



Legionella & Management of Hot & Cold-Water Systems

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Definitions, Scope & Responsibilities

This document sets out a framework for ensuring water systems are installed, operated and maintained in a manner which both reduces the risk of a Legionella outbreak and ensures an appropriate water quality. This document forms a four-part framework which comprises the following elements:

Management Policy (this document)

Outlines the overall responsibilities of the organization, details responsibilities of individuals, defines operational duties which must be implemented, defines record keeping requirements.

Risk Assessment (By Building)

For all BN1 Arts premises, information regarding the type of water systems and schematic plans identifies the layout of all water systems.

A risk assessment is carried out to identify and assess the risk of Legionellosis from work activities and water sources. Any remedial or precautionary measures that need to be undertaken should also be identified at this stage. The risk assessments are retained by Estates & Facilities and reviewed on a biannual basis.

Operational Arrangements (implemented based on the RA & Appendices)

Details the specific operational criteria that must be achieved for all systems identified in the Risk Assessment as being susceptible to colonising Legionella in College buildings.

Details the specific maintenance criteria that must be achieved to minimise the risk as identified in the Risk Assessment. Details testing protocols, frequencies, etc.

Operational Log Books

These will detail any maintenance work, plant modifications, tests, monitoring etc., undertaken on any part of the water systems, ventilation systems or other risk areas, as defined in the Risk

Assessment. These are retained and updated by Estates & Facilities in conjunction with the Legionella Management Contractor.

As BN1 Arts has both a moral and legal responsibility to ensure that the risk to students, employees, visitors etc. is reduced (so far as is reasonably practicable), those staff detailed in this document are required to implement the necessary procedures, works etc. necessary to ensure BN1 Arts obligations are fulfilled.

Background

Legionnaires Disease was first recognised in July 1976, when an outbreak occurred amongst delegates attending an American Legion Convention in Philadelphia. The cause eluded scientists for several months, but in January 1977 the Centre for Disease Control, Atlanta, reported the isolation of the causative agent, which they named *Legionella Pneumophila*. Since 1980 there have been a number of major outbreaks of Legionnaires Disease in the UK. While previously healthy people may develop Legionnaires Disease, there are a number of factors which increase susceptibility:

- Increasing age, particularly above 50 years (children are rarely infected);
- Gender: males are three times more likely to be infected than females;
- Existing respiratory disease which makes the lungs more vulnerable to infection or anything that may suppress the immune system;
- Smoking, particularly heavy cigarette smoking, because of the probability of impaired function.

The risk of infection depends upon the ability of these organisms to multiply to significant levels, to be then dispersed into the air as an aerosol and to be inhaled in sufficient numbers by susceptible

individuals. By knowing the conditions ideal for the bacteria's growth and taking all reasonable precautions to avoid them, we can reduce the risk of sufficient numbers of bacteria being present to cause a health hazard.

Most water systems can provide a potential habitat for the organism. The optimum temperature required is 37°C. At temperatures above 37°C the rate of multiplication of *Legionella*, in laboratory tests, decreases, and at 46°C falls to zero. Bacteria will survive at higher temperatures but the survival time decreases from a matter of hours at 50°C to one of minutes at 60°C and practically zero at 70°C.

Below 37°C the multiplication rate decreases and can be considered insignificant below 20°C.

The organism can remain dormant at much lower temperatures and return to active multiplication whenever more favourable temperatures occur.

It is this temperature dependence which gives us the main mechanism of prevention of

Legionnaires Disease in hot and cold water systems. If we can keep the cold water below 20°C and the hot water above 50°C then the bacteria will either not be able to multiply or will be killed.

However, even with good day to day control of temperature or scale, corrosion and fouling and the use of effective biocides it is essential to clean and sterilise all parts of a water system on a regular basis. The recommended times between this process vary dependent upon the type of system, but the objectives remain the same. The essentials of control are to keep any water system as clean as possible.

Legislation, Standards, Guidance and Codes of Practice

An approved Code of Practice and Guidance L8 (ACOP) "The Control of Legionella Bacteria in Water Systems" became effective on 8 January 2001 and employers (and others as defined) are expected to follow the ACOP guidance in controlling Legionellosis in all circumstances where the Health and Safety at Work Act 1974 (HSW) applies. The ACOP provides practical guidance for compliance with certain provisions under HSW and the Control of Substances Hazardous to Health Regulations (COSHH) 2002 (as amended). In the EU, refer to the EU-OSHA Legionella and Legionnaires Disease Policy Overview for local legislation.

In addition to the ACOP a number of other sources of legislation, guidance, codes of practice, etc. are available and are listed below:

- Control of Substances Hazardous to Health Regulations 2002
- Cold Water Services Water Supply (Water Fittings) Regulations 1999
- "Safe" Hot Water and Surface Temperatures – Health Guidance Note 1998
- British Standard 8558:2105 for design, installation and maintenance of services supplying water for domestic use within buildings
- and their curtilages.
- Health and Safety Executive – The control of legionella bacteria in hot and cold water systems HSG 274
- The Chartered Institution of Building Services Engineers TM13 2013 COP Minimising the Risk of Legionnaires Disease

The above documents provide a useful source of data for site staff to manage the control of Legionellosis and should be consulted whenever further information on the subject is required.

Duties and Responsibilities

In order to minimise the potential for an outbreak of Legionella and ensure appropriate water quality standards are maintained. The responsible persons as detailed in Section 5 shall implement all requirements of the ACOP and, where applicable, adopt the procedures and practices detailed in the supporting documents listed above. The key requirements of the ACOP are listed below.

- i. Identify and assess risk (as required by COSHH Regulations) 2002 (as amended):
 - assess the risk to health
 - identify and evaluate potential sources of risk
 - identify necessary precautionary measures
- ii. Preventing or minimising the risk from exposure to Legionella:
 - having an up-to-date site/system plan
 - description of correct and safe operation
 - necessary precautions
- iii. Management and the selection, training and competence of personnel:
 - where the assessment identifies a risk, BN1 Arts must appoint a person or persons to take managerial responsibility and to provide supervision for the implementation of precautions;
 - responsibilities and lines of communication must be properly defined.
 - Record keeping – appropriate records shall be kept, including:
 - the risk assessments
 - appointed persons and responsibilities
 - lines of communication
 - written Operational Plan
 - plant records
 - details of precautionary measures
 - results of inspections, i.e. water temperatures, chlorination, cleaning, etc.
 - signature of the person(s) carrying out particular tasks
 - records should be preserved for at least 5 years
- iv. Responsibilities of designers, suppliers, installers, etc. (both in-house and external):
 - they must ensure risk is avoided or designed so that systems will be safe and without risk to health when used at work

The Operational Manual provides specific details on the maintenance regimes that must be implemented on the systems on this site.

Training

- Training is fundamental to the operational success of minimising the risk of a Legionella outbreak. Staff must be instructed in what they must do, be given adequate information about the risks of Legionella, what precautions need to be taken to avoid them and what the dangers and consequences of not maintaining water systems will be.
- Estates will be responsible for identifying the training needs of the staff for whom they are responsible. Records of any training must clearly show the level and content of the training provided and must be recorded in the Site Logbook.

Identification of Key Risk Areas

The following list which is based upon the information sources listed in Section 3.0 may be assumed, in normal circumstances, to include all currently known sources where the risk is sufficient to warrant the measures required in the Approved Code of Practice (ACOP). This does not mean that the list includes all possible sources, or that cases of Legionnaires Disease will be avoided by applying precautions solely to the systems and plant listed. Whenever a risk is identified, all reasonably practicable precautions should be applied. However, experience to date indicates that the risk from plant and systems, other than those listed below, will normally be very small.

- water systems incorporating a cooling tower (not applicable at BN1 Arts)
- water systems incorporating an evaporative condenser (not applicable at BN1 Arts)
- hot and cold-water services irrespective of size in premises where occupants are particularly susceptible, such as health care premises (not applicable at BN1 Arts)
- humidifiers and air washers which create a spray of water droplets and in which the water temperature is likely to exceed 20 C.
- spa baths and pools in which warm water is deliberately agitated and re-circulated (not applicable at BN1 Arts).

It is systems susceptible to colonisation by Legionella, and which incorporate a potential means for creating and disseminating water droplets which present the greatest risk. Risk is to be assessed not just for the routine operation or use of the system but also in relation to breakdown, abnormal operation, commissioning, or unusual circumstances.

Risk Assessment is a fundamental requirement of the ACOP, the Management of Health and Safety at Work Regulations and the Control of Substances Hazardous to Health Regulations that a site-specific identification and assessment of risk be carried out. This is to determine the risk of Legionellosis from work activities and water sources on the premises and detail any necessary precautionary measures.

The principle risk within BN1 Arts is the hot and cold-water services. The level of risk varies according to:

- Type, e.g. instantaneous 'v' gravity fed systems with hot water storage
- Size, e.g. long pipe runs may lead to water stagnation or temperature fluctuations
- Age, e.g. older systems may contain materials suitable for bacterial growth (either in the form of biofilm, scale)
- Usage e.g. low usage systems will result in water stagnation
- Outlets fitted e.g. showers

Risk Assessments will be reviewed every 2 years or following significant changes in legislation or guidance, significant alterations to any of the water systems or significant changes in building population or use.

Appendix 1: Operational Arrangements: Inspection, Monitoring and Testing

In order to ensure compliance with the Health and Safety Executives guidance document and the approved code of practice (A.C.O.P.) (L8) to minimise the risk of Legionella the specific operational, maintenance and testing criteria that must be achieved is as follows.

Hot and Cold-Water Services

Service	Task	Frequency
Hot water services	Arrange for samples to be taken from hot water calorifiers, in order to note condition of drain water	Annually
	Check temperatures in flow and return at calorifiers	Monthly
	Check water temperature up to one minute to see if it has reached 50°C in the sentinel taps	Monthly
	Visual check on internal surfaces of calorifiers for scale and sludge. Check representative taps for temperature as above on a rotational basis	Annually
Cold water services	Check tank water temperature remote from ball valve and mains temperature at ball valve. Note maximum temperatures recorded by fixed max/min thermometers where fitted	Six monthly
	Check that temperature is below 20°C after running the water for up to two minutes in the sentinel taps	Monthly
	Visually inspect cold water storage tanks and carry out remedial work where necessary. Check representative taps for temperature as above on a rotational basis	Annually
Shower heads	Dismantle, clean and descale shower heads and hoses	Quarterly or as necessary
Little-used outlets	Flush through and purge to drain, or purge to drain immediately before use, without release of aerosols	Weekly

Inspection and Monitoring (Hot and Cold-Water Systems)

Frequency	Check	Cold Water	Hot Water	Notes
Monthly	Sentinel taps (the first and last taps in a water distribution system)	The water temperature should be below 20°C after running the water for up to two minutes	The water temperature should be at least 50°C within a minute of running the water	This check makes sure that the supply and return temperatures on each loop are unchanged, ie the loop is functioning as required
	If fitted, input TMV's on a sentinel basis		The water supply to the TMV temperature should be at least 50°C within a minute of running the water	One way of measuring this is to use a surface temperature probe
	Water leaving and returning to calorifier		Outgoing water should be at least 60°C, return at least 50°C	If fitted, the thermometer pocket at the top of the calorifier and on the return leg are useful points for accurate temperature measurement. If installed, these measurements could be carried out and logged by a building management system
Six monthly	Incoming cold water inlets (at least once in the winter and once in summer)	The water should preferably be below 20°C at all times (but see paragraph 156 of L8)		The most convenient place to measure is usually at the ball valve outlet to the cold water storage tank
Annually	Representative number of taps on a rotational basis	The water temperature should be below 20°C after running the water for two minutes	The water temperature should be at least 50°C within a minute of running the water	This check makes sure that the whole system is reaching satisfactory temperatures for legionella control

Procedure for Suspected Contamination by Legionella Bacteria

1. The nominated person will be informed of a suspected contamination by Legionella bacteria. It is essential that systems are not drained or disinfected before samples have been taken. The role of Estates & Facilities is an important one –identifying the various water systems within the building and to the points from which samples can be taken. Easy access to these sampling points is essential. The system in question must then be immediately isolated and not used.
2. An investigating team will be established, this will normally comprise of the staff listed in Appendix 3, with the exception of the Principal, who will be kept fully informed by Estates.
3. The investigation will concentrate upon all potential sources of Legionella infection, including:
 - the domestic hot and cold-water distribution system
 - showers or spray washing equipment
 - drainage system and traps
 - humidifiers in ventilation systems
 - cooling coils in air-conditioning systems
 - any other water-based system
4. To assist in such investigations Estates & Facilities and the Cleaning service must be able to provide details of all associated equipment including all documentation. They must assist by advising the investigating team on the extent of servicing on the site and by

locating taps and sample points.

5. Information will also be required, such as whether there has been any local excavation or earthmoving works, alterations to water supply systems or drainage systems or any other factors which may have a bearing on the site.
6. The team is responsible for identifying the cause of infection, and will advise on cleaning, disinfection, any modifications, and long³/₄term control measures.

Action in the Event of an Outbreak

1. If a Legionellosis outbreak is declared by the Public Health Laboratory Service a Local Authority appointed officer will lead any investigations.
2. As part of the outbreak investigation and control the following requests and recommendations may be made by the enforcing authority:
 - (a) To shut down any processes which are capable of generating and disseminating airborne water droplets and keep them shut down until sampling procedures and any remedial cleaning or other works have been done. Final clearance to restart the system may be required.
 - (b) To take water samples from the system before any emergency disinfection being undertaken. This will help with the investigation of the cause of the illness. The investigating officers from the local authorities may take samples or require them to be taken.
 - (c) To provide staff health records to discern whether there are any further undiagnosed cases of illness and to help prepare case histories of the people affected.
 - (d) To co-operate fully in an investigation of any plant that may be suspected of being involved in the cause of the outbreak. This may involve for example
 - Tracing of all pipe work runs
 - Detailed scrutiny of all operational records
 - Statements from plant operatives and managers
 - Statements from water treatment contractors or consultants
3. Any infringements of relevant legislation may be suspect to a formal investigation by the appropriate enforcing authority.

If a water system other is implicated in an outbreak of Legionnaire's Disease, emergency treatment of that system should be carried out as soon as possible.

