

Standard

Water Safety

Document Reference	HSD081B	Revision	1	Date	May 2017
Status					
Repeals					
Prepared by	Richard Borthwick		Authorised by	Tim Jones	

Acknowledgements

This document was prepared by Estate Management, University of Cambridge with assistance from Water Safety Consultants.

Contents	
Statement	4
Introduction	5
The University's Water Safety Standard	5
Management Structure	6
Management Objectives	6
Water Safety Compliance Group	6
Shared Premises	7
Autonomous Corporations and Institutions	7
Legal Requirements	10
Control of <i>Legionella</i>	11
University Arrangements	12
Appointments	12
<i>Legionella</i> Risk Assessments	12
Training Requirements	13
Reporting	13
Audit	14
Written Scheme	15
Little Used Outlet Flushing	16
Defects	16
<i>Pseudomonas aeruginosa</i>	16
Communications	17
Further Information	17
Appendix 1 - Glossary	18

Statement

The University of Cambridge recognises and accepts its responsibility under the Health and Safety at Work Act etc. and the Control of Substances Hazardous to Health Regulations, to take all reasonable precautions to prevent or control the potential of legionellosis to students, residents, staff and other persons working at, using or visiting its premises.

The University recognises its responsibility to implement, in full, the Codes of Practice and all other relevant and associated documentation, particularly '*Legionnaires' disease. The control of Legionella bacteria in water systems*, Approved Code of Practice and guidance, L8'.

To comply with its legal duties, the University shall:

- Identify and assess sources of risk;
- Prepare a scheme for preventing, reducing or controlling the risk;
- Implement and manage precautions;
- Maintain sufficient records in order to demonstrate compliance with good practice and fulfil legal obligations;
- Implement standards to the selection, design, installation and maintenance of plant;
- Ensure suitable and sufficient resources are available;
- Nominate employees and others with responsibility for implementing this Standard;
- Review this document at least every two years or when new developments arise.

Without exception, this Standard and its implementation, shall apply to all persons occupying buildings under the Central University's direct control, as denoted in the framework established within the University's Health and Safety Standard.

Autonomous corporations and institutions within the University including college properties and *domus* areas have their own duty and responsibility for the management of their own health and safety risks, with their own policies and procedures, which should include control of *Legionella* and other water borne pathogens.

Introduction

Legionnaires' disease is a potentially fatal pneumonia caused by *Legionella* bacteria. It is the most well-known and serious form of a group of diseases known as legionellosis. Other similar (but usually less serious) conditions include Pontiac fever and Lochgoilhead fever. Infection is caused by breathing in small droplets of water contaminated by the bacteria. The disease cannot be passed from one person to another. Everyone is potentially susceptible to infection but some people are at higher risk, e.g. those over 45 years of age, smokers and heavy drinkers, those suffering from chronic respiratory or kidney disease and people whose immune system is impaired.

Legionella bacteria are widespread in the environment, common in natural water courses such as rivers and ponds, and are present in low numbers in mains water supply.

They may contaminate and proliferate in any engineered water system such as cooling towers and hot and cold water services. They survive low temperatures and thrive at temperatures between 20°C-45°C if the conditions are right, e.g. if a supply of nutrients is present such as rust, sludge, scale, algae and other bacteria. They are killed by high temperatures.

If an aerosol (water droplets) is then created and dispersed into the atmosphere, people in the vicinity may be at risk of inhaling the bacteria. To eliminate or reduce the risk, control measures shall be in place to prevent the proliferation of the organism in water systems, and to minimise the generation of water droplets and aerosols.

The Standard describes the principal standards and arrangements that the University utilises to structure and monitor the management of water safety at an operational level. The main purpose of the Standard is to promote a consistent approach to the management of water safety by all stakeholders occupying and working within University controlled buildings.

To maintain statutory compliance and deliver the consistent approach detailed within the Guidance, all University faculties, divisions, departments, institutions and all other stakeholders shall administrate local, operational procedures (Water Safety Procedures Including Written Scheme).

The University's Water Safety Standard

This strategy draws on the statutory obligations and management guidance established within the Health & Safety Executive's (HSE) *Legionnaires' disease. The control of Legionella bacteria in water systems*. Approved Code of Practice and guidance, L8 (ACOP L8).

It shall be administered by the following overarching arrangements:

- Ownership of the document belongs to Estate Management;
- The Water Safety Compliance Group shall monitor the management objectives and monitor arrangements of directorates, divisions and departments;
- The Responsible Person shall ensure that suitable controls for any identified risk with the University directorates, divisions and departments, for which they are responsible for, are in place and being adhered to;
- Each department shall have an appointed "Departmental Responsible Person" who shall ensure suitable controls are in place to manage any identified risk from *Legionella* bacteria in areas under their control;
- The day-to-day operational responsibility for controlling any identified risk from *Legionella* bacteria, and other water borne pathogens shall lie with the University directorates, divisions and departments and their appointed "Departmental Responsible Person".

Management Structure

Management Objectives

The Management Objectives are key guiding principles that support the Standard Statement:

1	Provide a safe environment for University personnel and visitors <i>To employ a risk reduction strategy through the elimination of risk and engineering controls. Where this is not practicable, to implement management controls to manage the level of risk.</i> <i>To control risk by ensuring suitable maintenance regimes are in place and any activity that alterations or additions to water services within University controlled buildings are subject to appropriate documented management controls.</i> <i>To utilise specialist service providers as required under the terms of legislation, best practice and University guidance.</i>
2	Promote awareness and provide training <i>To communicate awareness of Water Safety and the University's safety arrangements through established media and documentation. To ensure information relating to the overarching safety arrangements is disclosed to anyone who needs it.</i> <i>To ensure that stakeholders manage the risk and endorse their Water Safety procedures through identification of University personnel who require training and induction.</i>
3	Ensure reliable information is available <i>To provide and maintain risk assessments that shall identify where the University has water systems installed and record the risk presented by them, through best practice standards of inspection and assessment.</i> <i>To provide and update schematic layouts of water services within affected properties.</i>
4	Define and communicate responsibilities to stakeholders <i>To implement operational delivery of the Water Safety Standard objectives through delegation of responsibilities to the network of stakeholders.</i> <i>To promote co-operation between the network of duty holders and stakeholders associated with the University of Cambridge.</i>
5	Operate effective information management processes <i>To safeguard accurate, up to date information by employing effective information management processes.</i> <i>To foster communication between stakeholders. To endorse compliance with the Sites and Buildings Regulations and information management processes so that activities affecting Water Safety in departmental managed articles are communicated to Estate Management.</i>
6	Monitor and review the principal objectives <i>To monitor and review the University's Water Safety Standards and Guidance at agreed intervals, utilising safety committee oversight.</i> <i>To ensure that the implementation of the Standard and Guidance is monitored at the appropriate level and that the review outcomes of documented procedures and investigations are disseminated.</i>

Water Safety Compliance Group

The aim of the Water Safety Compliance Group is to ensure the safety of all water used by staff, students and visitors, and to minimise the risk of infection associated with waterborne pathogens.

The meetings provide a forum in which people with a range of competencies can be brought together to share responsibility and take collective ownership. Findings are reported to the Sub-Committee for Biological Safety.

These meetings are held on approximately a quarterly basis with the aim to hold four per year or more frequently as required.

The formal meetings are chaired by the Responsible Person (EM), and attended by stakeholders as identified within the Terms of Reference.

Minutes are prepared for each meeting.

Agenda topics may include:

- Capital Projects - new build refurbishment works;
- Shut downs;
- Risk Assessment;
- Written Scheme feedback;
- Ongoing issues.

The committee structure which gives effect to the implementation of the University Water Safety Procedures including Written Scheme is shown in Figure 1 and Figure 2.

Shared Premises

A number of properties are not owned by University of Cambridge but are, in effect, leased. As such the ongoing maintenance and management of hot and cold water systems may be the responsibility of the Landlord. Under these circumstances University of Cambridge Estate Management shall assess the Landlords' ongoing compliance with *Legionella* control standards (ACOP L8) on an annual basis as part of their auditing procedure.

In such cases, responsibility should be documented through an explicit agreement such as a contract or tenancy agreement. In a multi-occupancy building, the agreement may be that the owner takes on the full duty for the whole building.

Where there is no contract or tenancy agreement in place or it does not specify who has responsibility, the duty is placed on whoever has control of the premises or part of the premises.

Autonomous Corporations and Institutions

Autonomous corporations and institutions within the University including college properties and *domus* areas have their own duty and responsibility for the management of their own health and safety risks, with their own policies and procedures, which should include control of *Legionella* and other water borne pathogens.

Figure 1 – University Safety Committee Structure

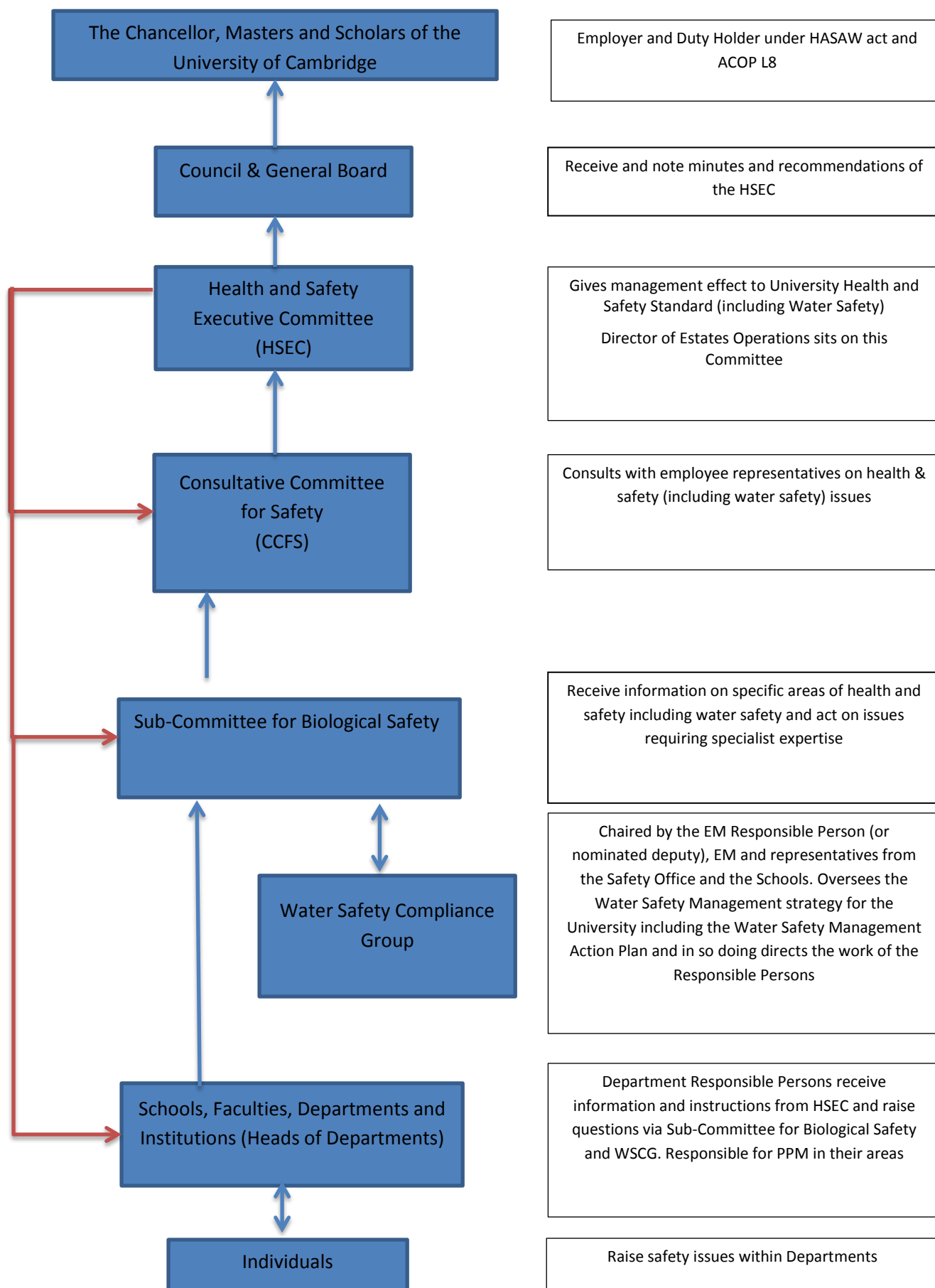
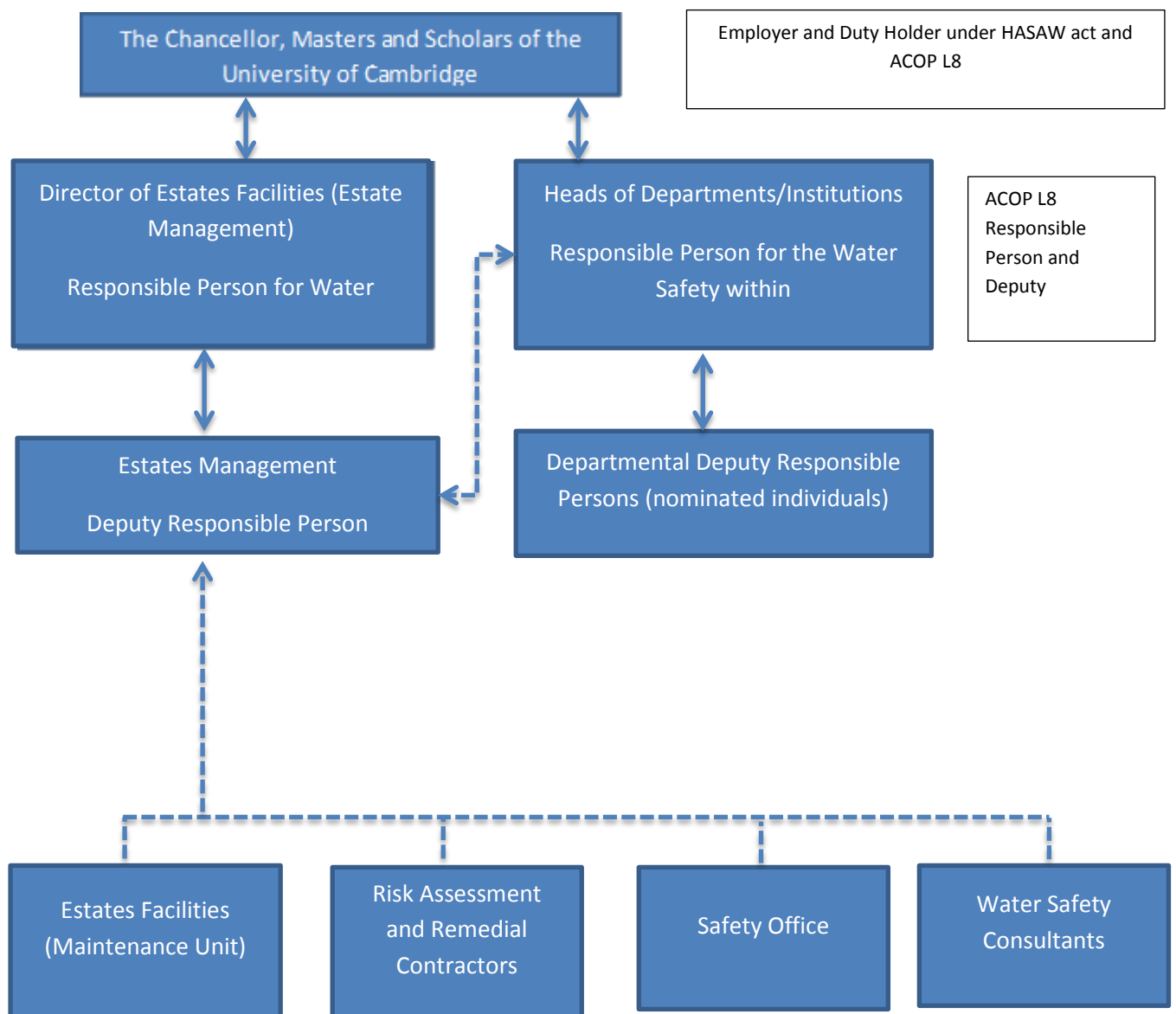


Figure 2 – Responsibilities for Water Safety and flow of information and communication:



Legal Requirements

The Health and Safety at Work Act etc.

Employers Duties

The University as employer has a general duty under The Health and Safety at Work Act etc. (HASAWA) to ensure so far as is reasonably practicable, the health, safety and welfare of all its employees.

HASAWA 2(1) requires employers to:

- i) Provide and maintain plant and systems of work that are safe and free from health risks;
- ii) Make arrangements for ensuring safety and the avoidance of health risks in connection with the use, handling, storage and transportation of articles and substances (HASAWA 2(2)b);
- iii) Provide such information, instruction, training and supervision to ensure the health and safety at work of their employees [HASAWA 2(2)c];
- iv) Provide a safe working environment [HASAWA 2(2)e];
- v) Those in control of premises shall ensure that they are safe and that any plant or substance does not endanger health of any persons at work or the general public (HASAWA 4).

Employees' Duties

Employees have a duty under Section 7 of the Health and Safety at Work Act etc. 1974 to take reasonable care for their own health and safety and that of others who may be affected by their acts or omissions at work.

Approved Code of Practice, Legionnaires' disease. The control of *Legionella* bacteria in water systems, L8 (Fourth edition)

The Approved Code of Practice, L8 (ACOP L8) describes methods that should be used (or standards to be met) to comply with the regulations and the duties imposed by the Health and Safety at Work etc.

Compliance with this document is considered good practice, meaning those standards for controlling risk which have been judged and recognised by the HSE as satisfying the law when applied to a particular relevant case in an appropriate manner.

To comply with their legal duties, duty holders should:

- a. Identify and assess sources of risk – this includes checking whether conditions are present that shall encourage the organism to multiply, for example:
 - i) Water temperature in the range 20-45°C;
 - ii) A means for creating and disseminating a fine, breathable aerosol;
 - iii) The likelihood of susceptible persons being exposed.
- b. Prepare a scheme for preventing or controlling the risk
- c. Implement manage and monitor these control measures
- d. Keep records and check that what has been done is effective
- e. Nominate persons to be responsible for the effective operation of the precautions
- f. Provide training for persons with delegated responsibilities
- g. Notify the relevant authority of and cooling towers or applicable adiabatic coolers

Other applicable legislation and guidance pertaining to water safety include but are not limited to:

- Control of substances hazardous to health (COSHH). The Control of Substances Hazardous to Health Regulations (as amended);
 - Food Safety Act;
 - The Management of Health and Safety at Work Regulations;
 - The Notification of Cooling Towers and Evaporative Condensers Regulations;
 - Reporting of Injuries, Diseases and Dangerous Occurrences Regulations;
 - Water Supply (Water Fitting) Regulations;
 - Water Supply (Water Quality) Regulations.
-
- Code of Practice: Cooling water treatment. Water Management Society;
 - Managing for health and safety HSG65;
 - Water fittings and materials directory Water Regulations Advisory Scheme;
 - Health Technical Memorandum 03 Part A & B Heating and Ventilating Systems;
 - Health Technical Memorandum 04-01: The control of *Legionella*, Safety, 'safe' hot water, cold water and drinking water systems Department of Health (Parts A, B and C).
-
- BS 1710 Identification of pipelines and services;
 - BS EN 806 (Parts 1-5) Specifications for installations inside buildings conveying water for human consumption;
 - BS 8554 Code of practice for the sampling and monitoring of hot and cold water services in buildings;
 - BS 8580 Water quality. Risk assessments for *Legionella* control. Code of practice British Standards Institution;
 - BS 8558 Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages – Complementary guidance to BS EN 806;
 - PD 855468 Guide to the flushing and disinfection of services supplying water for domestic use within buildings and their curtilages.

Control of *Legionella*

The primary method used to control the risk from *Legionella* at the University is water temperature control. Water services should be operated at temperatures that prevent *Legionella* growth:

- Hot water should be stored at 60°C or higher;
- Hot water should be distributed at 50°C or higher (where a scald risk is identified; thermostatic mixer valves (TMV) should be integrated into taps or be fitted as close as possible to outlets);
- Cold water should be stored and distributed below 20°C;
- A nominated, competent person should routinely check, inspect and clean the system, in accordance with the risk assessment.

'Sentinel' outlets (furthest and closest to each cistern or hot water source in each main and tertiary loops in a system) shall be identified for monthly checking of the distribution temperatures. Hot water storage cylinder temperatures require checking monthly with cold water cistern temperatures at least every six months. Further detail of these checks and tests can be found in the Pre-Planned Maintenance and Monitoring Regime section.

Stagnant water favours *Legionella* growth. To reduce the risk of water stagnation all identified dead legs/dead ends in pipe-work should be removed, flush out infrequently used outlets (including showerheads and taps) at least weekly and clean and de-scale shower heads and hoses at least quarterly.

Cold-water storage cisterns should be cleaned if inspection shows it necessary, and water should be drained from hot water cylinders to check for debris or signs of corrosion.

Design systems to minimise *Legionella* growth, by:

- Keeping pipe work as short and direct as possible
- Adequately insulating pipes and cisterns
- Using materials that do not encourage the growth of *Legionella*
- Preventing contamination, e.g. by fitting cisterns with lids and insect screens

Additional Controls

Water samples should be analysed for *Legionella* when deemed necessary (see *Water Safety Procedures Including Written Scheme*) to demonstrate that bacteria counts are acceptable. The frequency should be determined by level of risk, in accordance with the risk assessment.

Legionella samples should be collected in accordance with 'BS 8554 Code of practice for the sampling and monitoring of hot and cold water services in buildings', and tested in a UKAS accredited laboratory. The person collecting the sample should be competent and have attended a recognised training course. University of Cambridge staff undertaking sampling should attend the University's UC003 Water Sampling Training Course.

Other Control Methods

Other methods to control *Legionella* include copper and silver ionisation and biocide treatments (e.g. chlorine dioxide). To ensure that they remain effective their application shall need suitable assessment as part of the overall water treatment programme including proper installation, maintenance and monitoring. Account shall be taken of the effect on water quality by the introduction of these control methods in particular the effect on other plant and equipment.

University Arrangements

Appointments

The University of Cambridge shall appoint in writing a "Responsible Person" competent to:

- Identify and assess the risk of legionellosis resulting from work activities;
- Develop, implement and maintain appropriate and suitable Management Systems, Personnel Training programmes and plant treatment procedures;
- Develop and maintain adequate records in order to demonstrate compliance with best practice and fulfil legal obligations and;
- Ensure compliance with this Standard and supporting procedures.

Heads of Department shall appoint in writing a "Responsible Person" who is competent to ensure compliance with this Standard in departmental areas over which they have control.

Legionella Risk Assessments

ACOP L8 states that a suitable and sufficient assessment shall be carried out to identify and assess the risk of exposure to *Legionella* bacteria from work activities and water systems on the premises and any precautionary measures needed. Full records should be kept including all actions undertaken.

The risk assessment should identify and evaluate potential sources of risk and:

- The particular means of preventing exposure to *Legionella* bacteria; or
- If prevention is not reasonably practicable, the particular means of controlling the risk from exposure to *Legionella* bacteria.

See *Water Safety Procedures Including Written Scheme (HSD082B)* for specific arrangements.

Legionella Risk Assessments Review

The assessment shall be reviewed regularly in line with the University Water Risk Rating Matrix (see *Water Safety Procedures Including Written Scheme*), or specifically when there is reason to believe that the original risk assessment may no longer be valid.

The *Legionella* Risk Assessment programme shall be managed by the Deputy Responsible Person (EM) with full records kept.

The remedial works resulting from the Risk Assessments shall be managed by the Deputy Responsible Person (EM) with full records kept of all actions undertaken.

Training Requirements

An ongoing training programme is in place with a three yearly refresher frequency, unless there is a major change to legislation or guidance or the Responsible Person deems extra training as being necessary. Full records of the completed training should be maintained in the site Log Book. Refer to 'Water Safety Procedures Including Written Scheme' for further information.

The Responsible and Deputy Responsible Persons shall complete at least the University's "Responsible Person Training Courses".

All other members of staff that are appointed to implement the control measures and strategies shall complete the "*Legionella* Awareness Training Course".

Any identified members of staff required to undertaking sampling for *Legionella* shall undertake the University's "Water Sampling Training Course".

These courses shall be delivered by the University's Specialist Water Safety Consultant.

Reporting

Estate Management shall provide a quarterly report of Water Hygiene and Safety issues. This report as a minimum shall provide information on

- Compliance with ACOP L8 and HSG274
- Buildings with significant issues
- Any areas of concern relating to Water Hygiene and Safety

Audit

Estate Management shall instruct periodic audits to ensure compliance with ACOP L8 and HSG274. These independent audits are to be delivered by the University's Specialist Water Safety Consultant.

Written Scheme

Table 1 gives an overview of responsibilities for tasks forming the basis of a Written Scheme. Estate Management recognises each Department shall have a different “Written Scheme” due to the differing installed assets. The document *Water Safety Procedures Including Written Scheme* should be referred to when determining the “Written Scheme” for an individual Department.

SUMMARY OF DOMESTIC HOT AND COLD SERVICES TASKS									
PROGRAM TASKS/TESTS	BY WHOM	One off task	Daily	Weekly	Monthly	Quarterly	6-Monthly	Annually	Every three Years
<i>Legionella</i> risk assessment / review	Estate Management	AS REQUIRED							
<i>Legionella</i> risk assessment validation	Estate Management							X	
<i>Legionella</i> training	Water Hygiene Consultant								X
Audit (or as instructed by EM)	Water Hygiene Consultant							X	
MONITORING TASKS:									
Flush infrequently used outlets	Department			X					
Sentinel and representative hot and cold outlet temps	Department				X				
Supply temps to TMV's (if applicable i.e. a sentinel outlet)	Department				X				
Dismantle, clean and descale removable parts, heads, inserts and hoses of “hose and head” style showers and spray taps	Department					X			
Dismantle, clean and descale removable parts, heads, inserts and hoses of <u>fixed</u> showers and spray tap	Estate Management					X			
Hot Water Raising Equipment supply and return (if applicable) temps	Department				X				
TMV Service	Estate Management							X	
Temperature reading from mains	Estate Management						X		
Incoming water main temp at ball valve	Estate Management						X		
Temperature of cold water storage cistern - remote from ball valve	Estate Management						X		

Continued on next page...

SUMMARY OF DOMESTIC HOT AND COLD SERVICES TASKS (cont.)									
PROGRAM TASKS/TESTS	BY WHOM	One off task	Daily	Weekly	Monthly	Quarterly	6-Monthly	Annually	Every three Years
Calorifier vessel blowdown	Estate Management							X	
Internal calorifier inspection (if accessible)	Estate Management							X	
Cold water storage cistern, including any integral cisterns, internal inspection	Estate Management							X	
Cold water storage cistern clean and disinfection	Estate Management	AS REQUIRED							
<i>Legionella</i> sampling	Estate Management	AS REQUIRED							
Risk assessment and management of department equipment that uses or contains water e.g. ice machines and scientific equipment	Department	Risk assessment and subsequent management and reviews in line with HSG 274 part C Advice is available from Estate Management							

The “Written Scheme” may change as modifications are made to the systems. The “Written Scheme” is to be updated when these modifications are made.

Little Used Outlet Flushing

The Departmental *Legionella* Responsible Person shall be required to identify and to ensure that all known little used outlets are flushed as a minimum on a weekly basis, with these actions recorded in the site Log Book. If an outlet is not required, they are to advise the Estates Management Department via the Estate Facilities Helpdesk so removal of the outlet can be considered.

Defects

All defects pertaining to water systems are to be reported to the Estates Management Department via the Estate Facilities Helpdesk.

Pseudomonas aeruginosa

Due to the nature of the work ongoing in certain properties and departments the management of *Pseudomonas aeruginosa* maybe a local potential risk to the users of the water services. It will be the responsibility of the Departments to identify this, carry out risk assessments and implement control measure and monitoring, if required.

The EM Responsible Person is available to provide expert advice if required.

Communications

Communication procedures are particularly important given that both Estate Management and departments are responsible for different aspects of the “Written Scheme”. It is essential that both parties communicate with each other should the “Written Scheme” be found to be failing. Good communication shall prevent un-necessary elevation of risk.

Further Information

Estate Management – EMWaterSafety@admin.cam.ac.uk
University Specialist Advisor (for Water Safety)
Safety Office leaflet HSD175B Legionella Awareness, FAQ
Health and Safety Executive <http://www.hse.gov.uk/legionnaires/>

References

British Standard Institution. *BS 8580 Water Quality – Risk assessments for Legionella Control*. Milton Keynes:BSI.

British Standard Institution. *BS 8558 Guide to the design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages*. Milton Keynes:BSI.

Control of Substances Hazardous to Health (COSHH) Regulations (as amended). SI 3386.

Health and Safety Executive. Approved Code of Practice and guidance on regulations.

Legionnaires’ disease: The control of *Legionella* bacteria in water systems (L8). Health and Safety Executive.

Health and Safety Executive. **HSG274 Legionnaires’ disease – technical guidance. Part 2: The control of legionella bacteria in hot and cold water systems**. Health and Safety Executive.

Health and Safety Executive. **HSG274 Legionnaires’ disease – technical guidance. Part 3: The control of legionella bacteria in other risk systems**. Health and Safety Executive.

The Management of Health and Safety at Work (Amendment) Regulations. SI 438.

The Water Supply (Water fittings) Regulations . SI 1506.

The Water Supply (Water Quality) Regulations . SI 614.

University of Cambridge. *Water Safety Procedures Including Written Scheme (HSD082B)*. Cambridge: University of Cambridge

University of Cambridge. *Sites and Buildings Regulations*. Cambridge: University of Cambridge

Appendix 1 - Glossary

ACOP	Approved Code of Practice
Adiabatic	A device that uses water as a cooling medium
Calorifier	A device for the production of Domestic Hot Water
Cistern	A storage device for water
Cooling Tower	A device that uses water as a cooling medium
Copper and Silver Ionisation	A device that uses the combination of copper and silver to control bacteria
Chlorine Dioxide	A device that uses chlorine to control bacteria
Cylinder	A device to store water, normally DHW
Dead End	A section of pipe with no outlet
DHW	Domestic Hot Water
Flush	A means of reducing stagnation
HSG 274	HSE publication relating to Water Hygiene best practice
Health Technical Memorandum	Department of Health guidance document
L8	The ACOP relating to Water Safety
Log Book	A document used to store records pertaining to water safety
Little Used Outlet	an outlet used infrequently
Nutrient	a food source that will encourage the growth of bacteria
PPM	Pre Planned Maintenance
<i>Pseudomonas aeruginosa</i>	<i>Pseudomonas aeruginosa</i> is a Gram-negative bacterium, commonly found in wet or moist environments
Responsible Person	A person with authority to make resource decisions for an area
Risk Assessment	A legal document required to assess the risk from water services
Sample	The taking of water to determine quality
Sentinel	The extremity of a system or sub-circuit of a system
Stagnation	No or little flow
Thermal Control	A means of controlling Legionella through temperature
TMV	Thermostatic Mixing Valve, a device for scald control
Written Scheme	A documented method of controlling the risk