

Control of Legionella: Inspection of evaporative cooling systems and investigation of outbreaks, clusters and single cases of Legionnaires' disease

Open Government status

Open

Target audience

FOD Inspectors (Bands 0-4)

FOD SG Specialist (Occupational Hygiene and Mechanical) Inspectors (Bands 0-3)

CEMHD Chemicals Inspectors and CEMHD Microbiological Specialist Inspectors (Bands 0-3)

FOD Visiting Officers (Band 5)

CEMHD Regulatory Compliance Officers (Band 5)

Summary

This document provides guidance on inspection, investigation and enforcement at premises operating evaporative cooling systems (cooling towers and evaporative condensers). It also describes action to take in the event of outbreaks, clusters and single cases of Legionnaires' disease and other non-pneumonic illnesses such as Pontiac fever.

The Appendices are written as standalone documents.

This document does not provide guidance for specific planned proactive interventions; this will be contained in a separate OG.

Introduction

Legionnaires' disease is a potentially fatal form of pneumonia caused by inhaling an aerosol of water droplets containing *Legionella* bacteria. Evaporative cooling systems (ECS) are open water systems that operate at optimum temperatures for the growth of *Legionella* bacteria. They generate large quantities of aerosol that, if uncontrolled and dispersed, can spread into the wider environment, potentially exposing the public. Outbreaks of Legionnaires' disease associated with ECS can affect large numbers of people and may be considered low frequency/high impact catastrophic incidents.

This OG will assist inspectors:

- undertaking targeted proactive inspections of ECS
- investigating concerns associated with ECS
- deciding whether the measures in place are adequate to control the risk of exposure; and any necessary enforcement action where these are deemed inadequate

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- when an outbreak of Legionnaires' disease has been declared
- when a single case or cluster of Legionnaires' disease is reported to HSE.

Action

FOD and CEMHD Inspectors

Inspectors undertaking inspections of ECS must be suitably trained and competent in accordance with the legionellosis health and safety supplement. <http://intranet/yourhealthsafety/health/legionellosis.htm>

Inspections will need to be pre-arranged (except during an outbreak) to ensure that the necessary site personnel are available and arrangements can be made to facilitate physical inspection of the system(s). Sites should be contacted by the inspector or visiting officer/regulatory compliance officer (further details in **Appendix 1**).

Obtain occupational hygiene specialist support if required, especially where:

- the system is unusual in terms of its design and/or operating characteristics
- there are uncertainties about the suitability of the written control scheme
- it is not possible for process reasons to have the required part of the installation switched off for a physical inspection.

If specialist support is required, inspectors should contact a FOD SG Occupational Hygiene Specialist Inspector.

Background

Inhaling *Legionella* bacteria can lead to a number of diseases, which collectively are termed legionellosis, the most serious of which is Legionnaires' disease. Legionnaires' disease is a potentially fatal form of pneumonia and everyone is susceptible to infection. Cases are more common in people over 50, smokers, individuals with underlying medical conditions, e.g. diabetes, lung and heart disease and those who are immunocompromised.

Legionella bacteria can readily colonise man-made water systems presenting a risk to health where use of the system gives rise to aerosol generation. Any water system may be become colonised; however, larger outbreaks of Legionnaires' disease have been associated with ECS such as cooling towers and evaporative condensers.

The 4th edition (2013) of L8 ACOP and guidance '*Legionnaires' disease The control of Legionella bacteria in water systems*' gives advice on how the requirements of the Health and Safety at Work etc. Act 1974, the Control of Substances Hazardous to Health Regulations 2002 as amended (COSHH) and the Management of Health and Safety at Work Regulations 1999 (MHSW) are applied to the risk from exposure to *Legionella* bacteria.

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Organisation

Resources

Heads of Units should ensure that there is a suitable cadre of Legionella-trained Inspectors in-post to deal with planned interventions or major outbreak investigations.

Health & Safety

If you have not attended the 'FOD Control of Legionella: Inspection of Water Systems' course, or are not accompanied by a colleague that has, you should **not** undertake a physical examination of a system.

<http://intranet/yourhealthsafety/health/legionellosis.htm>

Further References

General

Legionnaires' disease. The control of Legionella bacteria in water systems. Approved Code of Practice and guidance.

<http://www.hse.gov.uk/pubns/books/l8.htm>

Control of Legionella bacteria in water systems. Audit checklists.

<http://www.hse.gov.uk/pubns/books/ck02.htm>

Evaporative Cooling Systems

HSG274 Part 1: The control of Legionella bacteria in evaporative systems.

<http://www.hse.gov.uk/pubns/priced/hsg274part1.pdf>

Health Protection Guidance on Outbreaks

Health Protection Network Scottish Guidance Guideline on the management of *Legionella* cases, incidents, outbreaks and clusters in the community.

<http://www.documents.hps.scot.nhs.uk/about-hps/hpn/Legionella-guidelines-2014-2.pdf>

Public Health England Guidance on investigating cases, clusters and outbreaks of Legionnaires' disease.

<https://www.gov.uk/government/publications/investigation-of-legionnaires-disease-cases-clusters-and-outbreaks>

Hot and Cold Water Systems

HSG274 Part 2: The control of Legionella bacteria in hot and cold water systems.

<http://www.hse.gov.uk/pubns/priced/hsg274part2.pdf>

Spa-pool Systems

HSG282 Control of Legionella and other infectious agents in spa-pool systems.

<http://www.hse.gov.uk/pubns/books/hsg282.htm>

Healthcare

[Safe water in healthcare premises \(HTM 04-01\) - Publications - GOV.UK](http://www.gov.uk/government/publications/safe-water-in-healthcare-premises)

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Scottish Health Technical Memoranda 04-01 and 04-02.

<http://www.hfs.scot.nhs.uk/publications-/guidance-publications/>

Other Risk Systems

HSG274 Part 3: The control of Legionella bacteria in other risk systems.

<http://www.hse.gov.uk/pubns/priced/hsg274part3.pdf>

Contacts

FOD Specialist Group Occupational Hygiene Unit.

Appendices

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Appendix 1: Inspection of Evaporative Cooling Systems

This is additional guidance for inspection of premises with ECS.

Pre-visit arrangements

The following will normally be required to facilitate the inspection:

- Availability of relevant personnel, including the responsible person or deputies (water treatment company representative at the dutyholder's discretion);
- All relevant documentation and records (including those held electronically):
 - risk assessment
 - written control scheme
 - monitoring data including chemical and microbiological records, inspection reports relating to system clean and disinfection (including photos), servicing etc.
- Arrangements for the fan serving the ECS(s) to be turned off for a period of approximately one hour during the visit, so that a physical examination of the system can be carried out (this includes 30 minutes to allow aerosol to settle prior to inspection).
- Arrangements for access to inspect the drift eliminators, pond and pack, e.g. removal of access hatches. Where the installation is not fitted with an access gantry/platform and a cherry picker or temporary scaffold is required, inspectors should explore the issue of arrangements for routine access for inspection and maintenance.

Inspectors are **not** expected to physically inspect **all** cooling towers / condensers on site (apart from during an outbreak investigation). A judgement should be made to select a number that will provide a representative sample, with consideration given to different models, system age, for example.

At most FOD sites, switching off the fan(s) and pump(s) for brief durations should not cause undue operational problems for the dutyholder. At some CEMHD sites, turning the fan and/or pump off may not be possible, for example where cooling is safety-critical. If this is the case, a visit should be planned during a scheduled shutdown period.

Where there are 'banks of towers' and they can't all be turned off to facilitate inspection, you should inspect the records of **all** the systems to ensure that these demonstrate good control and request that the installation nearest to the one you are inspecting is also turned off.

In an outbreak situation, the expectation is that the device will be voluntarily shutdown for the purposes of inspection at short notice, unless this presents a greater safety risk.

Where it is not possible to turn the fan/pump off or if you are uncertain, FOD SG Occupational Hygiene Unit should be contacted for advice.

Notification of Devices

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Inspectors should first check with the dutyholder that their installation(s) has been notified to the relevant local authority (LA) under the Notification of Cooling Towers and Evaporative Condensers Regulations 1992 (NCTEC).

<http://www.legislation.gov.uk/ukxi/1992/2225/contents/made>

Reliable intelligence about the location and number of towers is essential during outbreak investigations this lack of knowledge of installations can seriously hinder effective action to curtail ongoing public health risk. Enforcement action is likely to be appropriate where non-notification is encountered during an outbreak. Dutyholder's should also be encouraged to update the LA when there have been any changes e.g. addition or removal of a cooling tower.

Inspection Approach

The purpose of inspection is to determine the level of compliance with relevant legislation (MHSW and COSHH Regulations), the L8 ACOP and HSG274 Technical Guidance Part 1.

Inspection comprises of two stages:

1. Review of documentation including:
 - Risk assessment
 - Written control scheme (including management arrangements)
 - Monitoring results (outcome of inspections and routine tests)

2. Physical examination including:
 - Pack
 - Pond
 - Drift eliminators
 - Pipework
 - Other ancillary systems e.g. biocide dosing system

When inspectors prioritise action in relation to Matters of Evident Concern (MEC) or Matters of Potential Major Concern (MPEC), see [OC18/12](#) a further visit should be made to complete the inspection as necessary.

Review of Documentation

Inspectors will be presented with a wealth of documentation and historical records. This should be reviewed by assessing the documentation, then selecting aspect(s) and drilling down to form judgement on compliance. Inspectors will be looking to identify any deficiencies, e.g. failure to act on reports requiring remedial action, such as pack replacement, failure to review why there are repeated failures of control (even though remedial action has been taken).

Risk Assessment

It is important that the risk assessment (RA) considers the risk of the system as a whole, including all pipework, ancillary plant and equipment such as pumps and water softeners.

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Many RA are over-reliant on the water treatment programme. Whilst this is likely to be a vital component in controlling risk, inspectors should ensure that all aspects of the management regime are appropriately addressed. The RA should identify characteristics of the plant or its location that contribute to overall risk, such as the presence of deadlegs, damaged or corroded hardware, condition of the incoming water source, predisposition to process and/or environmental contamination.

To assist with assessing whether a RA is suitable and sufficient, a list of the most common key requirements when assessing risk associated with a cooling system, based on mechanical, operational, chemical and management aspects is available in Appendix 1 of the Technical Guidance HSG274 Part 1.

The RA should be carried out by a competent person. The United Kingdom Accreditation Service (UKAS) accredits companies in this field, in accordance with BS8580 'Risk assessments for Legionella control – Code of practice'. Accreditation may provide some assurance that the RA is suitable and sufficient but inspectors should not rely on this and should use their own knowledge and judgement to form an opinion on the suitability and sufficiency of individual assessments.

Written Control Scheme

The written control scheme (WCS) sets out how controls are to be implemented and the organisational arrangements to ensure these are, and remain, effective. It is likely to comprise (or signpost to) system plans/schematics, the water treatment programme, cleaning/disinfection procedures, inspection and monitoring regimes. It should clearly describe the correct operation of the system, including shutdown procedures, operating cycles, maintenance frequencies and actions to deal with matters of concern; e.g. breakdowns, abnormal/unexpected test results and/or visual fouling/contamination.

An effective WCS should be well-ordered and easy to navigate to enable the duty holder to check that the correct procedures are being followed and facilitate monitoring review. A template giving suggested headings and structure is given in Appendix 2 of the Technical Guidance HSG274 Part 1. An effective WCS will usually be one that has been jointly developed with technical and practical input from competent service provider(s) and the duty holder. The WCS should also reflect the findings of the RA.

Monitoring and Inspection Records

Monitoring relates to **all** checks on the effectiveness of the WCS and should not be restricted to the results of chemical and microbiological analyses.

Regular chemical monitoring provides information about biocide concentrations, the amount of solids suspended within the water and the degree to which scale and corrosion are being controlled.

Measurements of microbiological activity (dip slides or total viable counts (TVCs)) are used to indicate the overall bio-burden within the water and effectiveness of the chemical treatment programme. Interpretation of microbiological results is not

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straightforward. It is more important to consider trends, as isolated sample results will be of little value when assessing the overall performance of the system.

Further guidance on interpretation of results and guidance levels is given in Tables 1.9 and 1.10 of the Technical Guidance HSG274 Part 1.

Inspectors should emphasise the importance of routine visual inspection, as this is often neglected by dutyholder's or undertaken poorly without adequate instruction or training. An effective inspection programme is a vital element of monitoring that may prevent the development of conditions which favour microbial growth or aid dispersion of aerosol. For example:

- ill-fitting or damaged drift eliminators
- evidence of drift
- build-up of scale or biofilm on pack surfaces
- corrosion of hardware
- introduction of permanent or temporary deadlegs or blind ends
- damage to chemical dosing equipment, empty chemical drums etc.
- the presence of organic matter in the pond/sump.

Records should provide evidence that the dutyholder is undertaking regular visual inspections. Where deficiencies are found, the records should show what remedial action was taken and when.

Physical Examination

Access Arrangements

Physical examination is an important part of an effective inspection. The fan(s) and water circulating pump(s) should be turned off for approximately 30 minutes before approaching the installation. Physical examination **should not** be attempted where the fan/pumps cannot be switched off (see pre-visit arrangements).

To facilitate inspection, Inspectors should check that safe access is available for plant located at height and given that drift eliminators are often located on top of the device (see internal guidance <http://intranet/yourhealthsafety/visiting-staff/visiting.htm> for further information on general precautions). If there are problems with gaining safe access to the installation, then enforcement action should be considered. (**Note:** If access is difficult for inspection then it will also present difficulties for examination and maintenance by the dutyholder, indicating that it is not effectively carried out).

Removable hatches or viewing panels may be utilised to allow internal components to be viewed, but no attempt should be made to dismantle any part of the installation.

Inspection of System

A torch and camera are useful during physical examination.

The components to be inspected will include:

Pack (Note these are not present in evaporative condensers, although there	Look for scale build up on surfaces, silt deposits, algal growth. (HSG274 Part 1 – Figures 1.5 and 1.6 show
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are some 'hybrid' designs which include condensing tubes and pack).	external and internal pack deposits for comparative purposes).
Pond/Sump	Should be screened to reduce windage, ingress of UV light and organic matter/debris. Look at the condition of sump water for the presence of microbial growth, excessive cloudiness from suspended solids and biofilm.
Drift Eliminators (The purpose of drift eliminators is to <i>limit</i> rather than <i>eliminate</i> the amount of cooling water droplets exiting the tower in the exhaust stream)	Check from above to see that these are well-fitted, free from damage and secure. Extensive localised wetting of surfaces close to the exhaust stream, with evidence of algal growth and scale deposition, indicates ineffective control of drift.
Biocide Dosing System	Where there is automatic dosing equipment, check that the reservoir is not empty and that the dosing delivery tubing is connected and not split or otherwise damaged. The chemicals used can be checked and compared with the details provided in the WCS. The suitability of the sampling and dosing points should also be checked.
Associated pipework	Trace pipework to ensure that there are no deadlegs or blind ends; a schematic will assist. Note: The pipework for an evaporative condenser will be a small circuit that circulates water around the 'unit' whereas for a cooling tower the pipework will need to be traced into the factory or premises.
Pumps	Standby pumps will create a dead-leg and so must be either be flushed or switched over weekly.
Break tanks and softeners	Enquire if present and, if so check that they are subject to inspection, servicing and cleaning where necessary.

For further information on what to look for when inspecting components of the cooling tower or evaporative condenser, refer to Tables 1.3 and 1.4 the Technical Guidance HSG274 Part 1.

Alternative Treatment Techniques

The majority of cooling towers utilise a chemical biocide dosing regime, details of which should be set out in the WCS. However, in some circumstances, other technologies may be used that do not rely on chemical treatment e.g. cavitation and filtration. Further details on alternative control strategies are available in the Technical Guidance HSG274 Part 1 (paras 1.67-1.72).

Suppliers of products and services, including consultancy and water treatment services

Many dutyholders contract out activities in relation to the maintenance and control of risk from water systems to specialist service providers. Services range from risk assessment, water management, supply of chemicals, analytical services to cleaning/disinfection. It is important that the dutyholder maintains managerial responsibility for the installation(s) as their legal responsibility cannot be delegated.

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Many service providers are members of the Legionella Control Association (LCA) which administers a Code of Conduct for organisations providing services to occupiers/owners of water systems. This Code of Conduct does not have legal status but may give guidance to dutyholder's about the standards of service they should expect to receive from service providers who abide by the Code. A list of members and further details can be found at <https://www.Legionellacontrol.org.uk/>

The dutyholder must make reasonable enquiries into the competence of any service provider contracted for the purposes of *Legionella* control.

The L8 ACOP (paras 76-79) also places duties on suppliers of services to ensure the competence of their staff and the efficacy of services provided to control or prevent the risk of exposure to *Legionella* bacteria. Where deficiencies in such services are identified, appropriate enforcement action against the service provider should be considered. FOD SG Occupational Hygiene Specialist Inspectors are available to provide assistance if required.

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Appendix 2: Application of the EMM and Initial Enforcement Expectations

Application of the EMM

Inspectors should apply the EMM as set out in OC 130/5.

http://www.hse.gov.uk/foi/internalops/ocs/100-199/130_5/index.htm

When using the EMM for decisions on enforcement relating to Legionella you should consider the following:

Risk	It is credible that exposure to <i>Legionella</i> bacteria could result in Legionnaires' disease, which may cause death.
Immediacy (consequence) of risk	<p>Failure to adopt appropriate control measures can result in exposure to <i>Legionella</i> bacteria with the possible risk of serious ill health effects. This does not require a judgement regarding the likelihood of disease occurring following exposure.</p> <p>Legionellosis can result from inhalation of an aerosol contaminated by <i>Legionella</i> bacteria. Some forms of the illness can be mild and others more serious. There is no certain way of predicting who, in a given community, will develop Legionnaires' disease. Some people are known to be more susceptible than others e.g. smokers, those with chronic respiratory conditions or compromised immunity. Effective treatment is available, but successful recovery depends on a number of variables, such as speed of diagnosis and the presence of underlying medical conditions. Overall, mortality rate is calculated at 10 – 15%, although this may rise significantly for immunosuppressed persons.</p>
Benchmark standards	<p>The benchmark set is a nil or negligible risk of a serious ill health effect.</p> <p>This can be achieved by applying the precautions detailed in the L8 ACOP (avoiding, if practicable, water temperatures between 20°C and 45°C, avoiding water stagnation, controlling the release of water spray, maintaining the cleanliness of the system and water in it, use of water treatment techniques and taking action to ensure the correct and safe operation and maintenance of the water system); as well as appropriate arrangements for the monitoring and review of these precautions.</p>
Risk gap	Non-compliance with the benchmark standards (set by COSHH, MHSW Regulations, L8 ACOP and HSG274 Technical Guidance) will produce an 'extreme risk gap' with standards established or defined.

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The design and operating characteristics of cooling towers/evaporative condensers mean that a failure of controls may lead to contaminated aerosol being dispersed over a wide area, potentially exposing both employees and the general public. In urban areas, this may mean very large numbers of people. *Legionella* risks are considered to be a Matter of Potential Major Concern (MPMC) because of the potential to cause multiple fatalities or multiple cases of ill health. Therefore, in most cases, **Risk Table 2.2** should be used when determining the risk gap. This will also be the case for commercial spa pools as outbreaks typically affect large numbers of people. Hot and cold water systems, although they may be used by multiple users, are likely to give rise to low numbers of cases of ill health so **Risk Table 2.1** should be used.

Initial Enforcement Expectation

The table below gives an indication of the Initial Enforcement Expectations (IEEs) when inspecting ECS. (**Note:** This table can be used to broadly read across to other risk systems such as spa pools and hot and cold water systems, but inspectors will need to refer to specific technical guidance). These are a guide only. Inspectors will need to consider the full EMM including the local factors and consideration of the actual circumstances encountered.

In all cases, inspectors should consider whether the breach gives rise to an increased risk of *Legionella* growth and/or dispersal of aerosol.

Inspectors will also need to consider:

- serving a prohibition notice if there is immediate serious risk to health
- prosecution if the risk gap is extreme and in line with the Enforcement Policy Statement.

If further advice/discussion is required on the IEE, or if a Prohibition Notice or prosecution is appropriate, please contact FOD SG Occupational Hygiene Unit.

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Aspect	Situation	IEE/PN	Comment
Notification of Installation	Failure to notify under the NCTEC Regs	IN	The dutyholder may be able to register on-line. (Table 5.2 of EMM to be used)
Risk Assessment	Absent	IN	COSHH Reg 6(1)
Risk Assessment	Not suitable or sufficient	IN	<p>A suitable and sufficient RA should:</p> <ul style="list-style-type: none"> • account for the individual nature of each site e.g. possible sources of airborne contamination, source and quality of make-up water, operating characteristics and periods of intermittent use. • consider the system as a whole e.g. not just the cooling tower in isolation. • involve a site survey of the water system including an asset register of all associated plant, pumps, strainers and other relevant items. • include an up-to date schematic diagram showing layout of plant or system, including parts temporality out of use. <p>COSHH Reg 6(1) L8 ACOP para 38</p>
Risk Assessment	No arrangements for regular review and specifically when there is reason that it may no longer be valid	IN	COSHH Reg 6(3) L8 ACOP para 32
Written Control Scheme	Absent	IN	<p>There should be a written scheme for controlling risk from exposure that should be properly implemented and managed and consistent with the risk assessment.</p> <p>COSHH Reg 7(3) L8 ACOP Para 58</p>

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Written Control Scheme	Inadequate	IN	<p>The written scheme should include:</p> <ul style="list-style-type: none"> • an up to date plan e.g. a schematic diagram showing the layout of the system e.g. all associated pipework, pumps, feed tanks, heat exchangers, water softeners, quench tanks including parts temporarily out of use. • A description of the correct and safe operation of the system e.g. commissioning and recommissioning procedures; shutdown procedures; checks of warning systems and diagnostic systems in case of system malfunctions; maintenance requirements and frequencies; operating cycles – including when the system plant is in use or idle. • details of precautions to be taken e.g. chemical treatment programme, cleaning and disinfection procedures. • details of the checks to carry out to ensure that precautions above remain effective and the frequency of such checks e.g: <ul style="list-style-type: none"> ○ checks of the performance and operation of the system and its component parts ○ inspection of the accessible parts of the system for damage and signs of contamination ○ monitoring to ensure that the treatment regime continues to control to the required standard. • the remedial actions to be taken if the scheme is shown not to be effective, including lines of communication, control scheme reviews and modifications made. <p>COSHH Reg 7(3), 9(1) and L8 ACOP Paras 60 and 65</p>
Implementation of Written Control Scheme	No responsible person appointed	IN	<p>No-one has been appointed to take day to day responsibility for the implementation of the written control scheme. That person(s) should have sufficient authority, competence and knowledge of the installation to ensure that all operational procedures are carried out in a timely and effective manner.</p> <p>Management Reg 5(1) L8 ACOP Para 48</p>

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Implementation of Written Control Scheme	Inadequate management arrangements	IN	<p>Appropriate arrangements include:</p> <p>Staff responsibilities (including those not under direct control) and lines of communication are clearly defined and documented.</p> <p>The responsible person or an authorised deputy can be contacted at all times.</p> <p>Regular review of the management and communication arrangements to ensure they remain effective.</p> <p>Management Reg 5(1) L8 Guidance paras 53, 54, 56</p>
Implementation of Written Control Scheme	Failure to provide suitable and sufficient information, instruction and training and ensure competence of those carrying out work not under their direct control	IN	<p>Those appointed to carry out the risk assessment and draw up and implement precautionary measures do not have the ability, experience, instruction, information, training and resources to enable them to carry out their tasks competently and safely.</p> <p>No reasonable steps (checks) have been made to ensure the competence of those who carry out work who are not under direct control of duty holder. Note: where there is evidence that they are not competent enforcement action should be considered under HSWA Section 3.</p> <p>Management Reg 5(1) and Reg 7 L8 ACOP paras 48 and 49</p> <p>Note: Courses are provided by a number of organisations including the British Occupational Hygiene Society (BOHS), City and Guilds, the Water Management Society (WMS). Often, the site's water treatment company provides the training for staff and may be fit for purpose. Inspectors will need to assess on an individual basis.</p>
Implementation of Written Control Scheme	Absence of routine biocide checks and/or microbiological (dip slides) monitoring	IN or PN	<p>A PN should be considered if there are no monitoring results at the time of the inspection that demonstrate control. Inspectors should enquire about other monitoring checks that may have taken place e.g. by a water treatment company. Note: Weekly biocide testing will not be necessary for systems where a non-oxidising biocide is used. Where an oxidising biocide is used in combination with a non-oxidising biocide, but there are no weekly checks of the</p>

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			<p>oxidising biocide level a PN would only be considered if there were no weekly dip slide checks.</p> <p>COSHH Reg 7(3) L8 ACOP para 59(f)</p>
Implementation of Written Control Scheme	Excessive biological contamination on internal wetted surfaces	PN	<p>Evidence of slime, algae on pack, spray nozzles, internal surfaces of pond.</p> <p>COSHH Reg 7(3) L8 ACOP para 59(e)</p>
Implementation of Written Control Scheme	Absence of or clearly defective drift eliminator	IN or PN	<p>A PN should be considered where there is also evidence of poor microbial control or this cannot be demonstrated.</p> <p>COSHH Reg 7(3) L8 ACOP para 59(d)</p>
Implementation of Written Control Scheme	Failure to act in response to monitoring results that indicate loss of control.	IN or PN	<p>A PN should be considered if the results at the time of the inspection indicate loss of control.</p> <p>COSHH Reg 7(3) L8 ACOP para 59(g)</p>

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Appendix 3: Investigation of an outbreak of Legionnaires' disease

Scope of this guidance

This guidance relates to the investigation of outbreaks associated with evaporative cooling systems (ECS) which are likely to be the most demanding on HSE resource. However, some of the information may also assist in the investigation of outbreaks from other risk systems, such as spa pools.

Other guidance

In England and Wales, there is a mixture of local and regional incident plans for investigation of outbreaks. The Enforcement Liaison Officer (ELO) should enquire whether or not a regional incident plan exists. Public Health England (PHE) have also published guidance at:

<https://www.gov.uk/government/publications/investigation-of-legionnaires-disease-cases-clusters-and-outbreaks>

In Scotland, Health Protection Scotland (HPS) have a single national outbreak document available at:

<http://www.documents.hps.scot.nhs.uk/about-hps/hpn/Legionella-guidelines-2014-2.pdf>

Definitions of an Outbreak

PHE and HPS have respectively defined an outbreak as follows:

Public Health England	Two or more cases of Legionnaires' disease that are geographically linked within six kilometres , by places of residence, work, or other type of community setting, with an interval of no more than 28 days between onset dates of consecutive cases and one of more of the following : - isolates from clinical and environmental specimens from at least two cases are indistinguishable. or - isolates from respiratory specimens from at least two cases are indistinguishable. or - strong epidemiological evidence for link(s) between all cases (e.g. a common workplace).
Health Protection Scotland	Two or more confirmed or probable cases in the same locality for which there is strong evidence of a common source of infection and closely linked in time (weeks rather than months) . The definition of 'locality' is based on a judgement made by the Consultant in Public Health Medicine.

Legionnaires' disease statutory notification and reporting

Legionnaires' disease (LD) is notifiable under public health legislation. All cases of LD, (including any suspected) must be notified by the clinician to the Proper Officer

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of the relevant Local Authority (LA) or the Consultant in Communicable Disease Control (CCDC) in England and Wales or the Consultant in Public Health Medicine (CPHM) in Scotland.

PHE co-ordinates the national enhanced surveillance scheme (NELSS) for LD in residents of England and Wales. HPS undertakes surveillance of legionellosis in Scotland, working with the Scottish Reference Laboratory at Stobhill Hospital, Glasgow.

Any case of legionellosis in the community is considered a public health issue, initiating investigations by the LA environmental health department and the local Health Protection Team (HPT). HSE regional offices are likely to be notified about legionellosis cases by the LA or local HPT if there is a suspected link to HSE-enforced premises.

There are some situations where a case of LD is notifiable to HSE under the RIDDOR Regulations (<http://www.hse.gov.uk/riddor/>). This will require the exposure to be work-related, e.g. where a worker is exposed to *Legionella* bacteria while conducting maintenance on a hot and cold water system.

Action by HSE on declaration of an Outbreak

Attendance at Outbreak Control Team/Incident Management Team Meetings

An outbreak would normally be declared by the PHE/PHW/HPS local health protection team, triggering the convening of an Outbreak Control Team (OCT) in England and Wales and Incident Management Team (IMT) in Scotland. The CCDC or CPHM has the authority to convene and chair an OCT/IMT.

The primary purpose of an OCT/IMT is to protect public health and prevent further infection. To achieve this, its aim is to identify the source and control the risk from that source as a matter of urgency.

If HSE is the enforcing authority for any of the premises suspected of being the source, the CCDC/CPHM will invite HSE to join the OCT/IMT. The first meeting will be convened within 24 hours of the outbreak being declared. At the discretion of the CCDC/CPHM further meetings will be held; this may be every few days in the early stages of an outbreak. The OCT/IMT will also declare the outbreak over.

HSE should be represented at Band 2 Level or above. They should have necessary experience to make strategic decisions and have the competence to advise the members of the OCT/IMT on legal and technical matters. The relevant Band 2 Occupational Hygiene Specialist Group Team Leader should be notified immediately and they or an experienced Band 3 Occupational Hygiene Specialist Inspector should also attend the OCT/IMT, either in person or by telecon/video conference/Skype.

Investigation of an outbreak of LD will be a multi-agency response, it is therefore important that HSE inspectors and other agencies fully understand the extent of HSE's role and responsibilities. To facilitate communication of this, an information

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document is provided at **Appendix 4** that can be passed to the Chair of the OCT/IMT at the first meeting.

HSE's objective is to ensure that the risk of exposure posed by ECS is adequately controlled based on assessment of compliance with the ACOP L8. HSE investigations should run parallel to that of the OCT/IMT and ensure all relevant findings are fed back to the OCT/IMT.

It will be necessary to ensure that any action following an outbreak is coordinated between all agencies participating in outbreak investigations. Where other agencies take responsibility for communication with the media, inspectors must ensure that those agencies:

- Are made aware of any statutory restrictions on disclosure of information; and
- Do not disclose information about HSE-enforced premises without prior consultation.

Resources

At the earliest opportunity a Band 2 inspector should be nominated to lead the investigation on behalf of HSE and consideration given to the level of support required from:

1. FOD/CEMHD (Chemicals) Inspectors
2. SG Occupational Hygiene Specialist Inspectors
3. Visiting Officers/Regulatory Compliance Officers

Given that the source of the outbreak may be associated with a number of types of premises, it may not obviously fall within the sole responsibility of FOD or CEMHD or a single inspection group. Appropriate liaison between FOD and CEMHD should take place and consequently the lead inspector may need to be specifically appointed by FOD Head of Unit/CEMHD (Chemicals) Head of Unit. There may also be the need to liaise with Office of Nuclear Regulation (ONR) and/or Office of Rail and Road (ORR).

The initial consideration for the number of inspectors required will primarily depend on the number of HSE-enforced premises in the outbreak zone. Subsequently, it will be governed by the speed at which the number of potential sources can be narrowed down. Inspectors may need to be drawn from across FOD and CEMHD (Chemicals) inspection groups, depending on the availability of suitably trained personnel.

Visiting Officers/Regulatory Compliance Officers may provide assistance in gathering intelligence:

- searching COIN for recent contacts on *Legionella* issues at premises in the outbreak zone.
- information to identify potential cooling towers or evaporative condensers that have not been notified, focusing on industrial processes and premises having a need to dissipate heat, such as foundries, plastics manufacture, chemical and food manufacturing.
- Identifying other premises or processes that may need to use water systems that store water and create aerosols.

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The outbreak investigation may be considered to proceed in two phases. Firstly, there is a control phase, in which the objective is to minimise the chance for further cases of infection and all public bodies, including HSE, should be committed to this. The second phase comprises the investigation itself, where HSE's objective will be to ensure regulatory compliance and secure justice where appropriate. Where there is a small number of installations within an outbreak zone, there will be a significant overlap between the two phases.

Control Phase

The local HPT/EHO will identify potential sources from the information reported on the national surveillance form, e.g. places visited by the case during the 2 weeks prior to the onset of symptoms. Information regarding the number and location of notified ECS within the agreed outbreak zone will also be provided by the LA, usually at the first OCT/IMT meeting.

As no two outbreaks are the same, the exact nature of HSE's involvement can vary accordingly. If directed by the Chair of the OCT/IMT, HSE may be asked to inspect some or all of the HSE-enforced premises with ECS within the outbreak zone. This may depend on the characteristics of the outbreak, e.g. number of cases, speed of development etc. HSE may also be requested to assist with inspection of premises enforced by the LA or other enforcing authorities.

It might be necessary for HSE to prioritise sites for inspection; this is likely to be based on case proximity to sources, a site inspection history of non-compliance for *Legionella* and/or absence of any previous *Legionella* inspection.

The OCT/IMT will depend heavily on HSE's inspection conclusions at this stage. EHOs will undertake a parallel exercise of this type in LA-enforced premises. The inspection procedure should follow that for proactive inspections described in **Appendix 1**. Rapid assessment and decisions are likely to be required in order to limit the risk to public health.

A public health risk assessment may be used by the OCT/IMT to prioritise investigation of potential sources. A public health risk assessment differs from a risk assessment of a water system, as it considers the possibility of exposure and risks to public health. This will be dynamic in that it will be continually reviewed in response to information concerning investigation of potential sources and new case histories. According to the OCT/IMT public health risk assessment, HSE may be asked to inspect HSE-enforced sites with other types of water systems located within the outbreak zone, to check compliance with the L8 ACOP.

Investigation Phase

Clearly, preliminary investigation will commence during the control phase; however, once the outbreak is declared over, premises deemed to have posed a high risk will need to be re-visited and assessed in more detail.

Inspectors should also consider the need to take action against water treatment companies and other contractors and suppliers whose negligence or malpractice

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may have contributed to their client's failure to comply with their legal duties. Actions under HSWA Section 3 and/or 6 are likely to be relevant.

Divisional Major Incident Response Plan (MIRP)

HSE's Divisional Major Incident Response Plan (MIRP) may need to be invoked in the event of a LD outbreak <http://www.hse.gov.uk/foi/internalops/og/og-00076.htm>.

The criteria that may make this likely are:

- Where a large number of cases is clearly associated with one HSE-enforced site; or
- Where the number of cases is fewer, but local public and political concern becomes a major factor.

The major incident investigation team does not have the authority to take over the roles and functions of the OCT/IMT.

Work-related Death Protocol and Corporate Manslaughter and Corporate Homicide Act 2007 (CMCH)

Where a case of LD becomes a fatal investigation, the police may take primacy in accordance with the respective protocols: <http://www.hse.gov.uk/pubns/wrdp1.pdf> and <http://www.hse.gov.uk/scotland/workreldeaths.pdf>

It is a Police/CPS/COPFS rather than an HSE decision whether they wish to pursue a CMCH line of enquiry. Heads of Units will need an early dialogue with the Police/CPS/COPFS about HSE resourcing if this line of enquiry is pursued, see <http://www.hse.gov.uk/corpmanslaughter/about.htm>

Legionella sampling during an outbreak

The OCT/IMT utilises *Legionella* analysis of water and environmental samples for a number of reasons including:

- to identify the source of the outbreak;
- to eliminate potential sources of the outbreak; and
- to assess the effectiveness of remedial action.

HSE's health and safety policy states that inspectors **should not** take samples for the identification and quantification of *Legionella* bacteria.

LA EHOs and PHE Food, Water and Environmental (FW&E) staff (or equivalent in Wales and Scotland) with appropriate training will normally be the people to undertake sampling. Since PHE staff do not have powers of entry into workplaces they may need assistance from the relevant enforcing authority to carry out this work, this will need to be coordinated with HSE/LA at the OCT/IMT.

HSE does not have the *vires* to sample on behalf of the LA since HSE does not have a public health remit. LA EHOs have powers to enter a workplace (including those that are HSE-enforced) in order to carry out health protection functions such as *Legionella* sampling.

When dealing with CMCH, there will be a need for the Police and public health officers to consider if the causal link can be proved beyond reasonable doubt.

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Therefore, it is imperative that samples are taken in such cases to preserve evidence and assist in microbiological analysis of the available specimens to determine if *Legionella* can be isolated or detected. This is essential to enable derivation of typing data from the bacterial isolates or samples that can be used to determine whether potential sources contain *Legionella* bacteria that are genetically distinguishable from those from patients, enabling exclusion of potential sources; or are indistinguishable by sequence-based typing to those isolated from or detected in patients. Such samples can be classified as evidence and used to determine probable source site(s) consistent with a point source outbreak.

To ensure 'best evidence' is obtained HSE inspectors may wish to check with the OCT/IMT that, with respect to any sampling undertaken:

- a. The sampling officer is appropriately trained and equipped. In some circumstances it may be appropriate for a member of PHE FW&E or HPS equivalent staff, who is suitably trained, to assist the LA. Sampling should be carried out with due consideration of BS 7592:2008 Sampling for *Legionella* Bacteria in Water Systems Code of Practice.
- b. Samples taken by water treatment companies and EHOs in England and Wales, or by local PHE FW&E microbiology laboratories, should be processed for *Legionella* culture by an accredited laboratory, whilst maintaining the chain of evidence.
- c. *Legionella* isolates associated with an outbreak should be retained by the testing laboratory and referred to the National Legionella Reference Laboratory (NLRL) in Colindale for microbiological typing of isolates or environmental specimens. In Scotland these should be routed to the Scottish Reference Laboratory at Stobhill Hospital, Glasgow.
- d. To maintain the integrity of sample evidence relied upon in court, procedures should be in place to ensure continuity during transport, storage, custody and testing e.g. a standard chain of evidence form.

HSE has an interest in the results of such sampling, but does not need evidence of sampling to support a prosecution or any other enforcement action taken under health and safety legislation. HSE's objective to assess compliance cannot be confirmed by the results of analysis alone. Similarly, HSE should not take enforcement action solely based on sampling results. Enforcement action, including Prohibition Notices, should only be served where inspection reveals non-compliance with the ACOP L8.

Shock-dosing during an outbreak

It is prudent for ECS investigated during an outbreak to be shock or shot dosed with a high concentration of biocide (usually hypochlorite) as early as possible in order to control the ongoing public health risk.

Co-ordination with the OCT/IMT is required regarding timing of shock dosing and the instructions HSE gives to dutyholders. This is necessary because shock dosing may lead to a loss of evidence that could potentially link cases to a source of exposure and may mean that causation cannot be proved beyond reasonable doubt. This is a difficult public health versus securing justice decision and may be dependent on the unique characteristics of the outbreak e.g. number of cases, number of sites with notified devices, EHO training and resources, etc. In an ideal situation, *Legionella*

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samples would be collected from ECS identified as potential sources just prior to shock dosing. However, it is not intended that there should be a significant delay to shock dosing for the purpose of sampling.

For operational purposes, it is suggested that once an OCT/IMT has met and decided on the implementation of shock dosing, this should occur within 24 hours of the decision being made. It will need to be acknowledged by the OCT/IMT that this may not, however, provide the same quality of evidence for an outbreak to be attributable to a particular source.

Re-starting a system which has been shut down during an outbreak

Guidance in HSG274 Part 1 recommends that dutyholders carry out quarterly microbiological analysis for *Legionella* bacteria. Where dutyholders have been directed to carry out emergency cleaning and disinfection of their system as a consequence of an outbreak investigation, inspectors should consider requiring the dutyholder not to re-commission the plant until *Legionella* analyses prove to be negative. It may be possible to use quantitative polymerase chain reaction (qPCR) (a more rapid test than *Legionella* culture) but specialist advice must be available and sought to interpret these results. HSE's position statement on qPCR can be found at <http://www.hse.gov.uk/legionnaires/fags.htm>. This would be in addition to any sampling carried out by the LA/HPT as described above. Thereafter, inspectors may consider requiring dutyholder's to increase the frequency of *Legionella* sampling for a temporary period until the results indicate sustained control.

SG Occupational Hygiene Specialist Inspectors should be consulted for further advice regarding interpretation of sampling results and the need for more frequent testing.

The results of *Legionella* sampling should be regarded in the context of overall compliance and should not be taken in isolation when determining whether the risk is under control.

Enforcement during an outbreak

The following guidance should be read in conjunction with that in **Appendix 2**.

During the initial stages of the outbreak, enforcement will principally involve issuing notices under the COSHH Regulations, as the emphasis will be on securing control. During an outbreak, inspectors should serve a Prohibition Notice (PN) if they are of the opinion that the conditions they find could give rise to a risk of *Legionella* growth and/or spread of aerosol.

If agreement to switch off an ECS is not forthcoming, then a PN may be served to enable a physical examination to be carried out.

Inspectors should also consider the need to take action against water treatment companies, other contractors and suppliers, whose negligence or malpractice may have contributed to their client's failure to comply with their legal duties. Actions under HSWA Section 3 and 6 are likely to be relevant.

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Appendix 4: Information Document for the Chair of Outbreak Control Team/Incident Management Team

Role of the Health & Safety Executive (HSE)

The HSE is an enforcing authority responsible for the health and safety at work in Great Britain and was established by the Health and Safety at Work etc. Act 1974 (HSWA). The HSE is a non-departmental public body with Crown status, sponsored by the Department for Work and Pensions and accountable to its ministers.

The mission of HSE is to 'prevent death, injury and ill health in Great Britain's workplaces'.

HSE also investigates incidents and concerns about health and safety practices, and develops new or revised health and safety legislation and codes of practice.

HSE regulates health and safety across a range of sectors and industries including major hazard sites such as offshore gas, oil installations and onshore chemical plants through to more conventional sites, quarries, farms, factories and waste management sites. The **Health and Safety (Enforcing Authority) Regulations 1998** allocate workplace activities to either HSE or LAs for enforcing health and safety legislation. An A-Z guide to allocation can be found at <http://www.hse.gov.uk/foi/internalops/og/og-00073-appendix1.htm>

Employers and those in control of premises have a legal requirement to control the risks from *Legionella*. HSE publishes extensive guidance on the control measures which are necessary to minimise the risks and to comply with the relevant legislation. HSE periodically carries out inspections of companies with registered cooling towers and evaporative condensers to ensure that controls for *Legionella* remain adequate and that workers and the public are protected. Where there is evidence of serious non-compliance, in line with the Enforcement Policy Statement, HSE will use formal enforcement powers (Improvement or Prohibition Notices, prosecution (England and Wales) or recommendation of legal proceedings to the Crown Office and Procurator Fiscal Service (COPFS) in Scotland).

To enable HSE to conduct its functions in an open and transparent manner all of the operational procedures that it works to, plus the associated internal guidance and instructions, are publicly available on its website <http://www.hse.gov.uk/foi/internalops/index.htm>

The Health and Safety at Work etc. Act 1974 (HSWA)

HSE enforces the provisions of HSWA and the Regulations made thereunder. Under the main provisions of this Act, employers have legal responsibilities in respect of the health and safety of their employees and other people, who may be affected by their undertaking and who may be exposed to risks as a result. Employees are required to take reasonable care for the health and safety of themselves and others. Breaches of health and safety legislation amount to criminal offences.

Section 2 of HSWA requires every employer to ensure, so far as is reasonably practicable, the health, safety and welfare at work of all employees.

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Section 3 of HSWA places a duty on employers and in some circumstances, the self-employed to conduct their undertakings in such a way as to ensure, so far as is reasonably practicable, that non-employees are not exposed to risks to their health or safety. This is the main duty relevant to outbreaks affecting members of the public.

Legionnaires' disease. The control of *Legionella* bacteria in water systems. Approved Code of Practice and guidance (L8 ACOP)

The L8 ACOP has a special legal status and an employer has to follow this or show that they have complied with the law in some other way. The L8 ACOP and guidance gives advice on how the requirements of Health and Safety at Work etc. Act 1974, the Control of Substances Hazardous to Health Regulations 2002 as amended (COSHH) and Management of Health and Safety at Work Regulations 1999 (MHSW) are applied to the risk from exposure to *Legionella* bacteria.

Action that HSE are likely to take during an outbreak

1. HSE will contribute to OCT/IMT decisions on the extent of the outbreak zone, the priority with which potential sources should be investigated, and provide specialist advice as required.
2. HSE along with the LA as co-partners will seek to investigate relevant priority premises in the outbreak zone. HSE will make a decision as to which HSE-enforced premises to visit, based on a number of factors including registered cooling towers/evaporative condensers, local knowledge and advice of the OCT/IMT.
3. HSE will seek to ensure compliance with legislation and that adequate arrangements are put in place for the on-going and sustained control of *Legionella* risks. HSE will often specify the necessary corrective actions to decontaminate water systems and to achieve adequate control, using formal enforcement notices as necessary.
4. HSE will require employers to shut down their system(s) where on inspection there is evidence of a loss of control or if this control cannot be demonstrated. HSE is unable to prohibit the use of an ECS unless sufficient evidence of lack of control is available to justify a Prohibition Notice. Employers have a legal right to appeal any Notices to an Employment Tribunal, so HSE must be sure that there is sufficient evidence to substantiate its actions.
5. HSE will investigate to secure justice.
6. HSE (where it is the enforcing authority for the workplace and where deaths have already occurred or are likely) will investigate the outbreak in partnership with the Police/Crown Prosecution Service/COPFS in line with the respective Work Related Deaths Protocol (for Scotland or England and Wales).

Corporate Manslaughter and Corporate Homicide Act 2007 (CMCH)

Where a case of LD becomes a fatal investigation, the police may take primacy in accordance with the respective protocols: <http://www.hse.gov.uk/pubns/wrdp1.pdf> and <http://www.hse.gov.uk/scotland/workreldeaths.pdf>

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It is a Police/CPS/COPFS rather than an HSE decision whether they wish to pursue a CMCH line of enquiry.

Legionella Sampling

HSE's health and safety policy states that inspectors **should not** take samples for the identification and quantification of *Legionella* bacteria.

LA EHOs and PHE Food, Water and Environmental (FW&E) staff (or equivalent in Wales and Scotland) with appropriate training will normally be the people to undertake sampling. Since PHE staff do not have powers of entry into workplaces they may need assistance from the relevant enforcing authority to carry out this work, this will need to be coordinated with HSE/LA at the OCT/IMT.

HSE does not have the *vires* to sample on behalf of the LA since HSE does not have a public health remit. LA EHOs have powers to enter a workplace (including those that are HSE-enforced) in order to carry out health protection functions such as *Legionella* sampling.

When dealing with CMCH, there will be a need for the Police and public health officers to consider if the causal link can be proved beyond reasonable doubt. Therefore, it is imperative that samples are taken in such cases to preserve evidence and assist in microbiological analysis of the available specimens to determine if *Legionella* can be isolated or detected. This is essential to enable derivation of typing data from the bacterial isolates or samples that can be used to determine whether potential sources contain *Legionella* bacteria that are genetically distinguishable from those from patients, enabling exclusion of potential sources; or are indistinguishable by sequence-based typing to those isolated from or detected in patients. Such samples can be classified as evidence and used to determine probable source site(s) consistent with a point source outbreak.

To ensure 'best evidence' is obtained HSE inspectors may check with the OCT/IMT that, with respect to any sampling undertaken:

- a. The sampling officer is appropriately trained and equipped. In some circumstances it may be appropriate for a member of PHE FW&E or HPS equivalent staff, who is suitably trained, to assist the LA. Sampling should be carried out with due consideration of BS 7592:2008 Sampling for *Legionella* Bacteria in Water Systems Code of Practice.
- b. Samples taken by water treatment companies and EHOs in England and Wales, or by local PHE FW&E microbiology laboratories, should be processed for *Legionella* culture by an accredited laboratory, whilst maintaining the chain of evidence.
- c. *Legionella* isolates associated with an outbreak should be retained by the testing laboratory and referred to the National Legionella Reference Laboratory (NLRL) in Colindale for microbiological typing of isolates or environmental specimens. In Scotland these should be routed to the Scottish Reference Laboratory at Stobhill Hospital, Glasgow.
- d. To maintain the integrity of sample evidence relied upon in court, procedures should be in place to ensure continuity during transport, storage, custody and testing e.g. a standard chain of evidence form.

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HSE has an interest in the results of such sampling, but does not need evidence of sampling to support a prosecution or any other enforcement action taken under health and safety legislation. HSE's objective to assess compliance cannot be confirmed by the results of analysis alone. Similarly, HSE will not take enforcement action solely based on sampling results. Enforcement action, including Prohibition Notices, will only be taken where inspection reveals non-compliance with the ACOP L8.

Shock Dosing of Evaporative Cooling Systems

It is prudent for ECS investigated during an outbreak to be shock or shot dosed with a high concentration of biocide (usually hypochlorite) as early as possible in order to control the ongoing public health risk.

Co-ordination with the OCT/IMT is required regarding timing of shock dosing and the instructions HSE gives to dutyholders. This is necessary because shock dosing may lead to a loss of evidence that could potentially link cases to a source of exposure and may mean that causation cannot be proved beyond reasonable doubt. This is a difficult public health versus securing justice decision and may be dependent on the unique characteristics of the outbreak e.g. number of cases, number of sites with notified devices, EHO training and resources, etc. In an ideal situation, *Legionella* samples would be collected from ECS identified as potential sources just prior to shock dosing. However, it is not intended that there should be a significant delay to shock dosing for the purpose of sampling.

For operational purposes, it is suggested that once an OCT/IMT has met and decided on the implementation of shock dosing, this should ideally occur within 24 hours of the decision being made. It will need to be acknowledged by the OCT/IMT that this may not, however, provide the same quality of evidence for an outbreak to be attributable to a particular source.

Re-starting a system which has been shut down during an outbreak

Guidance in HSG274 Part 1 recommends that carry out quarterly microbiological analysis for *Legionella* bacteria. Where dutyholders have been directed to carry out emergency cleaning and disinfection of their system as a consequence of an outbreak investigation, inspectors should consider requiring the dutyholder not to re-commission the plant until *Legionella* analyses prove to be negative. It may be possible to use quantitative polymerase chain reaction (qPCR) (a more rapid test than *Legionella* culture) but specialist advice must be available and sought to interpret these results. HSE's position statement on qPCR can be found at <http://www.hse.gov.uk/legionnaires/fags.htm>. This would be in addition to any sampling carried out by the LA/HPT as described above. Thereafter, inspectors may consider requiring dutyholders to increase the frequency of *Legionella* sampling for a temporary period until the results indicate sustained control.

The results of *Legionella* sampling should be regarded in the context of overall compliance and should not be taken in isolation when determining whether the risk is under control.

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Appendix 5: Investigation of clusters of Legionnaires' disease

Scope of this guidance

This guidance relates to the investigation of clusters of Legionnaires' disease (LD) where HSE-enforced evaporative cooling system(s) (ECS) have been identified as potential source(s).

Other guidance

In England and Wales, there is a mixture of local and regional incident plans for the investigation of clusters. The Enforcement Liaison Officer (ELO) should enquire whether or not a regional incident plan exists. Public Health England (PHE) have also published guidance at:

<https://www.gov.uk/government/publications/investigation-of-legionnaires-disease-cases-clusters-and-outbreaks>

In Scotland, Health Protection Scotland (HPS) have a single national document available at:

<http://www.documents.hps.scot.nhs.uk/about-hps/hpn/Legionella-guidelines-2014-2.pdf>

Definitions of a Cluster

The definitions of a community cluster (including UK travel) provided by PHE and HPS respectively are detailed in the table below:

Public Health England	Health Protection Scotland
Two or more cases of LD that are geographically linked within six kilometres , by places of residence, work, or other type of community setting, and with onset dates of symptoms within six months of each other .	More cases than expected in a community

Legionnaires' disease statutory notification and reporting

LD is notifiable under public health legislation. All cases of LD (including any suspected) must be notified by the clinician to the Proper Officer of the relevant Local Authority (LA), or the Consultant in Communicable Disease Control (CCDC) in England and Wales or the Consultant in Public Health Medicine (CPHM) in Scotland.

PHE co-ordinates the national enhanced surveillance scheme (NELSS) for LD in residents of England and Wales. HPS undertakes surveillance of legionellosis in Scotland, working with the Scottish Reference Laboratory at Stobhill Hospital, Glasgow.

Any case of legionellosis in the community is considered a public health issue initiating investigations by the LA environmental health department and the local Health Protection Team (HPT). HSE regional offices are likely to be notified about clusters of legionellosis cases by the LA or local HPT if there is a suspected link to HSE-enforced premises.

There are some situations where a case of LD is notifiable to HSE under the RIDDOR Regulations (<http://www.hse.gov.uk/riddor/>). This will require the exposure

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to be work-related; e.g. where a worker is exposed to Legionella bacteria while conducting maintenance on a hot and cold water system.

Action by HSE in a cluster investigation

Attendance at Incident Control Team/Incident Management Team meetings

An Incident Control Team (ICT) (England and Wales) or Incident Management Team (IMT) (Scotland) is likely to be convened in response to a cluster. The CCDC or CPHM has the authority to convene and chair an ICT/IMT.

The primary purpose of an ICT/IMT is to protect public health and prevent further infection. Where a cluster has been identified this may prove to be a sporadic group of unrelated cases or it may be re-classified as an outbreak if it meets the respective definitions set by PHE and HPS (see **Appendix 3**). The ICT/IMT will aim to identify the existence of any common source(s) and control the risk from these.

The main differences between a cluster investigation and outbreak investigation are the degree of urgency, commitment of resource and communication of the investigation.

If HSE is the enforcing authority for any of the premises suspected of being a potential source, the CCDC/CPHM will invite HSE to join the ICT/IMT. At the discretion of the CCDC/CPHM further meetings will be held. The IMT/ICT will re-classify the investigation to an outbreak (if it meets the respective definitions) and also declare a cluster investigation over.

The local HPT/EHO will identify potential sources from the information reported on the national surveillance form, e.g. places visited by the case during the 2 weeks prior to the onset of symptoms. Information regarding the number and location of notified ECS within the agreed investigation zone will also be provided by the LA, usually at the first ICT/IMT meeting.

HSE inspectors attending ICT/IMT meetings should be represented at Band 2 Level. They should have necessary experience to make strategic decisions and have the competence to advise the members of the ICT/IMT on legal and technical matters. The relevant Band 2 Occupational Hygiene Specialist Group Team Leader should be notified and they or an experienced Band 3 Occupational Hygiene Specialist Inspector should also attend the ICT/IMT, either in person or by telecon/video conference/Skype.

HSE's objective is to ensure that the risk of exposure posed by ECS is adequately controlled based on assessment of compliance with the ACOP L8. Any HSE investigation should run parallel to that of the ICT/IMT and ensure all relevant findings are fed back to the ICT/IMT.

It will be necessary to ensure that any action during a cluster investigation is coordinated between all participating agencies. Where other agencies take responsibility for communication with the media, inspectors must ensure that those agencies:

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- Are made aware of any statutory restrictions on disclosure of information; and
- Do not disclose information about HSE-enforced premises without prior consultation.

Resources

In terms of HSE resource, each cluster investigation will be considered on its own merits and the investigating Band 2 should liaise with SG Occupational Hygiene Specialist Inspectors to agree a proportionate response with the ICT/IMT. A cluster investigation does not have strong evidence of a single source (either microbiological or epidemiological) otherwise it would be defined as an outbreak. The reason for the lack of strong evidence may be that it does not exist and the cases are purely coincidental or the evidence exists but has not been obtained.

HSE must apply a risk-based approach when commencing an investigation into public safety risks where Section 3 of HSWA applies <http://www.hse.gov.uk/enforce/hswact/index.htm>. In order to do this proportionately, Inspectors must first consider the likelihood of the source of exposure to be a plume of aerosol from an ECS. Therefore, inspectors should prioritise HSE-enforced sites operating ECS for initial enquiries based on information concerning the geographical proximity of cases. (**Note:** This is initially likely to be only premises within 2km of a cases home, workplace or place where one or more case's spent time outdoors, but more than just passing through in a vehicle).

Consideration of the number of Inspectors required will primarily depend on the number of HSE-enforced premises in the investigation zone that require a site visit as a result of initial enquiries (see following section). Cluster investigations will move at different speeds and the investigation zone may be extended during this time if more cases are included in the cluster by the ICT/IMT.

Given that potential sources may be associated with a number of types of premises, it may not obviously fall within the sole responsibility of FOD or CEMHD or a single inspection group. Appropriate liaison between FOD and CEMHD should take place and consequently the lead inspector may need to be specifically appointed by FOD Head of Unit/CEMHD (Chemicals) Head of Unit. There may also be the need to liaise with Office of Nuclear Regulation (ONR) and/or Office of Rail and Road (ORR).

Visiting Officers/Regulatory Compliance Officers may provide assistance in gathering intelligence:

- searching COIN for recent contacts on *Legionella* issues at premises in the investigation zone.
- information to identify potential cooling towers or evaporative condensers that have not been notified, focusing on industrial processes and premises having a need to dissipate heat such as foundries, plastics manufacture, chemical and food manufacturing.
- Identifying other premises or processes that need may need to use water systems that store water and create aerosols.

If the cluster is redefined as an outbreak by the ICT/IMT inspectors should immediately refer to the guidance at **Appendix 3**.

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Initial Enquiries and Site Inspection

HSE should identify sites for inspection where there is clear evidence of a causal link. This will be based on case proximity to sources, previous adverse site inspection history or absence of any previous inspection.

Initial enquiries e.g. relevant *Legionella* inspection history (COIN) should be made of HSE-enforced sites with notified ECS that have been identified by HSE as potential sources based on geographical proximity. This will aid prioritisation of site visits, particularly where large numbers of premises are located in the investigation zone. Where this is adverse or there is no recent inspection history (in last 3 years), then the site should be contacted and the following information requested:

- Weekly dip slide (or equivalent) checks (last 6 months)
- Weekly biocide and pH (where oxidising biocide used) checks (last 6 months)
- Legionella test certificates (last 12 months)
- Water treatment test reports (last 6 months)
- Clean and disinfection reports (last 12 months)
- Any plant shut downs or unusual operating circumstances in last 6 months
- Any problems with *Legionella* control in last 6 months.

Sites which, on review of the above, indicate potential control deficiencies, should be prioritised for inspection. Similarly, where local intelligence has identified sites with no recent inspection history, these should be inspected as a priority local inspection (PLI).

The inspection procedure should follow that for proactive inspections described in **Appendix 1**.

According to the ICT/IMT public health risk assessment, other HSE-enforced sites with water systems may be identified and HSE may be asked to inspect these sites to check compliance with the L8 ACOP.

Work-related Death Protocol and Corporate Manslaughter and Corporate Homicide Act 2007 (CMCH)

Where a case of LD becomes a fatal investigation, the police may take primacy in accordance with the respective protocols: <http://www.hse.gov.uk/pubns/wrdp1.pdf> and <http://www.hse.gov.uk/scotland/workreldeaths.pdf>

It is a Police/CPS/COPFS rather than an HSE decision whether they wish to pursue a CMCH line of enquiry. Heads of Units will need an early dialogue with the Police/CPS/COPFS about HSE resourcing if this line of enquiry is pursued, see <http://www.hse.gov.uk/corpmanslaughter/about.htm>

Legionella sampling during a cluster investigation

The ICT/IMT utilises *Legionella* analysis of water and environmental samples for a number of reasons including:

- to identify the source of the cluster;
- to eliminate potential sources of the cluster; and
- to assess the effectiveness of remedial action.

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HSE's health and safety policy states that inspectors **should not** take samples for the identification and quantification of *Legionella* bacteria.

LA EHOs and PHE Food, Water and Environmental (FW&E) staff (or equivalent in Wales and Scotland) with appropriate training will normally be the people to undertake sampling. Since PHE staff do not have powers of entry into workplaces they may need assistance from the relevant enforcing authority to carry out this work, this will need to be coordinated with HSE/LA at the HPT.

HSE does not have the *vires* to sample on behalf of the LA since HSE does not have a public health remit. LA EHOs have powers to enter a workplace (including those that are HSE-enforced) in order to carry out health protection functions such as *Legionella* sampling.

When dealing with CMCH, there will be a need for the Police and public health officers to consider if the causal link can be proved beyond reasonable doubt. Therefore, it is imperative that samples are taken in such cases, to preserve evidence and assist in microbiological analysis of the available specimens to determine if *Legionella* can be isolated or detected. This is essential to enable derivation of typing data from the bacterial isolates or samples that can be used to determine whether potential sources contain *Legionella* bacteria that are genetically distinguishable from those from patients, enabling exclusion of potential sources; or are indistinguishable by sequence-based typing to those isolated from or detected in patients. Such samples can be classified as evidence and used to determine probable source site(s) consistent with a point source.

To ensure 'best evidence' is obtained HSE inspectors may wish to check with the ICT/IMT that, with respect to any sampling undertaken:

- a. The sampling officer is appropriately trained and equipped. In some circumstances it may be appropriate for a member of PHE FW&E or HPS equivalent staff who is suitably trained to assist the LA. Sampling should be carried out with due consideration of BS 7592:2008 Sampling for *Legionella* Bacteria in Water Systems Code of Practice.
- b. Samples taken by water treatment companies and EHOs in England and Wales, or by local PHE FW&E microbiology laboratories, should be processed for *Legionella* culture by an accredited laboratory, whilst maintaining the chain of evidence.
- c. *Legionella* isolates associated with a cluster investigation should be retained by the testing laboratory and referred to the National Legionella Reference Laboratory (NLRL) in Colindale for microbiological typing of isolates or environmental specimens. In Scotland these should be routed to the Scottish Reference Laboratory at Stobhill Hospital, Glasgow.
- d. To maintain the integrity of sample evidence relied upon in court, procedures should be in place to ensure continuity during transport, storage, custody and testing e.g. a standard chain of evidence form.

HSE has an interest in the results of such sampling, but does not need evidence of sampling to support a prosecution or any other enforcement action taken under health and safety legislation. HSE's objective to assess compliance cannot be confirmed by the results of analysis alone. Similarly, HSE should not take

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enforcement action solely based on sampling results. Enforcement action, including Prohibition Notices, should only be served where inspection reveals non-compliance with the ACOP L8.

Shock-dosing during a cluster investigation

During a cluster investigation a request to shock dose should be based on inspection findings, specifically where this indicates loss of control. In such cases, systems should be 'shock or 'shot' dosed' with a high concentration of biocide (usually hypochlorite) as early as possible in order to control the ongoing public health risk. Generally, HSE inspectors should **not** request sites to undertake precautionary shock dosing i.e. if there is no evidence of loss of control.

Shock dosing may lead to a loss of evidence that could potentially link a case(s) to a source and may mean that causation cannot be proved beyond reasonable doubt. In an ideal situation, *Legionella* samples would be collected from ECS identified as potential sources just prior to shock dosing.

Where shock dosing is requested by HSE inspectors, the timing of this should be discussed at the initial ICT/IMT. For example it may be possible for a PHE FW&E or LA representative to attend site for the purpose of sampling at the same time as the HSE inspection. However, it is not intended that there should be a significant delay to inspection or shock dosing for the purpose of sampling. Sites may of course (and often do) decide to undertake a precautionary shock dose. Inspectors should make the ICT/IMT aware of this.

Re-starting a system which has been shut down during a cluster investigation

Guidance in HSG274 Part 1 recommends that dutyholders carry out quarterly microbiological analysis for *Legionella* bacteria. Where dutyholders have been directed to carry out emergency cleaning and disinfection of their system as a consequence of an outbreak investigation, inspectors should consider requiring the dutyholder not to re-commission the plant until *Legionella* analyses prove to be negative. It may be possible to use quantitative polymerase chain reaction (qPCR) (a more rapid test than *Legionella* culture) but specialist advice must be available and sought to interpret these results. HSE's position statement on qPCR can be found at <http://www.hse.gov.uk/legionnaires/faqs.htm>. This would be in addition to any sampling carried out by the LA/HPT as described above. Thereafter, inspectors may consider requiring dutyholders to increase the frequency of *Legionella* sampling for a temporary period until the results suggest that the system is back under control.

SG Occupational Hygiene Specialist Inspectors should be consulted for further advice regarding interpretation of sampling results and the need for more frequent testing.

The results of *Legionella* sampling should be regarded in the context of overall compliance and should not be taken in isolation when determining whether the risk is under control.

Enforcement during a cluster investigation

The following guidance should be read in conjunction with that in **Appendix 2**.

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Enforcement will principally involve issuing notices under the COSHH Regulations, as the emphasis will be on securing control. During a cluster investigation, inspectors should serve a Prohibition Notice (PN) if they are of the opinion that the conditions they find could give rise to a risk of *Legionella* growth and/or spread of aerosol.

If agreement to switch off an ECS is not forthcoming, then a PN may be served to enable a physical examination to be carried out.

Inspectors should also consider the need to take action against water treatment companies, other contractors and suppliers, whose negligence or malpractice may have contributed to their client's failure to comply with their legal duties. Actions under HSWA Section 3 and 6 are likely to be relevant.

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Appendix 6: Action in the event of single case of Legionnaires' disease

Scope of this guidance

This guidance will assist inspectors to take appropriate action when a single case of Legionnaires' disease (LD) is reported to HSE.

Other guidance

In England and Wales, there is a mixture of local and regional incident plans for investigation of single cases. The Enforcement Liaison Officer (ELO) should enquire whether or not a regional incident plan exists. Public Health England (PHE) have also published guidance at:

<https://www.gov.uk/government/publications/investigation-of-legionnaires-disease-cases-clusters-and-outbreaks>

In Scotland, Health Protection Scotland (HPS) have a single national outbreak document available at:

<http://www.documents.hps.scot.nhs.uk/about-hps/hpn/Legionella-guidelines-2014-2.pdf>

Legionnaires' disease statutory notification and reporting

LD is notifiable under public health legislation. All cases of LD (including any suspected) must be notified by the clinician to the Proper Officer of the relevant LA, or the Consultant in Communicable Disease Control (CCDC) in England and Wales or the Consultant in Public Health Medicine (CPHM) in Scotland.

PHE co-ordinates the national enhanced surveillance scheme (NELSS) for LD in residents of England and Wales. HPS undertakes surveillance of legionellosis in Scotland, working with the Scottish Reference Laboratory at Stobhill Hospital, Glasgow.

Any case of legionellosis in the community is considered a public health issue, initiating investigations by the Local Authority (LA) environmental health department and the local Health Protection Team (HPT). HSE regional offices are likely to be notified about legionellosis cases by the LA or local HPT if there is a suspected link to HSE-enforced premises.

There are some situations where a case of LD is notifiable to HSE under the RIDDOR Regulations (<http://www.hse.gov.uk/riddor/>). This will require the exposure to be work-related e.g., where a worker is exposed to *Legionella* bacteria while conducting maintenance on a hot and cold water system

When to investigate a single case of Legionnaires' disease

HSE will be informed of single cases of LD more frequently than outbreaks or clusters. These will sometimes be reported under RIDDOR, but more often the LA or local PHE HPT will inform HSE where they consider HSE-enforced premise(s) may be a possible source of infection.

Note: There have been occasions when HSE have been notified of a case, but the case history information indicates that the date when the individual was last

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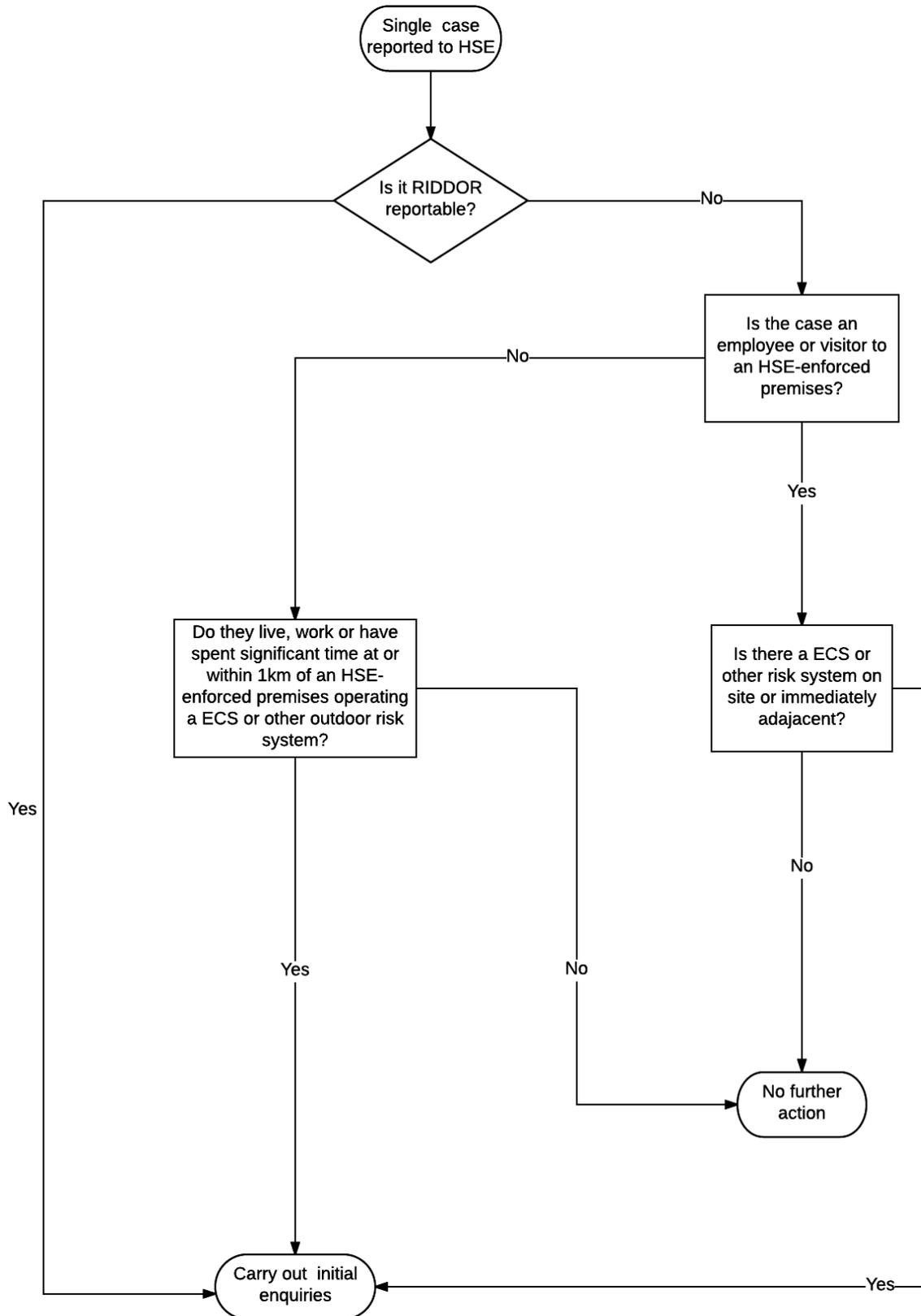
working/visiting an HSE-enforced premises was greater than the maximum 21 day incubation period. In such cases, the dates should be verified and if confirmed no further action taken as it is highly unlikely that the premises was the source of infection.

Band 2 inspectors should apply the incident selection criteria at <http://www.hse.gov.uk/enforce/incidselcrits.pdf> **and** where the case is a member of the public, HSE's policy on Section 3 HSWA and supplementary guidance for FOD <http://www.hse.gov.uk/enforce/hswact/docs/guidance-for-fod.pdf>

The following decision chart can be used to determine whether to carry out initial enquiries following a report of a single case of LD. **The decision to investigate will be subject to the findings of these initial enquiries and consideration of available HSE resource.**

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Decision chart in response to a report of a single case of Legionnaires' disease.



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RIDDOR-reportable cases in HSE-enforced premises should be subject to **initial enquiries**.

The following non-RIDDOR reportable cases should also be subject to **initial enquiries**:

- Where the case is an employee on an HSE-enforced premises which has an evaporative cooling system (ECS) either **on site or immediately adjacent**.
- Where the case is an employee on an HSE-enforced premises which has other risk systems (see HSG274 Part 3) **on-site or immediately adjacent (if that system is located outdoors)**. **Note:** All workplaces will have hot and cold water systems; enquiries should be made as to whether these are of the lower risk type or not (see Info box 2.2 HSG274 Part 2).
- Where the case is a member of the public and they live, work or have spent a significant period of time (more than passing) within 1km of HSE-enforced premise(s) with an ECS or other risk system that is located outdoors.

Enquiries may be needed to confirm some of the above details where these are not known.

For sites operating ECS, the relevant *Legionella* inspection history (COIN) should be reviewed. Where this is adverse or there is no recent inspection history (in last 3 years), then the site should be contacted and the following information requested:

- Weekly dip slide (or equivalent) checks (last 6 months)
- Weekly biocide and pH (where oxidising biocide used) checks (last 6 months)
- Legionella test certificates (last 12 months)
- Water treatment test reports (last 6 months)
- Clean and disinfection reports (last 12 months)
- Any plant shut downs or unusual operating circumstances in last 6 months
- Any problems with *Legionella* control in last 6 months.

Sites which, on review of the above, indicate potential control deficiencies, should be prioritised for inspection. Similarly, where local intelligence has identified sites with no recent inspection history these should be **inspected** as a priority local inspection (PLI).

The inspection procedure should follow that for proactive inspections described in **Appendix 1**.

For sites operating other risk systems, copies of risk assessments, written control schemes and any monitoring and inspection records should be obtained. If these suggest any loss of control an **inspection** should be considered.

For both RIDDOR and non-RIDDOR reportable cases, once a decision has been made to carry out an investigation, inspectors should carefully consider its scope and extent. For most situations, the workplace posing the most likely source of infection should be inspected, with a view to examining all water systems that could present a risk and this should not be restricted to ECS. Depending on the findings of this

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investigation, a decision may then be necessary as to whether to extend this to other premises in the immediate vicinity.

Single cases in healthcare premises

The guidance detailed above also applies to decision-making when considering investigation of healthcare-associated (nosocomial) cases. **Note:** For the purpose of case definition, PHE consider cases in residents of nursing homes to be community-acquired rather than nosocomial. Specific case definitions are provided in the respective 'outbreak' guidance documents published by PHE and HPS (see reference section).

There is however variation across GB concerning enforcement allocation in health and social care, which will need to be considered by Inspectors as part of their initial enquiries.

In England, a Memorandum of Understanding (MoU) between the Care Quality Commission (CQC), the HSE and LA's in England came into effect on 1 April 2015, to reflect the new enforcement powers granted to the CQC by the Regulated Activities Regulations 2014.

<http://www.hse.gov.uk/foi/internalops/og/og-00063.htm>

The following sets out the enforcement allocation for *Legionella* investigation at CQC-registered premises in England:

1. If the investigation is in relation to a patient/service user, the CQC is the lead regulator. If there is a *Legionella* issue which cannot be dealt with using CQC powers under the Health and Social Care Act, it may be appropriate to contact HSE to discuss further. The expectation is that there will be relatively few cases that will be transferred to HSE because CQC does not have appropriate or sufficient powers.
2. If the investigation is in relation to a worker and this is on an HSE-enforced premises, then HSE would be the lead regulator e.g. maintenance person or nursing staff suspected as having contracted LD from the premises concerned.

CQC may be able to call upon HSE to assist in an advisory capacity depending on resources. There is a channel set up between CQC and HSE (via Health and Social Care Services Team) through which such requests should be made.

A MoU between Healthcare Inspectorate Wales' (HIW) and HSE came into effect on 1st April 2016. In Wales, HSE deals with major non-clinical risks to patient's, which would include legionella.

<http://www.hse.gov.uk/aboutus/howwework/framework/mou/hscsu-fod-wales-hiw-mou.pdf>

In England, CQC has powers in respect of patient safety and so cross border matters may need to be directly referred to them. Where care is commissioned across the border (from England or from Wales) and HSE or HIW have intelligence of poor compliance or standards, each organisation will liaise with CQC to share intelligence where appropriate.

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HSE is the regulating authority for all healthcare premises in Scotland, working to a liaison agreement between HSE, Scottish Local Authorities and Care Inspectorate.

<http://www.hse.gov.uk/scotland/pdf/liaison-agreement-1215.pdf>

Investigations in hospitals are often technically complex; therefore where HSE is the regulating authority, SG Occupational Hygiene Unit can be contacted for support if required.

The Department of Health has produced specific guidance aimed at NHS Trusts, which aligns with HSG274 Part 2 (see paras 2.152 – 2.168) and the L8 ACOP. [Safe water in healthcare premises \(HTM 04-01\) - Publications - GOV.UK](#)

Inspectors should familiarise themselves with Part B in particular when commencing an investigation at a NHS Trust.

Health Protection Scotland has produced guidance as Scottish Health Technical Memoranda 04-01 and 04-02.

<http://www.hfs.scot.nhs.uk/publications-/guidance-publications/>

When there are nosocomial cases, clusters or outbreaks entirely on an NHS Trust property, the Trust may convene their own incident control meeting but should alert other relevant agencies.

Work-related Death Protocol and Corporate Manslaughter and Corporate Homicide Act 2007 (CMCH)

Where a case of LD becomes a fatal investigation, the police may take primacy in accordance with the respective protocols: <http://www.hse.gov.uk/pubns/wrdp1.pdf> and <http://www.hse.gov.uk/scotland/workreldeaths.pdf>

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Legionella sampling during a single case investigation

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- to identify the source;
- to eliminate potential sources; and
- to assess the effectiveness of remedial action.

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OPERATIONAL GUIDANCE

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Enforcement

The following guidance should be read in conjunction with that in **Appendix 2**.

Enforcement will principally involve issuing notices under the COSHH Regulations, as the emphasis will be on securing control. Inspectors should serve a Prohibition Notice (PN) if they are of the opinion that the conditions they find could give rise to a risk of *Legionella* growth and/or spread of aerosol.

If agreement to switch off an installation is not forthcoming, then a PN may be served to enable a physical examination to be carried out.

Inspectors should also consider the need to take action against water treatment companies, other contractors and suppliers, whose negligence or malpractice may have contributed to their client's failure to comply with their legal duties. Actions under HSWA Section 3 and 6 are likely to be relevant.