



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 – 45°C, and would not be maintained by Facilities Management Directorate (FMD). 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 FMD. 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 FMD 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 20° - 45°C (peaking at 37°C), 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 FMD “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°C

If possible, the water bath should be thermally disinfected on a monthly basis, by increasing the temperature to >60° 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 waterbath 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 waterbaths 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.¹

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 FMD 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 FMD 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 FMD.**

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 FMD 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.

¹ 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 FMD 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 FMD Maintenance and the Water Quality Measured Term Contractors [WQ-MTC]

Equipment such as emergency drench showers and emergency spray heads in laboratories are the responsibility of FMD Maintenance, who will arrange for risk assessment and any associated control measures such as regular flushing (normally undertaken by FMD Maintenance or by the WQ-MTC). 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 FMD (available for download from the “Policies, Procedures and Guidance” section of the FMD website http://www.fmd.reading.ac.uk/For_University_staff/Policies_and_procedures/)
- 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