 document, and HSG274
Note: Regulation HSW Act sections 3 and 6, ACOP 77, 78 and 80 (Hot and Cold water systems)
Ensure compliance with policy and specification.

Direct Labour Manager

Ensure compliance with L8 policy, and HSG274
Facilitate any monitoring or inspection work.
Ensure appropriately trained personnel available for L8 compliance works.

Heads of Department

Ensure compliance with L8 policy and HSG274
Ensure departmental equipment is maintained in house or by contractors to standard necessary for control of Legionella.
Keep records of departmental equipment servicing and maintenance.
Facilitate any monitoring or inspection work.
Ensure that **NO** modifications/alterations or additions to water systems are carried out, unless written approval is obtained from Legionella Duty Holder.

University Health & Safety Committee

Review Policy every 2 years**.**

Health & Safety Services Director

Ensure compliance with L8 policy, and HSG274
Where required, investigate and report to the University Health and Safety Committee on any alleged incident of accidental Legionella exposure, and also for ensuring correct reporting of incidents under RIDDOR, where appropriate. To notify the Occupational Health Service should any member of staff be involved in an incident of accidental Legionella exposure in order that medical advice can be given. Ensure that any accidental exposure is recorded in the employee's medical notes.

Project Managers / Consultants

Ensure compliance with L8 policy, and HSG274
Note: Regulation HSW Act sections 3 and 6, ACOP 77, 78 and 80 (Hot and Cold water systems)
Employ current Water Treatment Contractor to carry out Risk Assessment, schematic and chlorination prior to handover.

3.0 PROCEDURES FOR RISK ASSESSMENT

Classification
University of Reading buildings and equipment may fall into one of four categories, which are:

Class A - High Risk
Cooling towers associated with air conditioning systems. **Currently there are no cooling tower installations within the University.**

***Class B* - Medium Risk**
Large residential or academic premises, with cold water system fed via stored water and hot water supplied via calorifier/s with a pumped distribution or mains water system. Generally on these systems 2 yearly risk assessments, chlorination and schematic will be conducted but also additionally weekly flushing (where identified), monthly temperature monitoring, 3 monthly shower cleaning, 6 monthly tank inspections, annual calorifier cleaning and other works recommended in their individual risk assessment.

***Class C* - Low risk**
Small residential and domestic premises, including large complexes with self-contained living units. Typically the water systems are of the "domestic" type, with high turnover, i.e. with a cold water gravity-feed tank to a conventional copper storage cylinder. Generally on these systems 2 yearly risk assessments/chlorination/schematic will be conducted. Any additional work required will be presented to the Fund Holder for completion.

***Class D* - Very Low risk**
Small residential and domestic premises, including large complexes with self-contained living units. Typically the water systems are of the "domestic" type, with high turnover, i.e. mains water system with a combination boiler, having no tank or cylinder. Generally these systems can be desk risk assessed but a small percentage may be fully risk assessed every 2 years.

Risk Assessment

The University of Reading shall conduct risk assessments with schematics with respect to Legionella bacteria. These will be updated every two years or more frequently as determined by the risk assessment on:

- Existing buildings.
- New buildings.
- Building where major refurbishment has been undertaken.
- Change of use of a building.

The University of Reading will employ qualified and competent persons to carry out the risk assessment on its behalf. The risk assessments are held centrally by Estates.

The Responsible Person will instigate a review as required or on a 2 yearly cycle.

On completion of the risk assessment, a risk assessment report with a schematic drawing will be completed including an electronic logbook for each system.

4.0 AREAS OF RISK AND CONTROL

4.1 Cooling Towers associated with Air Conditioning Equipment

There are currently **NO COOLING TOWERS** in the University of Reading. Cooling towers may only be installed under exceptional circumstances which prevent the use of an alternative plant. Dispensation for their use can only be granted by the Responsible Person.

4.2 Showers and Spray Taps

Risk
A high level of spray and therefore aerosol will result with shower and spray tap operation. The risk of Legionellosis is higher, as infection can only occur if infected aerosols are inhaled. Risk can be reduced by cleaning and disinfecting shower or spray head/s.

Control
Clean, descale and disinfect shower and spray tap heads 3 monthly.
Each showerhead to be cleaned and descaled by the Specialist Water Treatment Contractor and recorded on the electronic system for on-going management

Emergency / showers, eye wash and spray taps
Should be subject to a 3 monthly flushing and disinfection maintenance regime. To be conducted by the Specialist Water Treatment Contractor.

It is the policy of University of Reading to remove any existing spray emission type taps and prohibit the installation of any new units. Taps that produce spray emission as a result of lime scale should be notified to Estates for replacement.

4.3 Hot Water System/s

Risk
The ideal growth temperature range for Legionella bacteria is 20-45°C. Temperatures between 20-45°C are not unusual in poorly managed or poorly specified water systems. The combination of the above temperature range with the presence of scale, debris and stagnation within a hot water system will result in Legionella growth.

Control
The University of Reading adopts a temperature regime for the control of Legionella in hot water systems by maintaining stored water at 60ºC, with a minimum return temperature of 50°C. Experimental data has shown at 50°C Legionella bacteria die within 2 hours, at 60°C death should occur within 2 minutes and at 70°C (pasteurisation temperature) instant death occurs.

Water should leave the calorifier/s at 60°C and should return at min 50°C.

Monthly, temperatures are recorded from sentinel taps (additional sentinels will be selected in complex buildings) and flow/return on calorifiers by the Specialist Water Treatment Contractor. All data to be provided electronically to Estates for further management.

Large or Commercial Systems

In large or commercial systems, due to high storage levels, stratification may occur in calorifiers. Therefore where possible a shunt pump should be fitted and set to operate via a time switch, which will heat the entire contents of the calorifier to 60°C for one hour per day. During low use period (01:00 – 06:00)

Where practicable, each system should be fitted with a circulation pump on the return leg.

Where practicable, each system should have sensors attached to the Building Management Systems (BMS) fitted to the flow and return legs. A daily log will be taken to confirm the correct operating temperatures.

Non-compliances must be reported immediately to the Legionella Duty Holder.

Each calorifier must be subject to an annual maintenance inspection. The calorifier is isolated from the building circuit, the shell is drained down, and internal surfaces are inspected then cleaned.

Immediately prior to a calorifier being returned to service a full pasteurisation process must be carried out. All data to be provided electronically to Estates for further management.

Small Water Systems

These are typically domestic residential premises. For such systems, the entire hot water system must be subject to disinfection **using chlorine** every 2 years.

4.4 Tank/s and Tank Fed Cold Water Systems

Risk

The ideal growth temperature range for *Legionella* bacteria is 20-45°C. Cold water temperatures of 20-25°C can be found in some domestic systems. Presence of debris, stagnation and non-approved materials will contribute to legionella growth. The aim is to maintain the water condition found in mains water. The maintenance regime is designed to keep temperatures below 20°C, and to keep debris and stagnation at a low level.

Control

The University of Reading adopts a temperature regime for the control of *Legionella* at the majority of the sites. Water temperature must not exceed 20°C.

Monthly temperatures are to be recorded from sentinel taps. More if within a complex system, by the Specialist Water Treatment Contractor. Records are to be returned electronically to Estates

Monitoring and maintenance of cold water tanks is described in (Appendix 3).
To include cold water storage tanks fitted to water heaters.

Recorded information must be returned electronically to ESTATES for on-going management.

The entire cold water system must be subject to chlorination every 2 years.

Where temperature control is identified as poor, alternative means of control will be undertaken:-

1 Evaluation of the building for spray outlets and frequency of use.
2 Increase sampling monitoring regime.
3 Review possible use of a chlorine dioxide unit.

Tank turnover

Use flow meter to determine actual usage over 12 hours, and adjust tank capacity to suit recommended storage capacity.

4.5 Infrequently Used Outlets

Risk
As low use of an outlet, will allow localised stagnation of water within the pipework. Stagnation results in higher cold water temperature due to warming, and lower hot water temperature due to cooling, resulting in water temperatures which are ideal for legionella growth.

Control
Water outlets that are unused for 7 days or more, must be flushed for 5 minutes on a weekly basis. Identification of such low use outlets can be during risk assessment, routine monitoring or by information provided by site. This is particularly applicable to areas such as disabled toilets.

The flushing can be undertaken by staff from:

Specialist Water Treatment Contractor
Estates Direct Labour.

Emergency showers and eyewash sprays, which are low use, will be subject to 3 monthly flushing or as recommended by risk assessment. Records will be returned electronically to Estates.

Areas which are disused, but still hold water within the system are considered as a Dead leg. Such unused or redundant pipework will be removed as soon as is practicable or drained down and clearly identified.

The following vacation arrangements have been made for some Academic Buildings, which will be unoccupied during holiday periods. L8 recommends that low use outlets are flushed weekly. Due to the high numbers of rooms in these building, the University of Reading will carry out the following procedures during holiday periods and other low use periods to ensure L8 compliance:

Flush the far ends of each floor on a weekly basis
Increase sampling for Legionella
Report to Estates if there is a change of use.
Recording will be conducted electronically.

Recorded information must be returned to Legionella Duty Holder for on-going management.

4.5.1 Terminology Amplification

Dead leg – a length of a water system pipework leading to a draw-off fitting, where little or no flow might occur.

Note This might include:

- Seldom or infrequently used fittings and cisterns.
- Hot water distribution pipe leading to taps that are not part of a secondary circulation.
- Cold water outlets with a TMV installed on system.
- All contribute to potential stagnation

Blind end, Dead end or Cut off ends - length of pipe closed at one end through which no water passes.

- Redundant or disconnected/capped pipework, short or long in length.
- Completely removing redundant pipe work. Where this is not practicable the pipe should be terminated so that any 'blind end' so created is no longer than twice the diameter of the pipe.
- This general principle should also be applied to fittings which by design incorporate areas which do not have a steady through flow of water.
  For pipework supplying fittings which are used infrequently i.e. fire supplies or water reuse systems with a back-up supply, appropriate backflow protection should be installed as close as reasonably practicable to the mains or supply/distributing pipe.

4.6 Drinking Water Distribution

Risk

Generally, the risk of Legionellosis is low, but can become significant in large water systems where, due to low use, stagnation can occur with warming because of poor lagging/location of pipework. This results in water temperatures in the 20-45°C range, control is required to ensure good through flow.

Control

Drinking water and drink dispensers should only be attached to the rising main, where possible. Supply from tank/s should be avoided but where not possible potable water must be appropriately labelled.
Tank supplied water (deemed drinking water quality by ESTATES, i.e. boosted) shall be monitored and tested 6 monthly. (Amplified in 4.17)

Drinking water outlets are to be located in designated areas and must be suitably labelled "Drinking Water".

The drinking water main, where reasonably practicable, is to supply at its extremity a urinal-flushing cistern, (or similar) programmed for 7-day operation in order to prevent water stagnation.

No alterations or additions to the drinking water supply can be made without written agreement from the Estates Legionella Duty Holder.

Estates must be notified by schools/department of any equipment that requires permanent fixture to the water supply.

4.7 Water Filters

Risk

Resin beds in water filters can act as a reservoir for bacteria and if breakthrough occurs, the supply system downstream may be contaminated with Legionella and other bacteria.

Control

For water filters, the regeneration period must be known and the service visits must be within a set period or as specified by the manufacturer (the usual period of change for domestic units is 6 monthly).

4.8 Stored Water Heaters:

Risk
Generally the risk is low but growth of legionella bacteria can occur where the temperatures are constantly maintained at 20-45°C.

Control
***Heaters with no storage*:** check for operation during risk assessment and bi yearly.
Heaters with up to 15 litres storage but with no header: Operate and maintain heater at 50-60°C. Temperature monitoring of these units will be conducted 3 monthly and adjusted to supply water at 50-60°C where appropriate.

Heaters with more than 15 litres and header tank: If holding tanks are fitted then the tank lid must be secured and the overflow screened. Temperature monitoring of these units will be conducted monthly and adjusted to supply water at 50-60°C where appropriate.

Combination Heaters with header tank: Tank lid must be secured and the overflow screened. Check internal condition, and temperature monitoring of these units will be conducted monthly and adjusted to supply water at 50-60°C where appropriate.

4.9 Vending Machines:

Risk
Generally the risk from Legionella is low, but other bacteria must be kept from proliferating by maintaining suitable temperatures within the units.

Control
The hot water supply temperature must be >70°C and the cold <10°C to meet the recommendations in the Automatic Vending Association (GB) Code of Practice. If filters are fitted to the cold water supply to the unit, these should be changed in accordance with manufacturer's recommended frequency. Vending machines must be supplied via a suitable potable source ensuring the length of pipework from the source (tee off point) for supply is as small as possible.

4.10 Water Softeners:

Risk
Resin beds in softeners can act as a reservoir for bacteria and if breakthrough occurs, the supply system, downstream, may be contaminated with Legionella and other bacteria.

Control
Hard/soft water checks should be carried out as required (normally at least weekly by the DLO) and recorded. The maintenance contract details should be available, which must include a periodic service/clean as indicated by the manufacturer of the unit or disinfection if necessary. The brine tank should be kept in clean condition and the softener back washed regularly preferably one backwash cycle in a day.

4.11 Fogging and Misting Systems (including horticultural misting systems)

Risk
A high level of spray/misting occurs when such systems are operated resulting in aerosol formation. There will also be periods of low use and therefore stagnation. The aim of the maintenance is to prevent stagnation.

Control
Glass houses around the University premises are fitted with fogging and misting systems.

a) Where UV lamps are fitted for bacterial control, the systems must be checked and serviced according to manufacturers' instructions (usually 6 monthly)
b) The water from the units must be manually purged as part of shut down
c) All wetted areas must be subject to disinfection as per risk assessment
d) Legionella sampling must be conducted as indicated by risk assessment

If any system has been installed by the department (other than Estates) then it will be their responsibility to meet the requirements of these procedures.

4.12 Materials in contact with water

Risk
Materials not approved by a Water Research Advisory Centre (WRAS) testing laboratory may provide nutrients to support microbiological growth.

Control
The best method to ensure compliance is to select products from the WRAS (Water Fittings and Materials Directory). Jointing materials such as natural rubber, hemp and linseed oil-based jointing compounds and fibre washers must not be used.

4.13 Legionella Sampling

Risk assessment at all sites will determine if Legionella testing is required. Generally, sampling may be conducted at larger Academic sites. Where sampling is undertaken, single samples will be collected from each hot and cold water system. Guidance is given in the appendix on interpretation of results.

4.14 Fume Cupboards with Scrubber Units

Quarterly measure tank temperature and note tank condition, clean if necessary.
Quarterly collect legionella sample.

For each bank of fume cupboards only one tank should be left operational. Other units must be drained down.

If installed by Department, then departmental responsibility, otherwise the responsibility of ESTATES. Recorded information must be returned electronically to Legionella Duty Holder for on-going management.

4.15 Thermostatic Mixing Valves (TMV's)

Assessment carried out by the Legionella Duty Holder to confirm if they are necessary.
Conduct annual service if directed by Legionella Duty Holder.
Remove if not required as stated in ACOPS.
Open and clean, replace defective parts and descale filter. Conduct fail safe test (type dependent)

4.16 Sampling of boosted/tanked water for drinking purposes

Risk assessment at all sites will determine if boosted/tanks water feed, all outlets including drinking water outlets for the building. Where tank water is found to be the supply of drinking water the following minimum sampling will be undertaken. Sample should be collected from the source tank and the furthest outlet at 6 monthly intervals. The samples will be subject to the following analysis: TVC, Coliforms and E.coli. All results sent back to Estates and logged on electronic system.

4.17 Expansion Vessels

Risk

Water stagnation within the expansion vessel at constant pressure. Lining may not be WRAS approved material.

In recognition that water stagnation and particulate accumulation can have detrimental effects upon water quality it is recommended that any fitting on a wholesome water system which accommodates expansion or pressure surges, such as expansion vessels, pressure accumulators and surge arrestors, be installed so as to avoid localised low turnover (stagnation) leading to the formation of biofilms and/or the accumulation of particulates. That is to say be installed in the vertical so that the fitting accommodating thermal expansion or a pressure surge is

Control

Where practical, flush through and purge to drain, as indicated by the risk assessment.
Where new expansion vessels are installed, ensure stop and drain off valves are fitted.
<10 litre expansion vessels:
Fit drain cock and stop valve, if not fitted, but flushing to be conducted only if poor microbiological results are recorded
>10 litre expansion vessels:
Fit drain cock and stop valve, if not fitted, conduct annual flush through and purge through drain.

Installation

1. Bottom fed and upright.
2. That the connecting pipework to the fitting: -
   - rises continuously
   - is kept to a minimum

Sized

3. Sized correctly for the system

System design

4. Designed to ensure an adequate turnover of water within the fitting.

4.18 Dental Equipment

Risk
High level of spray/aerosol near nose and mouth, which could cause legionellosis.

Control
Normal Dentistry practice to conform to Decontamination (Health Technical Memorandum 01-05, Decontamination in primary care dental practices)
Check at 6 monthly intervals and record.

4.19 F&E Tank, Closed heating pressurization units, Fire systems and little used appliances

Risk
Backflow from makeup water

Control
Cold water feed to these systems, will be low use, as water requirement for these units is intermittent. Effectively these are dead legs. Regular flushing of such outlets will not be possible.

For pipework supplying fittings which are used infrequently appropriate backflow protection should be installed as close as reasonably practicable to the mains or supply/distributing pipe.

5.0 MANAGEMENT PROCEDURE

General
Estates will store water records electronically for each building. Records for all control measures implemented, will be stored.
These will be held in the Estates building and will contain the following:

- Risk assessment for the system
- Schematic diagrams of the system
- Records of control checks taken
- Disinfection record certificates
- Records of any remedial work carried out

Audit procedures will be applied using in-house (Legionella Consultant) and/or external auditors. The legionella Duty Holder/Responsible Person will oversee the audit.

Specialist Water Treatment Contractor
Will carry out disinfections/s**,** risk assessment/s, schematic/s, sampling, monitoring, shower cleaning and other legislative works ensuring L8 compliance for the University.

Reporting

All reports will be sent electronically to Legionella Duty Holder from the contractor. The actions will be checked and authorised**.** Remedial works will be authorised and WRENs (Internal Work Orders) will be produced, where required**.**

Monthly Management Meeting

The outcome of defects, non-compliance and any other issues relating to water systems within the University of Reading will be reviewed at the monthly Legionella contract meeting. Actions undertaken will be recorded where necessary and minutes will be taken at the meeting.

Records

Estates

Records for legionella management are stored in the following manner

a) THE UNIVERSITY'S ELECTRONIC SYSTEM
This is an electronic system of data storage which allows data entry at the time of inspection. It is the system operated by the Legionella contractor. The data is stored electronically (requires password entry for authorised personnel). All records are stored within this system.

b) EDMS Extranet
All risk assessments, schematics and disinfection certificates and any other record provided will be stored as PDF files and are available for inspection through EDMS (Building Data – Water Quality) to authorised staff.

Individual University of Reading Schools/Departments/Directorates

Will ensure departmental equipment is serviced (including inspection, cleaning and disinfecting) and maintained to the standard required to control legionella bacteria. (see Appendix 33)
Individual Schools/Departments/Directorates will ensure records of servicing and maintenance are kept for at least 5 years. Records to be available for audit when requested.

6.0 SPECIFIC NON-COMPLIANCE PROCEDURE

Water Temperature
Non compliances are assessed and prioritised by the Legionella Duty Holder, on a day to day basis and action is taken accordingly.

Tanks and Calorifiers
Non compliances are assessed and prioritised by the Legionella Duty Holder, on a day to day basis and actions are taken accordingly.

Legionella – Action Level Guidance
Legionella testing will be conducted as and when necessary or if indicated by risk assessment. Typically, one hot water and one cold water sample will be collected from a single building. Action on the Legionella results should be considered in relation to the numbers of samples collected, the locations and the system particulars at the time of the results.

Action in the Event of Adverse Media Reports Regarding Legionella

If *Legionella* or other microbiological testing results are reported in the local or national media, then the following procedure must be followed:

1. Inform the University Communications Manager as soon as possible with as much information as possible, so they can prepare a statement for the press.

2. Do not speak to the press but guide them to the Communications Manager.

7.0 PROCEDURES FOR PROJECTS

All new water systems or modifications will be designed, constructed and installed in accordance with current legislation (see Appendix 1).

In order to ensure a consistent and compliant standard of delivery for all University of Reading projects, all final disinfection, risk assessment and sampling to project related works must be undertaken by the Universities incumbent Legionella Contractor.

It will be the responsibility of the Principal or Main Contractors to facilitate all the necessary arrangements with the Legionella Contractor, in accordance with the current agreed schedule of rates (available from Estates Legionella Duty Holder).

Project Managers to liaise with Estates Legionella Duty Holder when alterations are carried out which may affect the condition of the water supply. At a minimum compliance with BS EN 806-5:2012 Specifications for installations inside buildings conveying water for human consumption.

8.0 TRAINING

Staff involved in the management of water systems will be trained by a competent person to carry out their responsibilities.

The following training modules will be available for staff:

Training on all aspects of Legionella control.
Training for specific monitoring i.e. temperature testing, shower cleaning and flushing low use outlets.
Legionella Duty Holder will arrange training for Estates personnel.

APPENDIX 1

RELEVANT LEGISLATION, GUIDANCE AND STANDARDS

Health and Safety at Work etc. Act 1974 ~
Places general duties on employers and self-employed persons to ensure, as far as is reasonably practicable, the health, safety and welfare of all their employees, and persons other than their employees who may be affected by any of their undertakings. Employers must also ensure that the premises, and any plant or substance therein, are safe and present no risks.
Relevant legislation, guidance and standards to manage Legionella are set out below.

HSE Approved Code of Practice ACOP L8 2013 ~
The control of legionella bacteria in water systems. Provides technical guidance on the management of water systems for Legionella control.

Legionnaires' disease - Technical guidance - HSG274
The guidance is in three parts:

Part 1: The Control of Legionella Bacteria in Evaporative Cooling Systems.
Part 2: The Control of Legionella Bacteria in Hot and Cold Water Systems.
Part 3: The Control of Legionella Bacteria in Other Risk Systems.

BS EN 806-5:2012
Has been written in the form of a practice specification. It is the fifth part of BS EN 806 "Specifications for installations inside buildings concerning water for human consumption" which consists of five parts:

Part 1: General
Part 2: Design
Part 3: Pipe sizing — simplified method
Part 4: Installation
Part 5: Operation and maintenance

BS8558:2015 –
Guide to the design, installation, testing and maintenance services suppling water. Complementary guidance to BS EN 806

Control of Substances Hazardous to Health Regulations 2002 (as amended)
Apply to substances that are hazardous to health, including asbestos, and place specific responsibilities on employers, self-employed persons and employees. The regulations require a 'suitable and sufficient' assessment to be made of the risks and measures necessary to control substances hazardous to health arising from work. Employers are also required to maintain the control measures to provide information, instruction and training in relation to the risks and control measures; to monitor exposure of the employees to the substances and (where relevant) organise a health surveillance programme.

Water Supply (Water Fittings) Regulations 1999

With guidance from **Water Regulations Advisory Scheme (WRAS)** – provides an explanation of the water fittings regulations. Part of the WRAS guidance is provided in the Water Fittings and Material Directory which has information on materials which have been tested microbiologically and chemically and have been found to be appropriate for use with water systems.

Water Supply (Water Quality) Regulations 2010
Provides water suppliers with statutory limits on water quality with information on sampling, testing and monitoring frequency.

Private Water Supplies Regulations 2009 (with amendments)
Provides private water suppliers with statutory limits on water quality with information on sampling, testing and monitoring frequency.

Private Water Supplies Regulations 2009 Memo
Changes to Private Water Regulations 2009

BS8580 - 2019 Water Quality

Risk assessment for Legionella control – Code of Practice
Provides recommendations for risk assessment for legionella control in artificial water systems, covering the preparations, desktop appraisal, site visit/survey, reporting and review.

BS1710:2014

Specification for Identification of pipelines and services

APPENDIX 2

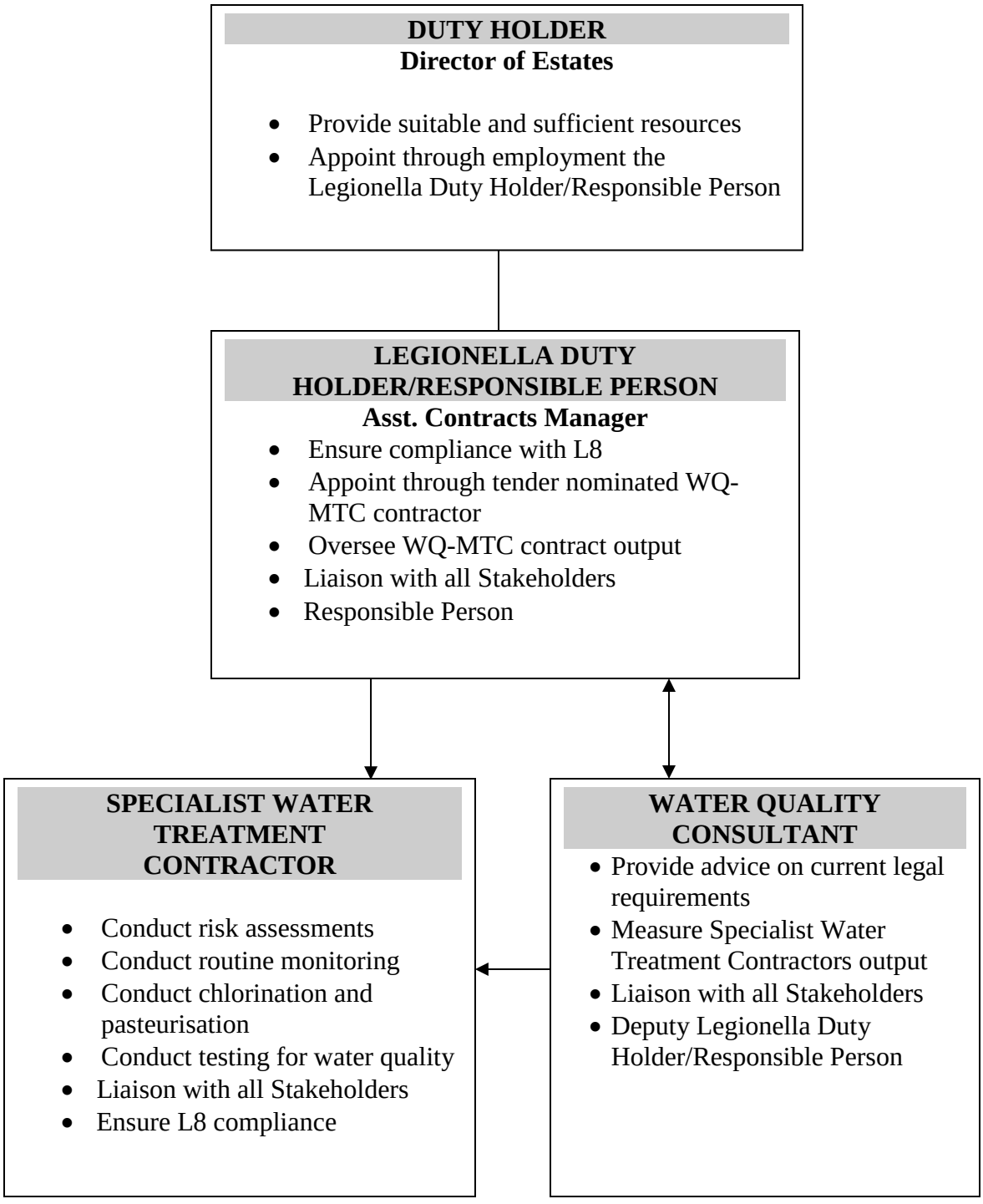
KEY CONTACT DETAILS

Title	Key Contact	Contact numbers
Duty Holder	Janis Pich	Tel : 0118 378 6044 Email: j.l.pich@reading.ac.uk
Legionella Duty Holder/ Responsible Person	Shane Benson (Asst. Contracts Manager)	Tel : 0118 378 8274 Mob: 07540803142 Email: Shane Benson
Water Quality Consultant (Deputy Responsible Person)	Girish Mistry Water Scientific Ltd 9 Trafford Road, Reading RG1 8JP	Tel: 0118 9453078 Mobile: 07973 254578 Email: Girish Mistry
Mobile:	SMS Environmental Ltd Gavin Harris (Managing Director) Maria Chiara Miraglia (Asst. Account Manager)	Tel: 01235 835 835 Mobile:07793 837365 Email: g.harris@sms-environmental.co.uk Mobile:07493 099 025 Email: m.miraglia@sms-environmental.co.uk
Specialist Water Treatment Contractor On Site Supervisor	Ryan Woodward (Site Supervisor)	Mobile: 07772 691506 Email: r.woodward@sms-environmental.co.uk

REQUIREMENTS - COLD WATER TANKS

Area	Action
Tanks <1000 litres	Storage Tanks are to be inspected annually by the Specialist Water Treatment Contractor with consideration to thermal insulation, lid condition, cleanliness, ball valve operation, overflow condition and general condition. Water temperature from the ball valve and tank must be tested.
Tanks >1000 litres	Storage Tanks are to be inspected 6 monthly by the Specialist Water Treatment Contractor with consideration to thermal insulation, lid condition, cleanliness, ball valve operation, overflow condition and general condition. Water temperature from the ball valve and tank must be tested.
Tanks in Domestic Houses	Storage tanks in Houses to be inspected 2 yearly during risk assessment by the Specialist Water Treatment Contractor with consideration to thermal insulation, lid condition, cleanliness, ball valve operation, overflow condition and general condition. Water temperature from the ball valve and tank must be conducted
Delay valves	Where possible tanks are filled with delayed action float valves or in the case of pumped services conductivity rod operated switches to allow for positive water displacement in the tank.
New tanks	New tanks to be partitioned or bypass installed to allow for the chlorination and cleaning of the tanks without interrupting the cold water/hot water service to the building. Where partitioned tanks are present, the procedure is to operate both tanks together except during chlorination and maintenance.
	The incoming feed to the tank is at the opposite end to the outgoing connections.
	New tank should be GRP sectional tanks externally flanged with integral insulation, and ditched bottom drain with a suitably sized drain for ease of cleaning.

RESPONSIBILITY FLOW CHART



PROCEDURE AND FORMAT FOR RISK ASSESSMENT

(In conjunction with UKAS 17020)

The risk assessment should be conducted as and when required, but UoR Policy requires it is conducted at least 2 yearly and also to be a live document.

The practical risk assessment must consider other Health and Safety risks.
The following type of reporting is required for all sites. Each risk assessment must of a similar or equivalent format.

Section 1: **Front page** with dated photograph of site. Indicating risk level and general description of site services

Section 2: **Asset Register**
Listing of all assets

Section 3: **Schematic**
To show the face view of building (or best angle)
Assets to be shown in locality of view or angle
Schematics to include

1. Staircases
2. Lift shafts
3. Any features which may identify location of plant
4. Entrance to building
5. Valves to be shown, on all water plant, attached to system where seen. (Including water meters, Non return valves, zonal valves etc.)
6. Sentinels and other key outlets as specified to be identified on schematic with bar code in legend.
7. Location of incoming mains and isolation valve.
8. Generally all items concerned with the water system must be included in the schematic (e.g. softeners, filters, expansion vessels, tmv etc.)
9. Schematics to be in unlocked pdf
10. Tank access location.

Section 4: Cold Water storage details
Description and detail of cold water storage including photographs

Section 5: Hot water storage details
Description and detail of hot water storage including photographs

Section 6: Temperatures
All sentinel taps to be measured for temperature. Additionally, in a large building, water temperature to be taken from hot and cold water services from 20% of the water system outlets.

Section 7: Hazard & Controls.
Location, description and actual amounts required e.g. remove Dead leg (how long, size of pipework, type of pipework, access, etc.) Include dated pictures of each hazard with reference number

Section 8: Operating and Maintenance Procedures
To be retained, but for each building only retain those services required.

Section 9: Water Regulations
To be the same format as hazards and controls, but to include if wastage, misuse, contamination, L8 non-conformance. Include pictures of each hazard with reference number.

Priority	Description	Action
1	Serious non-compliance	Immediate rectification
2	Significant non-compliance	Urgent rectification
3	General non-compliance	Planned rectification

Section 10: Photographs
Ensure all other photos taken have date, location and description labelled correctly.

PROCEDURE FOR TEMPERATURE MONITORING (MSPT21)

Ensure all equipment used for temperature monitoring is calibrated appropriately and calibration certificates are current.

Expectations

The hot water should be greater than 50 °C and less than 60°C
The cold water should be less than 20°C

Hot water

Run water from tap for 1 minute.
(At the fastest flow possible without causing high level of splashing or aerosols)
Record water temperature. The hot temperature should be between 50-60°C.

Cold water

Run water from tap for 2 minutes
(At the fastest flow possible without causing high level of splashing or aerosols)
Record water temperature. The cold temperature should be below 20°C

Flow and return from calorifiers

Where fitted with gauges on the flow and return.
Record the temperature indicated on the gauge.
Periodically check gauge reading by testing with a contact thermometer.
If the gauge reading is +/-3°C, report to Legionella Duty Holder.

Where no gauges are fitted, test using a contact thermometer.
Record flow and return temperatures when the temperature has stabilised.

The hot water temperature at the flow should be 60°C.
The hot water temperature at the return should be 50°C minimum.

TMV supplied taps and outlets

Run water from outlet to be tested (at the hottest setting) until the water temperature stabilises. Record water temperature.
Pipe temperature may be required if the TMV tap is a sentinel.
Select pipework to be measured.
Ensure the surfaces are bare metal.
Contact temperature probe to pipework (hot or cold) and hold until steady temperature is noted, while flushing the tap continuously.
The blended water temperature should be in the range 38-44°C.

Temperature monitoring from outlets is conducted monthly (sentinels) and annually (representative) from each system. In large water systems, numerous sentinels may be tested. Where temperatures are below expectations (non-compliance), then a report should be submitted to the Duty holder.

PROCEDURE FOR PASTEURISATION

Complete H&S Risk assessment – implement appropriate safe systems of work. The Specialist Water Treatment Contractor to liaise with Legionella Duty Holder detailing the impact on site of procedure to be carried out.

Warning notices to be placed in all appropriate places before work commences.

Adjust temperature control of the hot water vessel to achieve a homogeneous temperature throughout the vessel of >70°C.

Complete temperature profile of vessel – record results.

If it is not possible to maintain a homogenous temperature of >70°C for a period of 1 hour and sequentially pasteurise all outlets, then report as non-compliance and complete a chemical disinfection of the vessel in accordance with BS8558:2015 subject to customer approval.

Where it is possible to maintain a homogenous temperature of >70°C for a period of 1 hour and sequentially pasteurise all outlets, then maintain temperature at >70°C for a period of one hour, ensure all anti-stratification and secondary return pumps are operational throughout the process.

After the calorifier has been disinfected for an hour, sequentially run each hot water outlet fed from the calorifier for 5 minutes: ensuring the temperature recorded does not fall below 60°C.

After all outlets have been pasteurised, reduce the temperature of the vessel and outlets by flushing water to waste – ensure temperatures are just <60°C before running to service.

Remove all warning notices and return system to service.

Supply details to Legionella Duty Holder and record any non-compliance for monthly report.

PROCEDURE FOR FLUSHING AND PURGING INFREQUENTLY USED OUTLETS

The water systems at the University are regularly maintained by Estates, and are operated at temperatures to provide conditions that prevent the growth of the bacteria that cause legionnaires disease. However, there is a possibility that the bacteria might start to grow in parts of the water system when not in regular use.

L8 indicates that any outlet not used for 1 week (7 days) must be flushed. The flushing should be conducted weekly.

Little Used Outlets

When flushing a low use point bear in mind that the first quantity of water might be contaminated. Once this water has run through the risk is minimized. Therefore it is the first 30 seconds to 1 minute when the risk is greatest and it is essential that staff avoid contact with spray from outlets during this first flush through. Avoid contact with spray during other times where possible.

Flushing

When flushing showerheads and taps that have not been used for 7 days or more it is the first quantity of water that might be contaminated. Once this water has run through the risk is minimized. Therefore it is the first 30 seconds to 1 minute when the risk is greatest and it is essential that staff avoid contact with spray from outlets during this first flush through. Avoid contact with spray during other times where possible.

Showers

Run water from both hot and cold supplies, and warm if on a single mixer tap, through the showerhead for 5 minutes if not in use for a period of 7 days. Showerheads are designed to produce spray, which is why they should be run through a bucket of water so that no spray escapes into the atmosphere. In the absence of a bucket of water take showerhead off the bracket, and if possible lay it in the bath or shower tray before turning the taps on very low so that water flows gently out of it. If this is not possible point it into the base of the shower tray or bath. After 1 minute, the flow rate can be increased. If the showerhead is fixed, run the shower head very slowly for 1 minute then increase the flow for a further 4 minutes.

Taps

Run water from both hot and cold supplies, and warm if on a single mixer tap, through tap(s) for 5 minutes, if not in use for a period of 7 days. The water should be run slowly to avoid spray for 1 minute and can then run faster for a further 4 minutes.

Purging

Where it is difficult to carry out weekly flushing, the outlet concerned needs to be purged to drain before the outlet is used normally. Therefore the following procedure should be utilised:

Open the outlet slowly at first.
It is important that this is done with the minimum production of spray.
It may be necessary to use additional piping to purge to drain if it is envisaged that spray may be produced.

Run the outlet for 5 minutes before using the outlet.

Recording

Records should be kept detailing the time, date, location and name of the person who carried out the purging procedure either manually or electronically

Therefore the following procedure should be utilised:

1. Identify little used outlets as specified and verified from risk assessment.

2. Open the outlet slowly at first. It is important that this is done with the minimum production of spray. It may be necessary to use additional piping to purge to drain if it is envisaged that spray may be produced.

3. Run the outlet for 5 minutes before using the outlet.

4. It is envisaged that this procedure will only apply to outlets that are in areas difficult to access regularly and that all of the accessible outlets will be flushed weekly.

5. Records should be kept detailing the time, date, location and name of the person who carried out the purging/flushing procedure.

6. Leave working area clean and tidy.

When flushing the outlets, any difficulties or problems encountered (low flow, low pressure, intermittent flow etc.) should be noted and brought to the attention of the Legionella Duty Holder.

PROCEDURE ~ CHLORINATION

TANKS, CALORIFIERS and DOWN SERVICES (MSPT1)

The procedure for cleaning and disinfecting, complete hot and cold water system within the building.

1. WQ-MTC contractor to report to Legionella Duty Holder and to complete any necessary permits to work documentation.
2. Complete health and safety risk assessment and confirm if Confined Space Regulations 1997 apply – implement appropriate safe systems of work from WQ-MTC health and safety manual. Works Supervisor to inform relevant personnel that down water facilities may be interrupted.
3. Boilers to be turned off/isolated and calorifier temperature suitable to chlorinate.
4. Warning notices and '**DO NOT USE'** tape must be in place on all water outlets before work commences.
5. Identify foul drainage and mark up, surface water drainage must not be used for flushing of tank.
6. Close down service and make-up valves to the CWS tank.
7. Take dated photographs of tank internal condition before and after chlorination.
8. Drain the tank(s) using appropriate valve(s), (check oxygen levels of water within tank if necessary).
9. Mechanically clean out the tanks as thoroughly as possible (use extraction as required) swabbing sides (non-abrasive material) to remove any biofilm.
10. When cleaning complete, refill the tank with water and add dose sodium hypochlorite to achieve a free chlorine reserve of 50 mg/l. When chlorine is used as the disinfection agent, measure pH of the treated water to ensure it does not exceed 8.0 (refer to attached chart for the effect of pH on the efficacy of the chlorine). Chlorine concentration and pH to be measured in the stored water and sentinel outlets using a calibrated photometer, a comparator or an appropriate drop test kit to ensure exact measurement of chlorine concentration is achieved.
11. All outlets should be opened and run to ensure chlorine is distributed throughout the system (hot and cold water systems). Outlets other than sentinel outlets are to be tested on the high range potassium iodide paper until a dark blue colouration is achieved on the test paper.
12. When appropriate chlorine concentration is achieved at all terminal fittings, the outlets should be closed ensuring warning label or tape still in place clearly indicating that the facility is not to be used.
13. Do not allow the storage tank to empty during step 8 (or draw air into system).

14. The entire system must be left to soak as stipulated by BS8558:2015 and the HSC's Approved Code of Practice L8 – A minimum 1 hour contact period is to be achieved whilst ensuring the free chlorine concentration does not fall below 50 mg/l either at the CWS tanks, calorifiers or outlets. Record level of free chlorine after the 1hr period. Repeat disinfection will be required if the free chlorine level drops below 30mg/l. Inform Duty Holder if this occurs.
15. After the contact period of 1 hour is achieved, neutralise the disinfectant with Sodium Thiosulphate, drain the tank to foul sewer, then thoroughly flush tank and refill with fresh water.
16. Open the outlets, and flush system until chlorine concentration equals that of the incoming mains water, taking care not to empty the tank or draw air into the system. Remove warning labels.
17. Clean top of CWST/s and ensure all bolts have been fastened and lid/s sealed.
18. **Ensure system is fully operational, eg no air locks, temperatures achieved, return pumps and all associated valves working correctly.**
19. Leave working area clean and tidy.

EFFECT OF pH

WATER STORAGE TANK CLEANING AND DISINFECTION INCLUDING DOWN WATER SERVICES

HOCl	**H***	**OCl-**
Hypochlorous Acid **Killing Agent** **Active, but unstable form**	**Hydrogen Ion**	**Hypochlorite Ion** **Inactive, but stable form**
% Chlorine as HOCl	**pH**	**% Chlorine as OCl^-**
90	6.5	10
73	7.0	27
66	7.2	34
45	7.6	55
21	8.0	79
10	8.5	90

PROCEDURE ~ DISINFECTION USING PEROXIDE

TANKS, CALORIFIERS and DOWN SERVICES (MSPT1A)

The procedure for cleaning and disinfecting a water storage tank will vary from one installation to another. The details outlined below are specific and apply to the majority of systems. Supplementary detail would be included in the Work Instruction, which would accompany this document.

1 WQ-MTC contractor to report to Legionella Duty Holder and to complete any necessary permits to work documentation.
2 Complete health and safety risk assessment and confirm if Confined Space Regulations 1997 apply – implement appropriate safe systems of work from WQ-MTC health and safety manual. Works Supervisor to inform relevant personnel that down water facilities may be interrupted.
3 Close down service and make-up valves, to the CWS tank.
4 Drain the tank(s) using appropriate valve(s), (check oxygen levels of water within tank if necessary).
5 Take dated photographs of tank internal condition before and after chlorination.
6 Mechanically clean out the tanks as thoroughly as possible (use extraction as required) swabbing sides (non-abrasive) to remove any biofilm.
7 When cleaning is complete, refill the tank with water and add dose Peroxide to achieve a reserve of 50 mg/l.
8 All outlets should be opened and run to ensure peroxide is distributed throughout the system (hot and cold water system). All outlets are to be tested and verified.
9 When appropriate peroxide concentration is achieved at all terminal fittings, the outlets should be closed ensuring warning label's or tape are still in place clearly indicating that the facility is not to be used.
10 Do not allow the storage tank to empty, or draw air into system.
11 The entire system must be left to soak as stipulated by BS8558:2015 and the HSC's Approved Code of Practice L8 – A minimum 1 hour contact period is to be achieved whilst ensuring the disinfectant level does not fall below 50 mg/l either at the CWS tanks, calorifiers or outlets. Repeat disinfection may be required if the disinfectant drops significantly. Consultation with Legionella Duty Holder will be required.
12 After the contact period of 1 hour is achieved, drain the tank to foul sewer, then thoroughly flush tank and refill with fresh water.
13 Open the outlets, and flush system until peroxide level drops to near zero. Remove warning labels and tape.
14 Clean top of CWST/s and ensure all bolts have been fastened and lid is sealed.
15 **Ensure system is fully operational, eg no air locks, temperatures achieved, return pumps and all associated valves working correctly.**
16 Leave working area clean and tidy.

PROCEDURE ~ DESCALE CALORIFIER/BUFFER VESSEL AND INSPECTION (MSPT3)

1. Attend site and complete any signing in of permit to works procedure.
2. Complete a site risk assessment in the area of works and ensure all the requirements under the COSHH 2002 regulations are applied and implement all necessary safe systems of work.
3. Ensure that all operatives are wearing the PPE, appropriate for working with acidic chemicals and that all equipment complies with the requirements of the Personal Protective Equipment Regulations 2002.
4. Post any necessary warning signs and labels – including 'no smoking' signs.
5. Identify and mark foul sewer to which effluent is to be discharged – reference to site drawings should be made – NEVER DISCHARGE TO A SURFACE WATER DRAIN.
6. Ensure all permissions have been obtained from the water undertaker in order that discharge of effluent can be made to the sewerage system.
7. Inspect vessel to be de-scaled and ascertain material of manufacture so that the appropriate descaling agent can be chosen:
    a. For mild steel, welded steel, or copper calorifiers, Hydrochloric acid should be used (32% v/v) – dosage rate 10% of system volume.
    b. For galvanised steel calorifiers use sulphamic acid (Ca 98%) inhibited with ethoxylated amine for corrosion inhibition – dosage rate 10% of system volume.
    c. For stainless steel vessels use Phosphoric acid (32%) – dosage rate 10% of system volume - DO NOT USE HYDROCHLORIC ACID WITH STAINLESS STEEL.

    When descaling with any acid, some hydrogen gas may be evolved. Hydrogen is a flammable gas, and the working area should be well ventilated. Do not allow smoking or any other means of ignition in the area of work.
8. Disconnect or isolate cold water feed pipe – ensure all valves are holding.
9. Disconnect or isolate flow pipe and seal off any secondary hot water return pipe – ensure all valves are holding.
10. Remove any sacrificial corrosion anodes, and blank off apertures.
11. Electrically isolate vessel and implement lock off/ tag system to ensure electrical safety (This may be fully disconnected by site depending on site policy).
12. If there is a drain valve on calorifier, use this as pump connection point, in preference to the water feed inlet. Check that valve is clear and will pass water through at a reasonable rate. If necessary clear a passage through any blockage - there may be several inches of scale accumulation on the base of a calorifier.
13. Connect one de-scaled pump hose to the flow connection and one to the drain outlet (or alternative).

14. The pump connection to the lower point of the calorifier should always be through a valve. Power failure to the de-scale pump would result in the head-of-water in the calorifier over-flowing the de-scale pump tank; this can be prevented by closing the valve.

15. Hose connections should be made so that there is a closed circuit between the pump flow hose, through the calorifier, to the return hose. Venting of the carbon dioxide gas evolved is achieved through the pump tank filler cap aperture. The filler cap should be screwed on by no more than one quarter of a turn. This is sufficient to vent the gas, but at the same time reduces fumes and prevents splashes.

16. Connect the pump to a suitable earthed power supply - 110 Volt via a transformer. As the pump will be used in a damp location, a residual current circuit breaker plug top should be used.

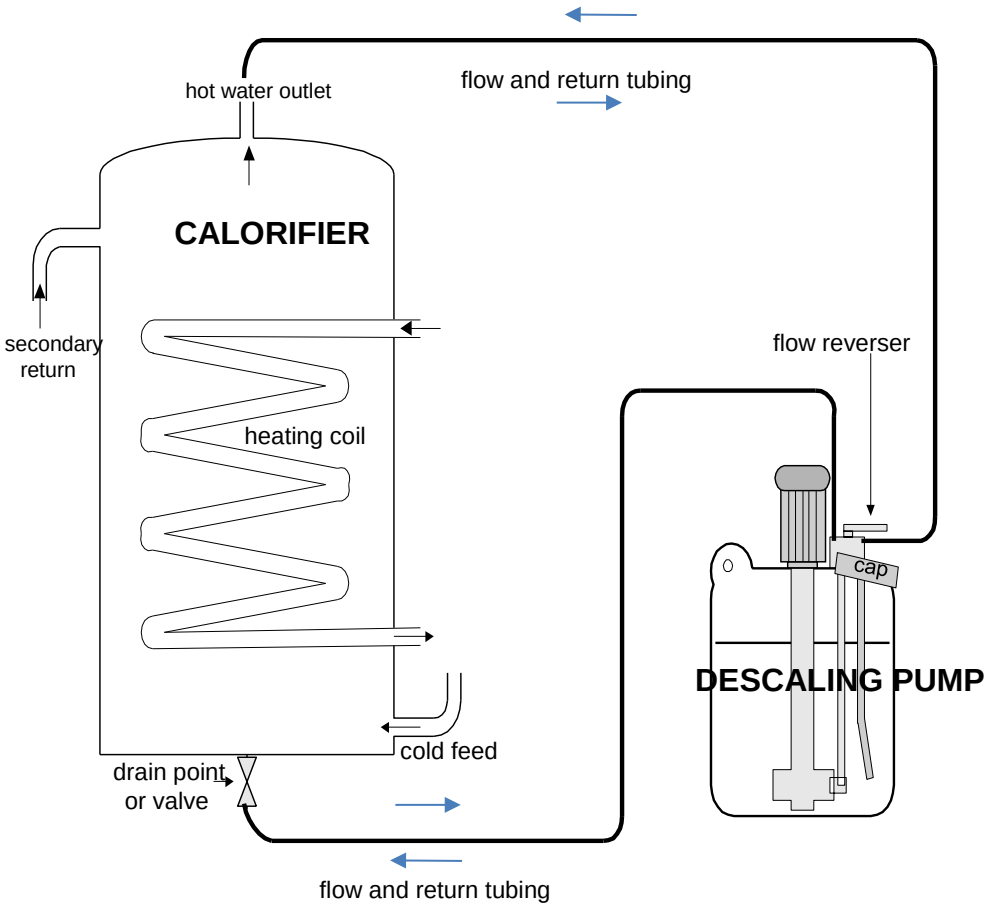


Figure 1: Typical installation of descaling pump and tank.

17. The flow reverser handle should point in the direction of flow of the liquid. Operate the handle so that it initially points towards the hose connected to the base/drain valve of the calorifier. The hose from the top of the calorifier will then be the return to the pump tank.

18. Prior to adding descaling chemical to pump tank, first 'prove' the circuit with fresh water alone. Add water to pump tank to approx. 8 cm above minimum liquid level, switch on pump, and immediately open the calorifier drain valve to allow circulation to commence. If water level drops initially, add more water to pump tank and check that all connections are tight.

19. To commence descaling, slowly add chosen descaling chemical into pump tank, waiting until liquid is returning into the descaling pump tank from the water heater and check to see if there is a rapid build-up of foam on top of the liquid in the pump. This may happen when there is a large build-up of reactive limescale in the base of the calorifier. If this is excessive, add a little anti-foam carefully to the pump tank to reduce the foam production.

20. As the pumping commences, bubbles will be seen in the return hose to the pump, indicating that limescale is being dissolved. Allow circulation through the calorifier and descaling pump to continue, briefly reversing the direction of flow periodically.

21. Check all connections regularly for tightness, and absence of leaks, and if foaming is excessive, carefully remove descaling pump tank cap and add more anti-foam to the descaling pump tank.

22. A pH meter or pH indicator paper should be used to check the pH of the descaling effluent. Once the pH has risen from 3.5 to 4, its ability to dissolve limescale is effectively spent and more descaling chemical or a fresh solution will be required.

23. The descaling procedure can be considered complete once the pH of the treated effluent stabilises at a pH of <3, as the neutralising effect of the hardness salt deposits within the vessel have all been used up and the effluent remains acidic.

24. If, after descaling has ceased the pH of the descaling solution is still < 5, then the remaining solution must be neutralised to bring the pH level above 5, and as close to 7 as practicable. This may be done by slowly adding sodium carbonate crystals to the tank of the descaling pump until there is no more effervescence as the crystals are added. If foaming is a problem during this operation, add a few millilitres of antifoam.

25. Check the pH of the descaling effluent once it has reached pH > 6.5 discharge to the agreed foul sewer, flush the calorifier with fresh water. Many natural waters are slightly alkaline, and therefore all that is needed is dilution to achieve a neutral pH within the vessel. Alternatively, circulate a 1% solution of sodium carbonate through the calorifier/Vessel for 15 minutes, drain, record time, and then flush with clean water once more.

26. At this stage any accessible calorifiers/vessels can be opened and internally inspected and any sediment and solids that are not acid soluble can be removed by vacuuming from the base of the vessel. Take dated photographs of the internal conditions of the vessel. Insert new gasket material and reseal vessel checking all connections.

27. Complete a thermal disinfection of the vessel in accordance with the requirements of the HSC Code of Conduct L8. On completion go to representative outlets on the system and test the pH for comparison with the pH of the incoming mains water supply to site. Flush all outlets if necessary.

29. Remove any warning signs and labels.

29. Reinstate or replace as necessary any sacrificial anodes.

30. Re-instate pipe work and any electrically isolated switches and controls.

31. **Ensure system is fully operational, eg no air locks, temperatures achieved, return pumps and all associated valves working correctly.**

32. Sign off any permits to works and record any discharge consent requirements.

33. Liaise with the point of contact on site and sign off all work sheets.

34. Provide all results in form of inspection report complete with dated photographs and certification.

35. Leave working area clean and tidy.

PROCEDURE ~ TANK INSPECTION

DOMESTIC SYSTEM (MSPT4a)

1 Take temperature at the ball valve and from the body of the water within the tank.

2 Internal inspection is carried out to determine the condition of the tank.

3 Internal condition, such as corrosion, sediment, slime must be reported.

4 Assess if complete turnover of water is occurring within 12 hours.

5 External inspection is carried out to confirm that the tank overflow is screened as is the warning pipe (if fitted), the lagging is well fitted and generally the tank is compliant with WRAS requirements.

6 Report is provided of the condition and with recommendations for improvement where required. Urgent recommendations are conveyed verbally and confirmed by email immediately.

7 Provide within report dated photographs of internal and external condition of CWST.

8 Clean top of CWST/s and ensure all bolts have been fastened and lid sealed.

9 Leave working area clean and tidy.

PROCEDURE ~ TANK INSPECTION

TANKS <1000 litres (MSPT4b)

1 Take temperature at the ball valve and from the body of the water within the tank.

2 Internal inspection is carried out to determine the condition of the tank.

1 Internal condition, such as corrosion, sediment, slime must be reported.

2 Calculate and determine if complete turnover of water is occurring within 12 hours.

3 External inspection is carried out to confirm that the tank overflow is screened as is the warning pipe (if fitted), the lagging is well fitted and generally the tank is compliant with WRAS requirements.

4 Report is provided of the condition and with recommendations for improvement where required. Urgent recommendations are conveyed verbally and confirmed by email immediately.

5 Clean top of CWST/s and ensure all bolts have been fastened and lid sealed.

6 Provide within report dated photographs of internal and external condition of CWST.

7 Leave working area clean and tidy.

PROCEDURE ~ TANK INSPECTION

TANKS >1000 litres (MSPT4c)

1 Take temperature at the ball valve and from the body of the water within the tank.

2 Internal inspection is carried out to determine the condition of the tank.

3 Internal condition, such as corrosion, sediment, slime must be reported.

4 Calculate and determine if complete turnover of water is occurring within 12 hours.

5 External inspection is carried out to confirm that the tank overflow is screened as is the warning pipe (if fitted), the lagging is well fitted and generally the tank is compliant with WRAS requirements.

6 Report is provided of the condition and with recommendations for improvement where required. Urgent recommendations are conveyed verbally and confirmed by email immediately.

7 Clean top of CWST/s and ensure all bolts have been fastened and lid sealed.

8 Provide within report dated photographs of internal and external condition of CWST.

9 Leave working area clean and tidy.

PROCEDURE ~ TANK INSPECTION AND SAMPLING (MSPT5)

TANK INSPECTION

1 Take temperature at the ball valve and from the body of the water within the tank.

2 Internal inspection is carried out to determine the condition of the tank.

3 Internal condition, such as corrosion, sediment, slime must be reported.

4 Calculate and determine if complete turnover of water is occurring within 12 hours.

5 External inspection is carried out to confirm that the tank overflow is screened as is the warning pipe (if fitted), the lagging is well fitted and generally the tank is compliant with WRAS requirements.

6 Report is provided of the condition and with recommendations for improvement where required. Urgent recommendations are conveyed verbally and confirmed by email immediately.

7 Clean top of CWST/s and ensure all bolts have been fastened and lid sealed.

8 Provide within report dated photographs of internal and external condition of CWST.

9 Leave working area clean and tidy.

TANK SAMPLING

The analysis conducted is Total Viable Count at 22°C and 37°C, Coliforms and E.Coli. The analysis is a general suite used for drinking water and provides suitable information of water condition.

Sample is collected in the following manner:-

1 Remove or open tank lid.
2 Take the lid of a sterile sample bottle and place carefully to prevent contamination.
3 Hold the body of the bottle and tip forward – dip into water within the tank.
4 Move forwards with the bottle opening leading – fill entire bottle.
5 Tip out water within the neck and replace cap.
6 Keep bottle cool (4°C) and return to laboratory within 24 hours for analysis.

E.coli and Coliforms are reported the next day and Total Viable Counts within 3 days.
Urgent recommendations are conveyed verbally and confirmed by email immediately.

PROCEDURE ~ CHECKING TMV FAIL SAFE (MSPT6)

Thermostatic mixing valves must be tested to determine if very hot water can be supplied to the outlet.

The following should be conducted:-

1. Turn off the cold supply to the TMV.
2. Wait a few seconds and check if there is flow at the outlet.
3. If the hot water is above 50˚C, then there should be no flow.
4. Fail safe check is considered satisfactory.
5. If the hot water is below 47˚C then there will be a flow and the failsafe check is considered complete, a repeat test will be required.
6. Repeat test should be conducted when the supply temperature is above 50˚C, when during cold shut off no water should be flowing from the outlet.
7. If hot water flows from the outlet during cold shut off above.
8. Report any non-conformances on TMV to Legionella Duty Holder.
9. Leave all working area clean and tidy.

PROCEDURE ~ SHOWER, EYEWASH, SPRAY, AND EMERGENCY SHOWERS, HEAD CLEANING (MSPT7)

1. Remove and dismantle shower head. Clean off any large particles and deposits.

2. Wear gloves, goggles and other appropriate PPE.

3. Soak heads and hose (if fitted) in Sulphamic acid solution (A) until scale deposits removed.

4. Rinse in clean water and brush off any remaining deposits.

5. Soak in chlorinated water solution (B) for 5 minutes.

6. Rinse in clean water.

7. Reassemble heads and reconnect to hose.

8. Flush and purge to drain 3-5 times volume of water in stagnant zone and record temperature.

9. Following flushing complete a test of the water from the shower. pH should be equal to that of the incoming main. Free chlorine concentration should be <1.0 mg.L^{-1} prior to returning the shower to service.

10. Leave working area clean and tidy.

NOTES

a) Solution (A) = Dissolve approximately 50g full Sulphamic Acid Powder to 1 litre hot water. Allow to cool and store in sealed labelled* plastic container. Depending on shower contamination the solution may be reused several times. (*Labelled "Sulphamic Acid solution -ACID/CORROSIVE").
b) Solution (B) = Dilute 10 ml Sodium Hypochlorite [stock solution?] in 1 litre cold water. (14% strength will produce approx. 1400 mg.L^{-1} free chlorine.) Depending on contamination this solution may be reused several times. Store in sealed plastic container (preferably black, and labelled STRONG OXIDISING AGENT": Do not mix with acid).
c) The shower hose fitting may also benefit from cleaning in the same way.
d) It is essential to rinse the shower head and container following the acid stage BEFORE immersing. Failure to do so will result in DANGEROUS GASES being given off.
e) Take care to avoid splashes of both solutions.
f) Care should be taken with metal finished components as prolonged contact with either solution may tarnish them.

PROCEDURE ~ WATER FILTER CHANGE (MSPT9)

1. Works Supervisor to report to Site Manager and to complete any necessary permits to work documentation.
2. Complete health and safety risk assessment and confirm if Confined Space Regulations 1997 apply.
3. Isolate electrical supply to unit via fused spur.
4. Isolate mains water supply to unit via isolation valve.
5. Locally isolate filter and remove.
6. Install new filter. For inline filter assemblies a directional arrow on the body of the filter denotes the flow of supply water.
7. For inline filter assemblies connect the supply side pipe work only and direct the open end of the filter into an appropriate receptacle.
8. Reinstate water supply and flush filter until discharge water is clear in appearance.
9. Isolate mains water supply and connect post filter pipe work.
10. Reinstate mains water supply.

Cartridge Type Assemblies

1 Once new filter is installed, reinstate mains water supply and flush through cold outlet tap until discharge water is clear in appearance.
2 Label new filter with current date and date of next replacement using permanent marker pen.
3 Reinstate mains water supply to unit and check integrity of isolation valves.
4 Reinstate electrical supply to unit.
5 Apply maintenance label to unit denoting:

a) Job number
b) Current Date
c) Date of next service

6 Leave working area clean and tidy.
7 Dispose of spent filter/s in line with Environmental Policy disposal recommendations.

PROCEDURE ~ STORAGE WATER HEATERS (MSPT10a)

Up to 15 litres

1. Up to 15 litres (changed from 20 litres) storage but with no header.
2. Check for operation between 50°C -60°C.
3. Temperature monitoring of these units will be every 3 months.
4. Notify Legionella Duty Holder of non-compliance.
5. Leave working area clean and tidy.

More than 15 litres

1. More than 15 litres.
2. Check for operation between 50°C -60°C.
3. Temperature monitoring of these units will be monthly.
4. Notify Legionella Duty Holder of non-compliance.
5. Leave working area clean and tidy**.**

Combination with header tank

1. Combination water heaters with header tank.
2. Check for operation between 50°C -60°C.
3. Temperature monitoring of these units will be monthly.
4. Annually check lid is secure and overflow screened, check internal condition of tank. Check for evidence of hot water flow back into tank
5. Notify Legionella Duty Holder of non-compliance.
6. Leave working area clean and tidy**.**

PROCEDURE ~ INSTANTANEOUS WATER HEATERS (MSPT10b)

1. With no storage.
2. Check for operation.
3. Temperature monitoring of these units will be bi annual. These will be checked during the two yearly risk assessment and alternate years.
4. Notify Legionella Duty Holder of non-compliance.
5. Leave working area clean and tidy.

PROCEDURE ~ LEGIONELLA TRAINING

(Specialist Water Treatment Contractor)

1 To assist the University in assessing the training requirements for the University's employees, at the University's discretion.

2 Provide the required expertise for the necessary Legionella awareness training for the University's staff.

3 Help raise awareness of Legionnaires disease by explaining how outbreaks might occur, and highlighting water systems that have a potentially high risk of developing the Legionella bacterium.

4 Provide information on the relevant legislation and requirements for compliance, and suitable for all staff, appropriate to their role:-

(a) Project staff
(b) Direct Employed Labour
(c) Building Managers
(d) Cleaning staff
(e) Other relevant groups

5 On successful completion, learners will have an increased understanding of Legionnaires' disease, including the potential consequences of an outbreak and the symptoms associated with the disease.

6 Employees should have an understanding of the importance in their roles within the University.

PROCEDURE ~ WATER SOFTENER (DISINFECTION) (MSPT12)

1 Ensure compliance with COSHH assessment.

2 Agree the method of works with the client or client's representative and complete any required permits prior to any work being commenced.

3 Isolate/Close outlet valves from softener.

4 If necessary by-pass the equipment to sustain services. Ensure that hand isolating valves are fully closed for the duration of the disinfection process.

5 Backwash the equipment thoroughly for 15 minutes.

6 Introduce a solution of NaOCL (Chlorine) at 0.3% - 0.5% with respect to available chlorine, educed through the injection system.

Note: The quantity required will be approximately 2% by volume of available resin.

7 Monitor the effluent from the system at the drain point and record the level of chlorine.

8 Isolate the equipment and shut down for a period of 60 minutes.

9 Thoroughly flush the system to remove excess chlorine and test at the drain to less than 1.0 p.p.m or the equivalent level provided by the water supplier.

10 Fully regenerate the system prior to reinstatement to service.

11 Certification is issued following disinfection, detailing the time and date of these works, and identifying the specification used.

12 Leave working area clean and tidy.

PROCEDURE ~ FOGGING AND MISTING SYSTEMS (DISINFECTION) (MSPT13)

1. Specialist Water Treatment Contractor to report to Legionella Duty Holder and to complete any necessary permits to work documentation.

2. Complete health and safety risk assessment and confirm if Confined Space Regulations 1997 apply – implement appropriate safe systems of work from health and safety manual. Works Supervisor to inform relevant personnel that down water facilities may be interrupted.

3. Warning notices and 'DO NOT USE' tape must be in place on all water outlets before work commences.

4. Close down service and make-up valves.

5. Locate the injection point for chlorinated solution. Pump into system using appropriate equipment.

6. All outlets should be opened and run to ensure chlorine is distributed throughout the system (cold water system).

7. When appropriate chlorine concentration is achieved at all terminal fittings, the outlets should be closed ensuring warning label's or tape are still in place, clearly indicating that the facility is not to be used.

8. The entire system must be left to soak as stipulated by BS8558:2015 and the HSC's Approved Code of Practice L8 – A minimum 1 hour contact period is to be achieved whilst ensuring the free chlorine concentration does not fall below 50 mg/l either at the CWS tanks, calorifiers or outlets. Repeat disinfection may be required if the free chlorine level drops significantly. Consultation with Duty Holder will be required.

9. After the contact period of 1 hour is achieved, neutralise the disinfectant with Sodium Thiosulphate, drain the tank to foul sewer, then thoroughly flush tank and refill with fresh water.

10. Open the outlets and flush system until chlorine concentration equals that of the incoming mains water. Remove warning labels.

11. If required take water samples as detailed in work instruction and submit to approved UKAS laboratory.

For more information on chlorination see MSPT1

PROCEDURE ~ FOGGING AND MISTING SYSTEMS (SERVICE) (MSPT14)

Glass houses with fogging and misting systems.

1. Where UV lamps are fitted for bacterial control, the systems must be checked and serviced according to manufacturers' instructions (usually 6 monthly). The service may involve the changing of the UV lamp and changing of filters.

2. The water from the units must be automatically purged as part of shut down.

3. Operate system; ensuring sufficient flow through is occurring. Check the UV Lamp is operational and adequate flow-through is occurring through the filter.

4. Legionella sampling must be as required as indicated by risk assessment. See MSPT19.

5. Leave working area clean and tidy.

PROCEDURE ~ LEGIONELLA SAMPLING (MSPT19)

Sampling to be conducted from sites as required or notified by Legionella Duty Holder. Each individual system is to be sampled. Usually 1 sample is collected from each system.
1 sample from cold water and 1 sample from hot water.

Sample collection

Cold water

1. Flush tap to be sampled for 2 minutes.
2. Record water temperature.
3. Take the lid off a sterile sample bottle and place carefully to prevent contamination.
4. Fill bottle to the neck and replace lid.
5. Keep bottle at room temperature and supply to the laboratory within 24 hours of taking sample.

Hot water

1. Flush tap to be sampled for 1 minute.
2. Record water temperature.
3. Take the lid off a sterile sample bottle and place carefully to prevent contamination.
4. Fill bottle to the neck and replace lid.
5. Keep bottle at room temperature and supply to the laboratory within 24 hours of taking sample.

Reporting

Legionella analysis takes up to 10 days for completion. However laboratories regularly inspect the plates and interim reports are issued.

Where interim reports are issued it means there is Legionella present in the sample. The receipt of such as result is forwarded immediately to the Legionella Duty Holder.
Report to show the following information:-

a) Location
b) Date of test
c) Time of test
d) System (Hot or Cold)
e) Name of Operative
f) Bar Code
g) Recommendations

The action required is determined by the Legionella Duty Holder, dependant on system operating information, temperature at the time of testing and on the type of Legionella Species present.

PROCEDURE ~ BACTERIAL SAMPLING (MSPT20)

The analysis conducted is Total Viable Count at 22°C and 37°C, Coliforms and E.Coli. The analysis is a general suite used for drinking water and provides suitable information of water condition. Varying numbers of samples are collected depending on the size and systems within the University. Samples are collected as below.

1. Flush tap to be sampled for 2 minutes.
2. Record water temperature.
3. Take the lid off a sterile sample bottle and place carefully to prevent contamination.
4. Fill bottle to the neck and replace lid.
5. Keep bottle at chilled or at 4°C and supply to the laboratory within 24 hours of time of sample.

Reporting

The laboratory provides results as soon as they are available. E.Coli and Coliforms are reported the next day and Total Viable Counts within 3 days. Poor results must be reported to the Legionella Duty Holder.

Urgent recommendations are conveyed verbally and confirmed by email immediately.

Report to show the following information:-

a) Location
b) Date of test
c) Time of test
d) System
e) Name of Operative
f) Bar Code
g) Recommendations

The action required is determined by the Legionella Duty Holder.

PROCEDURE ~ EXPANSION VESSEL INSPECTION

1 Check condition of vessel.
(Check for damage, dents, rusting, water marks from diaphragm entrance if possible)

2 Turn off pump set if applicable.

3 Check vessel pressure (raise hazard if water emits).

4 Isolate and drain vessel as much as possible (if no drain or isolation valve raise hazard for fitting).

5 Check air pressure with drain open to atmosphere.

6 Recharge with nitrogen (OFN) to correct pressure.

7 Record

- Serial number
- Dimensions (Length, breadth and max/min dia)
- Capacity (estimated if not known)
- Make and Model
- Location
- Pressure reading on vessel
- Photograph of vessel
- Photograph pressure gauge

8 Record all issues as hazards low, medium or high.

9 Fitted correctly YES/ NO.

PROCEDURE ~ CHLORINATION FOR CWS TANK(S)

The procedure for cleaning and disinfecting a water storage tank will vary from one installation to another. The details outlined below are specific and apply to the majority of systems. Supplementary detail would be included in the Work Instruction, which would accompany this document.

1 Specialist Water Treatment Contractor to report to Legionella Duty Holder and to complete any necessary permits to work documentation.

2 Complete health and safety risk assessment and confirm if Confined Space Regulations 1997 apply – implement appropriate safe systems of work from WQ-MTC health and safety manual. Works Supervisor to inform relevant personnel that down water facilities may be interrupted.

3 Identify foul drainage and mark up, surface water drainage **must not be used** for flushing of tank.

4 Close down service and make-up valves, to the CWS tank.

5 Drain the tank(s) using appropriate valve(s), (check oxygen levels of water within tank if necessary).

6 Mechanically clean out the tanks as thoroughly as possible (use extraction as required) swabbing sides (non-abrasive)to remove any biofilm.

7 When cleaning complete, refill the tank with water and add dose sodium hypochlorite to achieve a free chlorine reserve of 50 mg/l. When chlorine is used as the disinfection agent, measure pH of the treated water to ensure it does not exceed 8.0 (refer to attached chart for the effect of pH on the efficacy of the chlorine). Chlorine concentration and pH to be measured in the stored water, a comparator or an appropriate drop test kit to ensure exact measurement of chlorine concentration is achieved.

8 After the contact period of 1 hour is achieved, neutralise the disinfectant with Sodium Thiosulphate, drain the tank to foul sewer, then thoroughly flush tank and refill with fresh water.

9 Clean top of CWST/s and ensure all bolts have been fastened and lid sealed.

10 If instructed by Legionella Duty Holder/Responsible Person take water samples as detailed in work instruction and submit to an approved UKAS laboratory.

11 Leave working area clean and tidy.

EFFECT OF pH

HOCl	**H***	**OCl-**
Hypochlorous Acid **Killing Agent** **Active, but unstable form**	**Hydrogen Ion**	**Hypochlorite Ion** **Inactive, but stable form**
% Chlorine as HOCl	**pH**	**% Chlorine as OCl^-**
90	6.5	10
73	7.0	27
66	7.2	34
45	7.6	55
21	8.0	79
10	8.5	90

PROCEDURE ~ TMV SERVICE AND FAILSAFE

1. Mark the site address, the Job number, the date, the location and the type of TMV.
2. Wear gloves, goggles and other appropriate PPE.
3. Remove and dismantle TMV including valve mechanism, strainers, non-return valves and isolation valves (If practicable). Clean off any large particles and deposits.
4. Soak in sulphamic acid solution (A) until scale deposits removed.
5. Rinse in clean water and brush off any remaining deposits.
6. Soak in chlorinated water solution (B) for 5 minutes.
7. Rinse in clean water.
8. Reassemble TMV and replace 'O' ring gasket if required.
9. Turn on isolation valves and open outlet and run for 2 minutes then record mixed water temperature.
10. Isolate cold water supply to test the cold water failsafe. If hot water continues to flow to the outlet, then TMV has failed and will require a replacement. If the hot water has stopped, the TMV has passed the failsafe check, and may now resume normal service.
11. Record Temperature from incoming hot water.
12. Following flushing, complete a test of water from the TMV. pH should be equal to that of the incoming main. Free chlorine concentration should be <1.0 mg.L^{-1} prior to the outlet.
13. Check fail safe as MSPT6.
14. Leave working area clean and tidy.

APPENDIX 28

PROCEDURE ~ DESCALE TAP(s)

1. Arrange/notify appropriate Building manager of works to be carried out.

2. Use approved descaler/gel and allow full hour contact time.

3. Ensure inside of tap head is fully immersed/coated.

4. Lightly abrade with plastic scourer/wipe clean scale sediment, ensuring no damage is caused to tap.

5. Stubborn scaling repeat above process.

6. Rinse and wipe clean.

7. Leave working area clean and tidy.

MAINTENANCE PERIODS FOR THE UNIVERSITY OF READING

Area	Description	Frequency
Risk assessment	Risk assessment of all sites for water features likely to cause Legionellosis to be conducted every 2 years or less depending on the finding of the risk assessment	2 years or as required
Schematics	Usually conducted during disinfection of water system. Review to be carried out during disinfection	2 years or as required
Chemical Disinfection	2 yearly disinfection of all water systems with gravity feed cold water tank with calorifier. Domestic systems fed directly from mains with small heaters will be chlorinated by consultation with the risk assessment. CWST used for the supply of wholesome water.	2 yearly or dependant on risk assessment Yearly or dependant on risk assessment
Tanks Tanks (Drinking Quality)	>1000 litre internal inspection and temperature check <1000 litre internal inspection and temperature check Inspection and sample for TVC, Coliform, and E.Coli	6 month Annual 6 month
Calorifiers	Visual internal check with descaling as necessary	Annual
Showers	Cleaned and disinfected	3 month
Little used outlets	Flush outlet for 5 minutes (single point) Record temperature at start and finish	Every Week
Water Filters	Change as per manufacturers recommendations – usually 6 monthly	6 month

Area	Description	Frequency
POU Water heaters	Test 3 monthly – check correct operation temperature, adjust if required to maintain at 50-60°C	3 monthly
Combination Water Heaters	Inspect as CWST regime – Clean and disinfect as necessary. Temperature monitor at one outlet	Annually Monthly
Water Softeners	To ensure unit is operating satisfactorily conduct hard/soft test weekly Disinfect unit as per manufacturers recommendations	Weekly Annually
Fogging and Misting systems	If UV system fitted check for operation and clean filters as per manufacturer's instructions Automatically purge system when not operational Chlorination and sampling as per risk assessment	6 months Per risk assessment
Emergency showers and eye wash stations	Flush for >5 minutes, with minimum of spray on a periodic basis, or at least 5 x water volume ion stagnant zone	3 months
Legionella sampling	As considered necessary or where indicated by risk assessment , a single sample to be collected from each hot and cold water system	As necessary or as indicated by risk assessment
Bacterial quality sampling	Sample to be collected from cold water tank/s or drinking water outlets. Other systems as required.	As necessary or as indicated by risk assessment

GENERAL GUIDANCE - MAINTENANCE OF DIFFERENT PROPERTY TYPE

Area	**Responsibilities**	**Tasks to be carried out by**
Tenanted domestic residences	Water system controlled by tenant	*Specialist Water Treatment Contractor* Minimum 2 yearly disinfection and risk assessment review
Multi occupancy residences	Water system controlled by tenant Water system controlled by ESTATES	*Specialist Water Treatment Contractor* Minimum 2 yearly disinfection and 2 yearly risk assessment review *Specialist Water Treatment Contractor* Apply policy as all responsibility with University of Reading
Academic	Water system controlled by ESTATES and all areas accessible Water systems controlled by ESTATES but local non fixed systems by Departments	*Specialist Water Treatment Contractor* Apply policy as all responsibility with University of Reading *Departments* Ensure risk assessments carried out in local area and follow University of Reading Policy *Specialist Water Treatment Contractor* Apply policy as overall responsibility with University of Reading
All other areas	Water system controlled by ESTATES	*Specialist Water Treatment Contractor* Apply policy as overall responsibility with University of Reading

SPECIFIC NON COMPLIANCE PROCEDURE

Water temperature

Non-compliance is assessed by the Legionella Duty Holder on a day to day basis and prioritised and actioned accordingly.

Defect	Action	Period allowed
Hot water temperature above 70°C	Raise Wren to reduce temperature (Priority 1).	Immediate 1 Day
Hot water temperature above 60°C	Raise Wren to reduce temperature (Priority 2).	1 week
Hot water below 50°C	Raise Wren to increase temperature (Priority 2).	1 week
Cold water constantly >20°C	Determine reason for high temperature Action such as weekly flushing, tank lagging, tank volume reduction, pipework lagging etc./ may be required	2 months

Tanks and Calorifiers

Defect	Action	Period allowed
Cold water tank below current guidance requirements	Replace or refurbish	12 months
Calorifier drain not operational for desludging or sampling	Raise Wren to repair or replace drain unit (Priority 3)	1 month
Calorifier below current guidance requirements	Replace or refurbish	6 months

APPENDIX 32

LEGIONELLA – ACTION LEVEL GUIDANCE

The notes below are just for guidance; interpretation of the results should be conducted by a competent person or independent consultant.

Legionella testing is conducted on a regular basis around the site. Typically from a single building one hot water and one cold water samples are collected as required.
The guidance on Legionella results should be considered with numbers of samples collected, locations and system particulars at the time of the results.

Type of bacteria	Number of bacteria	Action	No of days for action to be completed
Legionella pneumophila serogroup 1	>1000 cfu/l (Hot or Cold)	System shut down Disinfect Immediately	1 day or 24 hours
	Up to 1000 cfu/l	Hot Water Keep hot water at pasteurisation temperature Cold Water Chemical disinfection of water system Shut down shower systems.	3 days or 72 hours
Any *Legionella Species other than L. pneumophila* serogroup 1	>7,000 cfu/l	Hot Water Keep hot water at pasteurisation temperature Cold Water Chemical disinfection of water system Shut down shower systems.	3 days or 72 hours
	>1000 cfu/l	Hot Water Keep hot water at pasteurisation temperature Cold Water Chemical disinfection of water system Shut down shower systems.	7 days or 168 hours
	Up to 1000 cfu/l	Pasteurise hot water system and flush cold water to full system turnover	14 days or 336 hours

After completion of actions as indicated above, the system must be tested by sampling to ensure that, the actions taken have resulted in a significant reduction of legionella levels.

Health and Safety Services Safety Note 43

The control of *Legionella* in departmental equipment

Scope

This Safety Note applies to the control of Legionella in items of equipment that are not considered to be part of the building fabric and which are susceptible to colonisation by Legionella. Such equipment would contain water which is held or recirculated at a temperature between 20 – 45oC, and would not be maintained by Estates (E &F). In this context, the term "departmental" applies equally to Schools, Departments or Units.

The control of Legionella in most areas of the University is described in the Control of Legionella Bacteria within Water Systems Policy and Procedures document (Ref. 1), which has been produced by the Maintenance Services department of ESTATES. This policy applies to the water systems which are considered to be part of the fabric of each building, and is designed to ensure compliance with the Health and Safety Commission (HSC) Approved Code of Practice for the control of Legionella bacteria in water systems, L8 (Ref. 2). The policy sets out the responsibility for preventing or controlling the risks arising from systems that may be contaminated or colonised by Legionella bacteria. The associated procedures do not refer in detail to items of equipment which are owned, operated and maintained by Schools, Units or Departments. In such cases, the responsibility for ensuring control of any risks that may arise from Legionella is devolved to the relevant Heads of School or Unit Managers.

Responsibilities and Duties (*See section 2 of the Control of Legionella Procedures document.*)

Heads of Schools, Directorates, Departments and Units that possess equipment to which this Safety Note applies are regarded as duty holders within the meaning of the *Control of Legionella Bacteria within Water Systems Policy & Procedures* document. Their prime responsibilities are to:

1. Ensure compliance with the requirements of the Approved Code of Practice, L8;
2. Ensure that departmental equipment is maintained to the standard necessary for the control of *Legionella*.
3. Provide suitable and sufficient resources to enable compliance with the Policy document in so far as it affects equipment under their control;
4. Keep records of departmental equipment servicing and maintenance;
5. Facilitate any monitoring or inspection work;
6. Ensure that no modifications/alterations or additions to water systems are carried out, unless written approval is obtained from the ESTATES Legionella Duty Holder.

Where a School or Unit is responsible for the maintenance of individual items of equipment at risk of colonisation, the School/ Unit is also responsible for minimising the likelihood that the equipment may be colonised by Legionella, and ensuring that it does not present a risk of infection when the equipment is used, maintained or repaired.

Hazard identification, risk assessment and control

The first priority is to identify all departmental equipment at risk of colonisation, and then to assess the magnitude of the risk. The risk assessment must also identify those persons at risk, for example because of their duties in respect of use, cleaning, adjustment or maintenance of relevant items of equipment. Sampling for Legionella is not normally required or recommended, unless the need is identified by the risk assessment.

Anyone who is allocated duties under this requirement must be given suitable information, instruction and training to enable them to understand the nature of the risks, and to undertake their duties in a safe manner.

Following the risk assessment, appropriate control measures must be put in place. In most cases, this would be by the establishment of a suitable cleaning and/or maintenance schedule, which may also involve the use of suitable biocides. The equipment manufacturer should be consulted regarding "suitability" of any biocide being considered for use. Note that the use of biocides will require a COSHH assessment before being undertaken.

The prevention and maintenance schedule must be operated in such a way that exposure to any contaminated aerosols is either prevented, or (if prevention is not possible), minimised. Note that exposure minimisation must not rely on the routine use of respiratory protective equipment (R.P.E.): there are no items of R.P.E. that are certified to provide protection against infection by airborne biological agents, as only one viable organism/ contaminated droplet of water may be sufficient to cause infection.

The highest risk of colonisation or contamination of equipment will arise where water is stored or recirculated in the critical temperature range of 20o – 45oC (peaking at 37oC), but temperatures outside this range may also present a risk. Equipment producing sprays of fine droplets of water will create the greatest risk of exposure.

Guidance:

Examples of such items of equipment include:

- Laboratory water baths;
- Water-jacketed incubators;
- Humidification equipment (however, most examples are covered under the *Legionella* policy document);
- Items of equipment containing an integral water cooler or water purifier;
- Vending machines that are not permanently plumbed into the building water system, and
- Other equipment where stored water could be recirculated at room temperature and where there is a potential for the dissemination of water droplets containing viable *Legionella* bacteria.

Note that some equipment such as vending machines dispensing drinks may well be under a maintenance contract from the manufacturer/ supplier. The terms of the contract should be carefully studied to examine whether (for example) routine cleaning is included. **See also the Estates "*Policies and Procedures*" document, section 4.9.**

Control procedures

Recommendations for specific items of departmental equipment are:

1. **Laboratory water baths recirculating or storing water between 20 – 45^{o}C**
   If possible, the water bath should be thermally disinfected on a monthly basis, by increasing the temperature to >60^{o} and maintaining the increased temperature for 30 minutes. After treatment, the water should be disposed of to drain without splashing, and the bath thoroughly cleaned and descaled before being refilled with deionised or distilled water. Using deionised or distilled water will reduce the accumulation of limescale, which can harbour biofilms / *Legionella* organisms. If thermal disinfection is not possible and the volume of water contained is large, it may be impracticable to regularly drain the water. In such cases, the use of a chemical biocide may be necessary – the manufacturer of the water bath should be consulted to identify suitable chemicals that are compatible with the equipment. In all cases, measures must be taken to prevent splashing both during use and cleaning/ maintenance.

Case study:

Laboratory water baths operating in the critical temperature zone are liable to support a thriving population of *Legionella,* and even baths operating at a lower temperature (<20°C) may become contaminated, but the growth rate of the organisms is reduced. Baths regularly operated at temperatures > 55°C are normally free of *Legionella*.

Normally, the risk of dissemination of contaminated water droplets is low, but if a stirrer or recirculation Pump is fitted to the water bath and the water level is allowed to drop to expose the top of the stirrer paddles, then there is an increased risk of splashing and aerosol generation. Older-style shaking water baths also present a risk of aerosol generation.

2 **Water jacketed incubators**

Water-jacketed incubators contain water which is normally held at the operating temperature of the incubator. This is normally only ever drained if the incubator is moved to a new position, or repair is required. The water contained within the jacket may be in place for years, and may become heavily contaminated by biofilms and Legionella, as the water within the jacket is normally static. During normal operation, topping-up of the water jacket may be the only routine operation that is undertaken. This operation presents a minimal risk of exposure to contaminated aerosols, for example, when the filling-port is opened. By contrast, if the incubator has to be moved, or the water-jacket drained down for repair, then there is a greater potential for exposure to contaminated aerosols. This operation must be done in such a way that splashing and generation of aerosols is minimised. A flexible hose should be attached to the drain port, and the drainage water directed into the waste pipe of a sink. Flushing deionised water through the water jacket should minimise recolonisation. When the jacket is refilled to bring the equipment back into use, deionised or distilled water should be used. Many such incubators have a copper water jacket, which may in itself have an initial biocidal action against *Legionella* and so minimise recolonisation.

3 Departmental water purification equipment

Most Departmental water purification equipment (such as water softeners - see Section 4.10 of the *Control of Legionella* policy document) are permanently plumbed into the water supply for the building. Such systems would normally be the responsibility of Estates Maintenance, as they are considered to be part of the building fabric. Departmental staff may however be involved in the routine regeneration of resins in the equipment, and they must be made aware of the possibility that the waste water arising during regeneration may be contaminated by *Legionella*. Disposal of the waste water must be effected without splashing or aerosol generation.

Servicing or maintenance of such units is frequently under a maintenance Contract with the manufacturer of the equipment: the manufacturer's recommendations should be followed. The results of any water quality control checks required by the equipment manufacturer must be recorded and returned to ESTATES Maintenance.

In some cases, specific items of equipment may be purchased with their own integral water purification systems. **Such systems must not be plumbed into the building water supply without prior approval from Estates.**

The manufacturer's recommendations and instructions should be followed if cleaning and routine maintenance is undertaken by Departmental staff. The results of any quality checks must be recorded and returned to the Estates Legionella Duty Holder.

Guidance:

Examples include units to provide ultra-pure water for analytical instruments in laboratories, reverse osmosis units; hollow-fibre cartridge water purifiers etc.

However, note that biocidal action requires the presence of free Copper ions, usually at a pH of 5.5 or less. Once water in the jacket has been in place for several weeks, the copper will be covered in a thin oxide film, which will prevent any further dissociation of copper ions into the water.

Normally, the ultra-pure or High Quality (HQ) water produced by the unit is not liable to be contaminated: it is the "feed" side of the unit which may become contaminated by the growth of a biofilm, especially if the water velocity through the unit is low. In a cartridge unit for example, development of a biofilm would be evident from the reduction in flow and increase in pressure required to generate a given volume of ultra-pure water. The manufacturer's instructions should be followed for cartridge / membrane regeneration, but operators must be made aware of the probability of *Legionella* contamination in the flush water. Splashing and aerosol generation must be avoided when disposing of the effluent.

4. Items of susceptible equipment in University-owned buildings

There may be several types of equipment to which this description applies, and where the equipment is the property of the building occupant (tenant). Unless the tenant has an arrangement with Estates to undertake maintenance of the equipment, the responsibility for ensuring that the equipment remains free from risk of colonisation by or dissemination of *Legionella* remains with the building tenant.

5. Items of susceptible equipment that are the responsibility of Estates Maintenance and the Specialist Water Quality Contractors.

Equipment such as emergency drench showers and emergency spray heads in laboratories are the responsibility of Estates Maintenance, who will arrange for risk assessment and any associated control measures such as regular flushing (normally undertaken by Estates Maintenance or by the Specialist Water Treatment Contractor). IF Departmental staff are involved in flushing of emergency showers/spray heads, the flushing operation must be undertaken in such a way that creation of aerosols is avoided, and any potentially contaminated water discharged to drain without splashing. A suitable system of work should be identified by the risk assessment.

References

1 *Control of Legionella Bacteria within Water Systems* – Policy and procedures document issued by Estates.

2 *Legionnaires' disease: The control of Legionella bacteria in water systems.* Approved Code of Practice and Guidance. Health and Safety Commission, ref. L8. HSE Books, 2000, ISBN 0-7176-1772-6

SAFE OCCUPATION OF NEW/REFURBISHED BUILDINGS AND SAFE SHUT DOWN OF WATER SYSTEMS

This section identifies the control measures in place to mitigate against the risk from legionella bacteria within the risk systems identified in the policy and where appropriate, design and operational guidance for those undertaking new installations or refurbishment projects.

Operation of Systems - General

Occupation of New/Refurbished Buildings

Where new or refurbished buildings or parts of buildings are occupied, there is a risk of legionella bacteria growing to high numbers within the water systems, particularly if there is a delay between completion/handover of an area and its' occupation.

Project managers and others responsible for the delivery of capital or refurbishment works shall ensure that any water systems are cleaned and disinfected immediately before occupation & suitable precautions measures to protect against contamination, e.g. regular recorded flushing, is implemented during any commissioning or pre-occupancy period.

Where it is anticipated that there will be a delay in occupation of greater than one week, the project manager or other responsible person shall notify the Legionella Duty Holder.

Arrangements should take into account the complexity of the system(s) concerned, any activity or partial occupation of the area and any requirement for operation of the systems during the delay period. Depending on the outcome of these discussions, options may include:

- Implementation of the procedure for "Temporary Closure"
- Implementation of the procedure for "Indefinite Closure"
- A combination of the above, or other arrangements deemed appropriate to the risk.
- Any arrangements implemented should be documented

Closure or vacation of buildings or parts of buildings

Where a building or part of a building is to be closed or vacated for a period of greater than relevant Project Manager (Building Manager) must notify the Legionella Duty Holder to discuss appropriate management arrangements to reduce the risk of legionella contamination.

In general, if the unoccupied period is anticipated to be less than 60 days, then the procedure for "Temporary Closure" should be implemented.

If the closure is anticipated to be in excess of 60 days or is indeterminate, then the procedure for "Indefinite Closure" should be implemented. Project managers should note that, where works are involved in implementation, a recharge for these will be made. Where the procedure for "Indefinite Closure" has been implemented, the following information should be supplied at least one month to any re-occupation:

- Intended date of occupation.
- Any change in use of the building or area.
- Any areas which will not be used.
- Any works undertaken on any of the risk systems within the building or area.

Note: that before any water systems are returned to service following an "Indefinite Closure", modifications and/or maintenance will be required and the system will be chlorinated in accordance with "Procedure MSPT1" Complete chlorination (Hot and Cold).

Safe Shutdown of Water Systems (Temporary Closure)

This procedure may only be used where systems, or parts of systems, are to be placed out of use for a period of less than 60 days and MUST be used in conjunction with Procedure MSPT8 Flushing unused outlets.

Domestic Hot Water Systems

Pasteurise Calorifiers and the Hot Water Systems in full.
Switch off secondary circulating pumps, de-stratification pump (if fitted) and close calorifier feed valve.
Isolate primary heat source(s) to calorifier(s) including immersion heater(s) if fitted.
Identify suitable flushing points and set up a flushing regime. Initiate flushing regime until site is to be reopened.

Cold Water Systems
Inspect CWS Storage tank, ensuring lids, screens, etc. are in place, overflow arrangements are operational and clear of any obstruction and ball valve is operating correctly. Record tank temperature.
Inspect any water pressure boosting system, ensuring that pressure switches are operating correctly and auto pump changeover arrangements (if fitted) are operational.
Identify suitable flushing points and set up a flushing regime. Initiate flushing regime until site is to be reopened.

Safe Start Up of Water Systems (Temporary Closure)

This procedure may only be used where a system, or part of a system, has been out of use for maintenance purposes for less than 7 days, OR where a system, or part of a system, has been out of use for up to 60 days AND a record of flushing of outlets is available for inspection. If a record of flushing is NOT available, then Safe Start Up of Systems (Indefinite Closure) MUST be followed.
Inspect system(s) and confirm operational status.

Domestic Hot Water Systems

Carry out Pasteurisation of Calorifiers/Hot Water Systems in full.
(Switch on secondary circulating pumps, de-stratification pump (if fitted) and open calorifier feed valve.
Initiate primary heat source(s) to calorifier(s) including immersion heater(s) if fitted)

Cold Water Systems

Inspect CWS Storage tank, ensuring lids, screens, etc. are in place, overflow arrangements are operational and clear and ball valve (fitted) is operating correctly. Record tank temperature.
Inspect any water pressure boosting system, ensuring that pressure switches are operating correctly and auto pump changeover arrangements (if fitted) are operational.
Purge and flush water from all outlets on site. Record in logbook system.
System is ready for reoccupation

Safe Shutdown of Water Systems (Indefinite Closure)

Domestic Hot Water Systems only

Carry out Pasteurisation of Calorifiers/Hot Water Systems in full.
Switch off secondary circulating pumps, de-stratification pump (if fitted) and close calorifier feed valve.
Isolate primary heat source(s) to calorifier(s) including immersion heater(s) if fitted)
Desludge calorifier via drain and allow system to cool.
System will remain charged and therefore ensure the Building is kept cold

Domestic Cold Water Systems

Clean and disinfect cold water tanks.
Isolate & label incoming water supply & water booster equipment (if fitted).
System will remain charged and therefore ensure the Building is kept cold

Safe Start Up of Water Systems (Indefinite Closure)

Inspect system(s) and confirm operational status. If necessary refer to Facilities Team to confirm procedure or for further advice.

Inspect CWS storage tank, ensuring lids, screens, etc.. are in place, overflow arrangements are operational and clear and ball valve (if fitted) is operating correctly.

Carry out Chlorination of Water System including the mains water system. Chlorination should be conducted with a 4 hour contact time.

Ensure that all parts of the system are filled and free of airlocks.
Inspect any water pressure boosting system, ensuring that pressure switches are operating correctly and auto pump changeover arrangements (if fitted) are operational.

Reinstate secondary DHW circulation & de-stratification pumps (if fitted).
Reinstate primary heat source to calorifier including immersion heaters (if fitted). Ensure DHW temperature control(s) are operational and set at 60^0C.
When DHW calorifier temperature has reached 60^0C. allow one hour for temperatures to stabilise and undertake standard monthly temperature checks.

PROJECT AND DESIGN REQUIREMENTS/HANDOVER

As a minimum, for new installations or major refurbishment, the Contract should require the following documents and drawings to be supplied to the Legionella Duty Holder/Responsible person for the UOR.

- Risk assessment for the control of legionella. (In accordance with BS 8580 -1:2019)
- Full records and certificates of pressure tests for all sections of pipework.
- Settings of all balancing valves with readings of flow rates where applicable.
- Full details of each item of plant, including arrangement drawings and appropriate test certificates.
- As-fitted drawings, showing clearly the location of balancing valves, flows and settings, isolation valves, drain valves.
- Schematic drawings for installation in plant rooms showing all valves and items of plant.
- Full details of water treatment parameters and operating modes and settings.
- Full details of maintenance requirements, to include recommended planned maintenance intervals.
- Detailed confirmation of disinfection procedures to BS EN 806 series (parts 1-5) and BS 8558 and results of post-disinfection microbiological analysis.
- Full records confirming that all materials and fittings hold WRAS or equivalent accreditation.
- Expected operational conditions of the water system (that is, expected pressures expected temperatures, expected flow rate throughout the system as pressure drops will occur etc).
- Commissioning records of flushing.

All hot and cold water pipework should be designed and installed in full accordance with the water supply (water fittings) regulations 1999 and relevant parts of BS EN 805, BS EN 806-2 and BS 8558.

Pipe branches should be designed with the aim of avoiding stagnation. As far as practical the maximum length of any pipework between a terminal device and a recirculating system or a cold water distribution mains should be kept to a minimum; generally, the complete length of the spur should not exceed 3 m.

The length is measured from the centre line of the circulation pipework to the point of discharge along the centre line of the pipework. These pipes should be insulated.

AMPLIFICATION OF TERMS

All pipework should be accessible for inspection, maintenance and repair as far as is practicable. Ducts, trenches and chases containing pipework should be large enough to facilitate repairs.

Backflow Prevention

The whole installation protection should be provided as required by the Water Supply (Water Fittings) Regulations 1999.

The Water Supply (Water Fittings) Regulations 1999 require the identification, by colour-coding or labelling, of all pipework carrying fluids other than wholesome water, this includes plumbed-in equipment used for diagnostic and treatment purposes (see BS 1710).

New systems should not include legs of pipework for potential future extensions to the system as these will create stagnant legs. Any alterations to existing systems - or where redundant pipework is found - should be cut back to the connection point; this includes replacing the branch 'T' with a straight coupling.

Dead leg

A length of water system pipework leading to a fitting through which water only passes infrequently, when there is draw off from the fitting, providing the potential for stagnation.

Blind end/Dead end

Redundant pipework or a length of pipe closed at one end through which no water passes. Length should not exceed 2 x diameter of the service pipe.
Installation, testing and commissioning

The water system should be filled as late in the commissioning process as possible. The system should be flushed to remove all flux and debris before being filled with water as soon as possible, but within a maximum of 48 hours.to prevent biofilm development and corrosion. Wholesome water should be used for flushing.

All strainers should be cleaned after flushing and before final filling.

After water has been introduced into the system, a flushing regime (weekly), should be introduced to the hot and cold water services. This will reduce the likelihood of seeding of legionella within the system.

FLUID CATEGORIES BACKFLOW PREVENTION ~ GUIDANCE

Determination of fluid category 1

Fluid Category 1:

Wholesome water supplied by a water undertaker and complying with the requirements of regulations made under section 67 of the water industry act 1991

Example:

Drinking Water supplied directly from a water undertaker's main.

Determination of fluid category 2

Fluid Category 2:

Water in fluid category 1(no human health hazard) whose aesthetic quality is impaired owing to:

a) Change in its temperature; or
b) The presence of substances or organisms causing a change in its taste, odour or appearance, including water in a hot water distribution system

Example:

Mixing of hot and cold water supplies (combination taps and showers}
Domestic softening plant (common salt regeneration).
Drink vending machines in which no ingredients or carbon dioxide are injected into the supply or distribution inlet pipe.
Fire sprinkler systems (without anti-freeze). Ice Making Machines.
Water cooled air conditioning units (without additives).

Determination of fluid category 3

Fluid Category 3:

Fluid which represents a slight health hazard because of the concentration of substances of low toxicity, including any fluid which contains:

a) Ethylene glycol, copper sulphate solution, or similar chemical additives; or
b) Sodium hypochlorite (chloros and common disinfectants).

Example Water in primary circuits and heating systems (with or without additives) In a house.
Domestic washbasins, baths and showers.
Domestic clothes and dishwashing machines
Home dialysing machines
Drink vending machines in which ingredients or carbon dioxide are injected.

Fluid Category 3:

Commercial softening plant (common salt regeneration only)
Domestic hand held hoses with flow controlled spray or shut off control.
Hand held fertilizer sprays for use in domestic gardens.
Domestic or commercial irrigation systems, without insecticide or fertilizer additives, and with a boxed sprinkler heads not less than 50mm above ground level.

Determination of fluid category 4

Fluid Category 4:

Fluid which represents a significant health hazard due to the concentration of toxic substances, including any fluid which contains:

a) Chemicals, carcinogenic substances or pesticides (including insecticides and herbicides); or
b) Environmental organisms for potential health significance.

Examples

General

Primary circuits and central heating systems in other than a house.

House gardens

Mini-irrigation systems without fertilizer or insecticide application;
Such as pop-up sprinklers or permeable hoses.

Food Processing

Food preparation.
Dairies.
Bottle washing apparatus.

Catering

Commercial dishwashing machines. Bottle washing apparatus.
Refrigerating equipment

Industrial and commercial installations

Dyeing equipment.
Industrial disinfection equipment.
Printing and photographic equipment.
Car washing and degreasing plants.
Commercial clothes washing plants
Brewery and distillation plant.
Water treatment plant or softeners using other than salt.
Pressurized firefighting systems.

Determination of fluid category 5

Fluid Category 5:

Fluid representing a serious health hazard because of the concentration of pathogenic organism, radioactive or very toxic substances including any fluid which contains,

a) faecal material or other human waste; or
b) butchery or other animal waste; or
c) pathogens from any waste source

Examples

General

Industrial cisterns
Non-domestic hose union taps
Sinks, urinals, WC pans and bidets
Permeable pipes in other than domestic gardens, laid below or at ground level with or without chemical additives.
Grey water recycling systems.

Medical

Any medical or dental equipment with submerged inlets. Laboratories
Bedpan washers
Mortuary and embalming equipment
Hospital dialyzing machines
Commercial clothes washing plant in health care premises.

Food processing

Butchery and meat trades
Slaughterhouse equipment
Vegetable washing

Catering

Dishwashing machines in health care premises
Vegetable washing.

Industrial and commercial installations

Industrial and chemical plant etc
Mobile plant, tankers and gulley emptiers
Laboratories
Sewage treatment and sewer cleansing.
Water storage for agriculture purposes
Water storage for firefighting purposes
Commercial agricultural
Commercial hydroponic systems.

Note: The list of examples of applications shown above for each fluid category is not exhaustive

APPENDIX 37

PROCEDURE ~ ACTION IN CASE OF AN OUTBREAK OF LEGIONNAIRES DISEASE

Due to the nature of *Legionnaires Disease* it is difficult to immediately trace the bacteria's source if an outbreak occurs.

It is the responsibility of the Local Authority to declare an outbreak. Once an outbreak has been declared UoR officers listed below must be notified and be available.

Duty Holder
Deputy Duty Holder
Head of Health and Safety

When the Local Authority declared and outbreak, they will put their incident plan into operation. The Local Consultant in Communicable Disease Control, Environmental Health Officer or relevant officers from the enforcing authorities (either Health and Safety Executive or Local Authority) may make a visit.

As part of the outbreak investigation and control the enforcing authority may request:

- The shutdown of relevant equipment/process;
- Taking water samples;
- Staff health records;
- co-operation with the investigation;

Emergency cleaning of water systems that have been implicated in the outbreak will require completion as soon as possible.

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Internal Review Only	