Chapter 4: Risk Assessment

4.1 Introduction

This chapter on risk assessment and Chapter 5 on *Legionella* prevention and control provide an overview of risk management in relation to *Legionella* in water systems. They do not purport to provide definitive guidance for every situation. They should be read in conjunction with the UK, Health and Safety Commission (HSC) document – *Legionnaires' disease: the control of Legionella bacteria in water systems: approved code of practice and guidance (L8)*[64] and the UK, Department of Health technical document – *Health Technical Memorandum 04-01: the control of Legionella, hygiene, 'safe' hot water, cold water and drinking water systems: Part B: operational management*.[6]

The UK Approved Code of Practice (L8) advocates that a systematic risk management approach is adopted to prevent and control the risk of exposure to *Legionella* bacteria from water systems. This approach should be multidisciplinary, involving a team of experts with a thorough understanding of the particular water system. Risk management involves:

- Assessing the risks
- Developing a written scheme for preventing and controlling the risks
- Implementing and auditing the scheme.

This approach also provides a means for ensuring controls are applied which are commensurate with the level of risk and that a process for review and continual improvement is in place. The subcommittee agrees with this approach. Key elements of the risk management process are summarised in Figure 6.

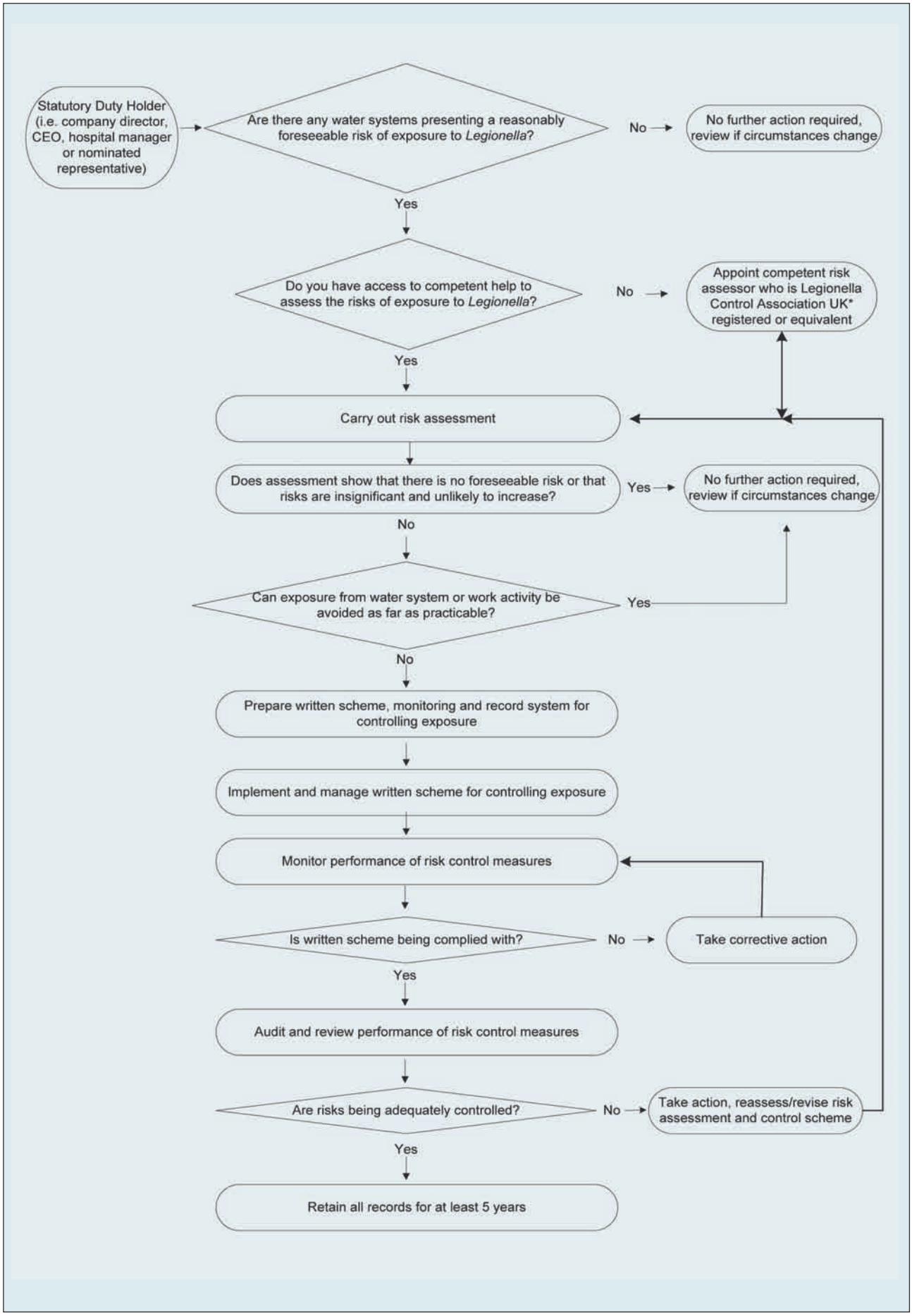

Figure 6. Summary of risk management process

**Legionella Control Association (LCA) (Chapter 4, Section 4.2.1 and Chapter 7, Section 7.3)*

4.2 Risk Assessment

In Ireland, under occupational health and safety legislation (see Chapter 3) there is a legal obligation on employers to carry out a risk assessment in relation to *Legionella* prevention and control in the workplace and where a risk is identified the appropriate control measures should be put in place and a risk management plan adopted.

4.2.1 Responsibilities, training and competence

It is imperative that a competent person (Appendix G) with the relevant skills, knowledge and experience carries out the risk assessment. Organisations and individuals carrying out risk assessments should ideally be members of a recognised professional body or association e.g. the Legionella Control Association in the UK or equivalent (see www.conduct.org.uk and Chapter 7, Section 7.3). If this level of expertise is not available within the organisation, then it should be sourced externally. Sections 8 and 19 of the 2005 Safety, Health and Welfare at Work Act outline in detail the legal duties of the employer in this regard and the legal requirements in relation to hazard identification and risk assessment (see Chapter 3). The person on whom the corporate responsibility for the premises/systems lies should have access to such expertise. In order to prevent any conflicts of interest, it is recommended that ideally, those appointed to carry out the risk assessment are independent of those appointed to implement the control measures and remedial actions, including water treatment and cleaning and disinfection. It is the duty of the employer to ensure that those undertaking the risk assessment are competent and suitably trained and have the necessary equipment to undertake the risk assessment in a safe and proper manner (see Chapter 7 on training).

4.2.2 Undertaking a risk assessment

The purpose of a risk assessment is to:

- Identify and assess the risk of exposure to *Legionella* bacteria from work activities and water systems on a premises i.e. a workplace, healthcare facility or leisure facility
- Establish any necessary preventive and control measures
- Provide direction on prioritising the risks.

A risk assessment is usually undertaken by or on behalf of the employer or person in control of a premises or systems where the risk may be present (e.g. the CEO of the hospital) in order to assess the risk to employees, themselves or to others.

Risk assessments should consider:

- The potential for *Legionella* seeding and growth
- The potential for aerosol generation and exposure
- The presence of susceptible persons
- The adequacy of existing site management arrangements and records
- The efficacy of existing preventive and control measures.

4.2.3 Process of risk assessment

When undertaking a risk assessment, the individual nature of each site must be taken into account. In complex systems or premises, a site survey of all the water systems should be carried out and should include an asset register of all associated plant, pumps, strainers and other relevant items. This should include an up-to-date diagram/drawing showing the layout of the plant or system including parts temporarily out of use. A schematic diagram would be sufficient. It should then be decided which parts of the water system, for example which specific equipment and services, may pose a risk to those at work or to other people.

The following systems present a potential risk of exposure to *Legionella* bacteria:

- Water systems incorporating a cooling tower
- Water systems incorporating an evaporative condenser
- Hot and cold water systems
- Spa pools
- Humidifiers
- Respiratory and other therapy equipment
- Dental chair waterlines
- Natural thermal springs and their distribution systems
- Fountains/sprinklers
- Water-cooled machine tools
- Vehicle washes
- Potting compost/soil in warmer climates
- Other plants and systems containing water which is likely to exceed 20°C, or have an electrical component that can transfer heat and cause localised heating, and which may release a spray or aerosol (i.e. a spray of droplets and/or droplet nuclei) during operation or when being maintained.

A water system includes all plant/equipment and components associated with that system e.g. all associated pipework, pumps, feed tanks, valves, showers, heat exchangers, quench tanks, chillers, etc. It is important that the system is considered as a whole and not for example the cooling tower in isolation. Dead legs and parts of the system used intermittently also need to be included as they can create particular problems with microbial growth and go unnoticed. Other systems e.g. humidifiers and air washers, spa pools and baths, car/bus washes, wet scrubbers, industrial water systems, fountains and water features also need to be considered.

The following list contains some of the factors which should be considered when undertaking a risk assessment:

- The source of the system supply water, e.g. whether from the mains supply or not
- Possible sources of contamination of the supply water within the premises before it reaches the cold water storage cistern, calorifier, cooling tower or any other system using water that may present a risk of exposure to *Legionella* bacteria
- The design, location and condition of equipment for example the position of air intakes for buildings in relation to the location of cooling tower exhausts
- Conditions suitable for multiplication of the microorganisms e.g. stagnant water, suitable temperature (20°C-45°C), and a source of nutrients e.g. sludge, scale, rust, algae and other organic matter
- A means of creating and disseminating inhalable droplets e.g. aerosols generated by cooling towers, taps, showers or spa pools
- Normal equipment operating conditions and any unusual but foreseeable conditions e.g. equipment breakdown
- The presence of vulnerable individuals e.g. immunocompromised individuals who may be exposed to infection
- The extent of exposure – the number of people who may be exposed and the length, duration and frequency of exposure.

Not all systems will require elaborate risk assessment and control measures. A simple risk assessment may show that the risks are low e.g. small domestic-type premises where temperature and turnovers are high and where instantaneous water heaters are used. In such cases no further action may be required other than to review the risk assessment on a regular basis.

4.2.4 Written risk assessment

Where a risk is identified, the significant findings of the assessment should be recorded, together with the name of the person and organisation that carried out the assessment. It will also be necessary to record sufficient details of the assessment to be able to show that it has been done. It should be linked to other relevant health and safety records.

Failure to undertake a risk assessment or possession of an inadequate risk assessment may lead to prosecution, especially if a system or premises is implicated in a legionnaires' disease outbreak.

A written risk assessment should include:

- The scope of the assessment
- A description of the site and water systems with details of design, operation and maintenance
- Details of site arrangements for managing and recording control of *Legionella* risks
- Assessment of risk for each system and activity
- Recommendations for preventing (elimination of source of bacteria, aerosols or exposure) or controlling (control bacteria re-growth, aerosol release and exposure) the risks including monitoring, remedial actions, etc.

4.2.5 Frequency of risk assessment

Once the risk assessment is completed and documented, it should be reviewed regularly i.e. at least annually. If there are significant alterations to operational procedures in the institution or significant changes to the water distribution system then the risk assessment should be reviewed and updated. There should be a written record of this review. In addition, it will need to be repeated more frequently in situations where the original assessment is considered to be no longer valid. An indication of when to review the assessment and what needs to be reviewed should be recorded. This may result from:

- Changes in the water system or its use
- Changes in the use of the building in which the water system is installed
- The availability of new information about risk and control measures
- The results of checks indicating that control measures are no longer effective
- A case of legionnaires' disease/legionellosis associated with the system.

4.2.6 Risk rating

The risk rating for exposure to *Legionella* can be categorised as follows:

a. **VERY HIGH** - where it is certain or near certain that exposure will occur

b. **HIGH** - where exposure will often occur

c. **MEDIUM** - where exposure will sometimes occur

d. **LOW** - where exposure will seldom occur

e. **INSIGNIFICANT OR NOT FORESEEABLE.**

Where an assessment determines that there is a potential risk of exposure to *Legionella* bacteria, the use of water systems, parts of water systems or systems of work that lead to exposure have to be avoided as far as is reasonably practicable. Where it is not practicable to do so then control measures should be adopted to minimise exposure.

Guided by the risk ratings outlined above, actions for the prevention or control of exposure to *Legionella* should be prioritised by adopting:

- Urgent corrective actions to prevent or control exposure from water systems or activities categorised as VERY HIGH or HIGH RISK
- Planned corrective actions to meet L8 guidance or equivalent for medium and low risk.[64]