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A revised programme of interventions for the control of legionella risks in workplaces

Purpose of the paper

1. This paper provides an update on the HSE and LA work on the control of Legionella risks and outlines a new programme of interventions, following a review of the outbreaks in GB over the last 10 years.

Background

2. In August 2002, seven members of the public died and 180 others suffered ill health as a result of an outbreak of Legionnaires' disease in Barrow-in-Furness. Following legal proceedings, two public meetings were held in the town and six key failures that led to the outbreak were identified, and recommendations were made and published in a report. These are provided in Annex 1.
3. Since the public meetings, HSE and LAs have undertaken a range of activities relating to the control of legionella risks. These include cross-sector work, such as the provision of training for HSE and LA inspectors, collaborating in research activities with external organisations, and regular liaison with industry bodies. In addition, Directorate and sector-specific work have been undertaken, including inspection programmes, publication of guidance and delivering SHADs in the health and social care sector. Details of these are provided in Annex 2.
4. In September 2011, HSE's Legionella Committee commissioned the Health and Safety Laboratory (HSL) and the Biological Agents Unit to analyse the outbreaks of Legionnaires' disease over the previous ten years. The analysis showed that outbreaks could be attributed to a range of risk systems, but that evaporative cooling systems (such as cooling towers), hot and cold water systems and spa pools were responsible for the majority. In June 2012, the Committee also requested that HSL review the formal enforcement action taken by HSE in relation to Legionella control over the previous five years. A report of both analyses has been produced¹. The underlying causes of the outbreaks and the reasons for HSE enforcement mirrored the findings of the Barrow-in-Furness report and indicate that duty holders continue to have difficulty in maintaining sustained compliance in this area.
5. The recent outbreaks of Legionnaires' disease in Edinburgh, Stoke-on-Trent and Carmarthen have resulted in keen political and media interest in the disease. Whilst all three remain subject to on-going investigations, the

¹ http://www.hse.gov.uk/research/hsl_pdf/2012/hex1207.pdf?eban=rss-legionnaires-disease

emerging findings have been taken into account in devising a revised programme of interventions (Annex 3).

6. In the wake of the recent outbreaks and as part of the programme, HSE has issued two safety notices; one aimed at operators of evaporative cooling systems and the second targeting those responsible for other Legionella risk systems. Both safety notices contained no new information, but highlighted the need for duty holders to ensure that risks are being controlled – they also provided links to existing, well-established guidance on HSE's web pages. These safety notices form part of our wider communications strategy which takes account of the significant interest that this topic has created during 2012. Additionally, the forthcoming prohibition (on 1 February 2013) of the use of elemental copper as a biocide in water treatment systems is expected to generate further press interest.

Argument

7. There is a very wide range of workplaces and other premises in GB with water systems that have the potential to create a risk from legionella. This includes around 5000 sites that operate evaporative cooling systems; hot and cold water systems that are ubiquitous in workplaces and other premises; spa pools in a wide range of leisure outlets; and a plethora of other systems such as fire sprinkler units, pressure washers, spray humidifiers, fogging and water misting systems, emergency showers, train/car and bus washers, outdoor and indoor fountains and water features, composting facilities and irrigation systems. In fact, any industry that uses water for processes such as washing, misting and cooling may pose a legionella risk. However, in many cases, dutyholders only need to undertake a basic assessment that confirms the risks are negligible or, where this is not the case, identifies easily implemented controls for simple low risk systems.
8. It is not possible to estimate the numbers of such systems, but it will run into hundreds of thousands. An intensive inspection programme of all such systems is thus impractical. Moreover, dutyholders should have systems and procedures in place to ensure sustained compliance with H&S law – this is of particular relevance here as legionella bacteria can increase to high levels with the right conditions in a matter of days or weeks.
9. The intervention programme is based upon an analysis of both the risks posed by different systems and the likely impact that would arise from an outbreak. In addition to compliance checks focussing on evaporative cooling systems, it includes stakeholder engagement, education and advice and the promotion of good practice across those sectors whose work or premises may have significant associated legionella risks. The programme is designed to maximise the potential for partnership working and to encourage industry to take ownership and lead work to bring about sustained improvements in standards. Details of the revised programme of interventions are provided in Annex 3.
10. We have not set targets for the number of interventions that we intend to undertake (other than visiting all sites with cooling towers and evaporative condensers) – this will be determined by the standards that we find. However, the programme will have a firm enforcement profile using Notices, as appropriate, and proactive prosecutions in sufficiently serious cases. Several

aspects of the inadequate control of legionella risks would constitute 'material breaches' and thus would attract FFI/cost recovery.

11. The programme includes various aspects dealing with: risk assessment, systems for controlling legionella risks and the arrangements for managing these, including training and competence of staff, management of contractors, monitoring and review of effectiveness, as well as roles and responsibilities.
12. To date, in addition to the safety notices referred to above, HSE has worked with LA colleagues to collate information on sites with evaporative cooling systems, and has developed a system to target follow-up compliance checks, using a questionnaire and population density information for the surrounding area. (This is essentially a triage system to prioritise the visits). We have piloted the system in the Glasgow area and developed an inspection protocol and associated briefing material and recording systems. We have also begun to identify and work with key stakeholders on the education and advice aspects of the programme.
13. Building upon our work on legionella since 2006, this multi-faceted intervention programme provides a proportionate approach to the findings of the HSL reviews.

Action

14. The Board is asked to note the revised programme of interventions for the control of Legionella risks in workplaces.

Paper clearance

15. David Ashton

Recommendations of the report of the Barrow public hearings

Lines of communication and responsibility

1. Organisations need to define the responsibilities and relationships within their health and safety policy, particularly where special expertise is called for. A clear policy allows managers, supervisors and team leaders to understand what is required from them and how they will be held accountable. Ignorance is no excuse for failing to address serious risks such as legionella.
2. Effective lines of communication, which include both written communication and face-to-face discussion, allow those individuals with specific responsibilities to ensure necessary information is communicated throughout the organisation, right up to the leaders.
3. Leaders need to ensure they are kept informed of, and alerted to, relevant health and safety risk management issues and that they are sufficiently aware of what is being achieved in health and safety by the organisation they command. We recommend that the organisation appoint someone who is in a leadership role to be responsible for making sure health and safety is being well managed. We commend Joyce Edmond-Smith's letter (see Appendix 3) to Council leaders, specifically her recommendation that 'a senior elected member with specific responsibility for health and safety is identified...(and) trained as appropriate.'

Acting on advice and concerns raised

4. Systems need to be in place to support effective monitoring and reporting to ensure leaders are being kept informed about any significant health and safety failures. Effective management of health and safety risks depends on the active participation of workers and co-operation between all individuals. Workers should be actively encouraged to raise issues and voice their concerns to line managers, without the fear of reprisal, but with the knowledge it will be actioned where appropriate.
5. Co-operation and communication is not only vital within any organisation in developing a positive health and safety culture. All parties external to the organisation also need to be aware of any liaison arrangements, particularly where more than one contractor or sub-contractor is engaged.

Risk assessment

6. The Management of Health and Safety at Work Regulations 1999 provide a broad framework for controlling health and safety at work. Under these regulations all employers and self-employed people are required to assess and review the risks to workers and any others who may be affected by their work or business. This will enable them to identify the measures they need to comply with health and safety law. The level of risk arising from the work activity should determine the degree of sophistication of the risk assessment. Those who employ five or more employees should record the significant findings of that risk assessment.
7. People required to identify and assess the risk of exposure to legionella bacteria

must have the ability, experience, information, instruction, training and resources to enable them to carry out their tasks competently and safely. The risk assessment should identify the 'responsible person' authorised with the overall control of legionella and it should include a written scheme setting out how the risk will be controlled. The scheme should describe the system (with the aid of a schematic diagram), detail the safe operating procedures, including start-up and shut-down procedures, and specify details of the water treatment regime, in particular, the monitoring and audit checks.

Management of contractors and contract documentation

8. It has frequently been found that operators of water cooling towers/systems are unclear as to the precise terms of their contracts with their water treatment company. Some water treatment companies only have a remit limited to provide biocidal treatment of the water, with no one responsible for implementing the other equally important areas of control (such as the checking and cleaning of drift eliminators, the maintenance of tower condition etc). Clients need to clearly identify all aspects of the work they want a contractor to do. They should include a full specification of the work at the tendering stage to allow the contractor to provide a comparable quote for the work and then fulfil their side of the contract, by providing the service expected by the client. In drawing up the contract, it is essential both parties are clear about the work that has been agreed, and that the process has been competently managed. Part of any reasonable enquiries by the client in establishing a contractor's competence, should include identifying whether the contractor is accredited to a relevant trade body.

9. Clients must decide what they need to do to effectively manage and supervise the contractors' work. The more impact the contractor's work could have on the health and safety of anyone likely to be affected, the greater the management and supervisory responsibilities of the client. It is essential that the nature of the controls exercised by the client is agreed before work starts. An important part of this is the arrangements for the selection and control of any sub-contractors. Clients should also arrange periodic checks on the contractor's performance to see if the work is being done as agreed.

10. Contractors employed for legionella control must ensure that any deficiencies or limitations, which they identify in the client's system or written scheme, are made known, orally if appropriate, but always also in writing, to the appointed person responsible for the cooling tower/system.

11. The larger the number of contractors employed by an organisation, the greater the requirement for co-ordination and regular communication between the client and contractor (and sub-contractors). Leaders should be aware of what areas of work are contracted out and acknowledge and provide input into the substantial contracts. They should also satisfy themselves that the general arrangements for managing their contractors, as described above, are working. Councillors should accept ultimate responsibility for the appropriateness, accuracy, effectiveness and monitoring of all Council contracts and sustain the structures to exercise those responsibilities.

Training and resource

12. Under the Health and Safety at Work etc Act 1974, there is a general duty on

employers to provide such training as necessary to ensure the health and safety at work of their employees. New recruits have particular training needs, as do people changing jobs or taking on extra responsibilities, and young employees. Regular auditing and refresher training helps ensure people's skills are kept up to date.

13. Those appointed to carry out the legionella control measures and strategies should be properly trained to a standard that ensures tasks are performed in a safe and technically competent manner. The Legionella Control Association (LCA) is able to provide advice on competent organisations that deliver legionella control training (see Appendix 2 for the LCA's website). Details of qualifications in accredited training were given in Part 2, page 36.

14. Where posts that carry health and safety duties are unfilled, leaders must take effective steps to ensure that essential standards are not compromised

Individual failings

15. Section 7 of the Health and Safety at Work etc Act 1974 places important duties on the employee, while at work, irrespective of the obligations on the employer. Employees may commit an offence if they contravene the general duties imposed by section 7 by failing:

- to take reasonable care for someone's health and safety (including their own),
or
- to co-operate with their employer, so far as was necessary to enable their employer to comply with a statutory duty or requirement.

Review of Legionella interventions since 2006

Cross-Sector/Directorate work

Legionella Committee

1. HSE's Legionella Committee was reinvigorated in 2011, expanding its membership to increase the participation across the organisation. Meetings are held every 4 months to discuss and coordinate work relating to Legionella control. In 2011, the Committee established a Technical Working Group (TWG) comprising members from HID SI4 (Biological Agents Unit) the Health and Safety Laboratory (HSL) and FOD's Specialist Occupational Hygiene Group – this meets on an ad-hoc basis to progress the workstreams identified by the Committee.

Training

2. Since 2006, HSE has provided 10 training events to 217 FOD and HID inspectors. This training covers information on the Legionella bacterium and the disease, including Legionnaires' disease, which it causes. The various types of risk systems are also covered in depth, as well as the inspection techniques to use and how to ensure the inspectors' own health and safety. Over the same period, HSE has provided tailored training to Local Authority colleagues on an approximately annual basis, with around 70 Environmental Health Officers in attendance at each.

Research

3. HSE has engaged in a number of collaborative research initiatives designed to improve the understanding of Legionella risk and to help inform intervention approaches. For example, in 2009, colleagues at the Respiratory and Systemic Infections Department at the Health Protection Agency published a scientific paper in the European Journal of Clinical Microbiology and Infectious Diseases <http://www.ncbi.nlm.nih.gov/pubmed/19156453> which described the development of novel molecular tools to detect strains of Legionella bacteria that are responsible for most cases of human disease. This collaborative work has continued and a final report is expected to be published shortly.

ACoP and Guidance review

4. A review of HSE's ACoPs was recommended by Professor Ragnar Löfstedt in his independent review of health and safety legislation, 'Reclaiming health and safety for all.' Draft text for a revised ACoP is currently being considered by the Legionella TWG and, in parallel, HSE is working with an industry working party, the Legionella Control Association, to produce guidance on Legionella risk systems.

5. HSE has worked with other stakeholders to produce a range of guidance, for example the joint HSE/HPA guidance on managing the risks associated with spa pools
http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1200471665170?p=1158945066455.

6. Considerable work has been undertaken to update and review HSE's Legionella web-based micro site that includes links to guidance such as that above. The review was completed and the updated micro site and guidance (<http://www.hse.gov.uk/legionnaires/index.htm>) went live in April 2012.

Sector-specific work

Health and Social Care Services

7. Following a programme of interventions undertaken by FOD Wales in 2008-9 targeted at hot and cold water systems in care settings, the Health and Social Care Services Unit (HSCSU) delivered a series of one-day safety and health awareness days (SHADs) in Wales, which included guidance on the proper management and control of Legionella risks. HSCSU followed this up by supporting a series of regional half-day SHADs across the rest of GB.

8. In 2009-10, HSCSU, with support from HSE Specialists, drafted guidance setting out practical measures for care home managers and maintenance staff on managing the risks from hot and cold water systems. Much of this was utilised in the review of the HSE Legionella website and a new webpage on Legionella management in health and social care was launched in the Autumn of 2011. In 2012, HSCSU produced a Sector Information Minute, 'Managing the risks of Legionella in hot and cold water systems at care settings'.

FOD and HID interventions and enforcement

9. In 2006-7, HID delivered a programme of proactive inspections of evaporative cooling systems in the Manchester area, covering 18 sites operating 31 cooling devices. This work followed a similar HID initiative in the Birmingham area in 2004-5.

10. Between 2007 and 2010, FOD undertook a proactive inspection campaign targeted at the Manufacturing Sector, including Engineering and Food.

11. Between 2010 and 2012, FOD SW carried out proactive inspections on legionella control at hospital Trusts across the region.

12. In the months preceding the London Olympic Games, FOD, HID and LAs conducted inspections of sites operating evaporative cooling systems with HSE interventions taking place at sites within 2 km of London-based Olympic venues and major travel hubs.

13. HSE and LA inspectors take appropriate enforcement action (in line with HSE's policy and procedures) regarding any instances of poor compliance that lead to significant risks, whether arising out of proactive interventions, investigations or where matters of evident concern come to light during interventions on unrelated topics. In the 5 year period preceding June 2012, HSE issued 409 notices and took 14 prosecutions on breaches relating to legionella control.

HID Offshore Division (OSD)

14. Offshore Division identified the management of potable water and Legionella risks as a priority in 2006. Inspections at approximately 60 installations, covering all operators, began in 2008 and the programme resulted in 5 Improvement Notices being served and a Safety Alert issued to the industry - this required all offshore operators to respond with details of their arrangements on managing potable water and Legionella risks on all their offshore installations. The analysis of the findings from the three-year project and responses to the Safety Alert have been subsequently used to plan follow-up inspections over the following years. The interventions have produced significant improvements in compliance with respect to the management of potable water and Legionella risks offshore and have provided a benchmark against which future compliance may be monitored.

15. OSD has consulted and worked with key stakeholders (Oil and Gas UK, Step Change, Energy Institute) to ensure industry-wide commitment to this initiative. This has included regular presentations at Health and Safety Forums on progress with this work and the production of guidance (Offshore COSHH Essentials) on potable water/Legionella risk management by an HSE/Industry/Trade Unions Working Group. Stakeholder engagement work continues with a presentation at the OIL and Gas UK Health Seminar on 20 November 2012.

Programme of interventions for the control of legionella risks in workplaces

Summary

1. A revised programme of interventions to promote the control of legionella risks, following a review of (a) Legionnaires' disease² outbreaks over the past 10 years and (b) HSE's formal enforcement action on legionella, the main results from which are confirmed by the lessons emerging from the 2012 Edinburgh and Stoke outbreaks. The programme will involve stakeholder engagement, education, advice, the publication of safety notices and follow-up targeted compliance checks

Background

2. Contamination of water systems by legionella bacteria is an infection risk for exposed workers and members of the public, with sporadic outbreaks of infection, ranging in scale both in terms of numbers infected and the severity of the resulting illness (including fatalities). When outbreaks occur, they are a major public health concern.

3. There is a wide range of workplaces and other premises with water systems that have the potential to create a risk from legionella. These include premises where health and safety is enforced by HSE and, also, significant numbers where the enforcement responsibility lies with Local Authorities (LAs).

4. In September 2011, HSE's legionella committee requested an analysis of outbreaks over a 10-year period and a review of enforcement data over the last 5 years, to identify any trends and failures to meet the standards described in the Approved Code of Practice L8³. A summary of the results of this work and the key indications are included in Appendix 1. This work has been used as the evidence on which to base the strategic intervention programme, which is aimed at promoting effective sustained management of legionella risk.

A risk-based approach to target interventions

5. Legionella is not a sector-specific risk. However, key sectors are manufacturing, health and social care, and leisure and, within these, there is a range of systems and premises which give rise to varying levels of risk. The strategy is based upon an analysis of both the risks posed and the likely impact that would arise from an outbreak.

6. A programme of stakeholder engagement, education and advice and the promotion of good practice will be undertaken across those sectors whose work or premises may have associated legionella risks. The programme is designed to

² The review also considered outbreaks of Pontiac Fever, which is a less severe form of disease caused by the legionella bacteria

³ *Legionnaires' disease: the control of legionella bacteria in water systems (L8)*
<http://www.hse.gov.uk/pubns/priced/l8.pdf>

maximise the potential for partnership working and to encourage industry to take ownership and lead work to bring about sustained improvements in standards. Two safety notices have been targeted at key groups of dutyholders⁴ and, for the higher risk premises (risk level 1 below), there will also be targeted follow up compliance checks that dutyholders are aware of their duties and taking the necessary measures to properly manage the risk.

Risk criteria

7. We have used the following criteria, to determine the risk groupings:
- Numbers and scale of outbreaks arising from the system
 - Levels of compliance associated with the system/sector
 - Complexity of the systems involved
 - Profile of the industry and the key players.

(A) Risk level 1

Cooling towers and evaporative condensers⁵

8. These systems operate at optimum temperatures for the growth of bacteria. They are re-circulating systems that can allow bacteria to build up within the system and generate large quantities of aerosol that, if uncontrolled and dispersed, can spread into the general environment, potentially affecting the general public. Such systems are generally associated with a larger number of exposures during individual outbreaks, and can be described as low frequency/high impact occurrences. An initial estimate of the costs of a legionella outbreak from this type of source is upwards of £4.3 million⁶. We estimate there are around 5800⁷ such potential sources.

(B) Risk level 2

Hot and cold water systems

9. These ubiquitous systems operate at optimum temperatures for the growth of legionella bacteria and they may be connected to outlets and showers that can generate an aerosol when in use. In some premises, the water system can be extremely complex e.g. hospitals, but the majority of premises have much simpler systems (such as in care homes, hotels etc). Hot and cold water systems are associated with low numbers being exposed and little or no offsite impact. However, outbreaks in hospitals are characterised by an increased likelihood of major ill health effects or death following infection because the exposed population is more vulnerable.

⁴ A safety notice aimed at those in control of cooling towers and evaporative condensers was issued on 27th July <http://www.hse.gov.uk/safetybulletins/coolingtowers.htm> A further notice relating to other systems was issued on 19 September <http://www.hse.gov.uk/safetybulletins/legionella2.htm>

⁵ Cooling towers and evaporative condensers are devices that provide cooling in a range of applications from industrial processes to air conditioning systems

⁶ Provided by CSEAD for an outbreak of 50 confirmed cases and 2 fatalities, but known to be a significant underestimate at this stage.

⁷ Figures estimated from numbers provided by LAs in June 2012.

Spa pools

10. These systems generally operate at optimum temperatures for growth of bacteria, including legionella. They are re-circulating systems that, when not properly controlled, allow bacteria to build up within the system and the mode of operation generates an aerosol in the vicinity of the breathing zone of the user/s. The HSL review of outbreak data indicates that, in GB, the ill health outcomes from exposures in spa pools are sometimes less serious, e.g. Pontiac fever⁸. However, they are associated with large numbers of exposures during individual outbreaks.

(C) Risk level 3

11. These systems include fire sprinkler units, pressure washers, spray humidifiers, fogging and water misting systems, emergency showers, train/car and bus washers, outdoor and indoor fountains and water features, composting facilities and irrigation systems. In fact, any industry that uses water for processes such as washing, misting and cooling may pose a legionella risk as such systems commonly allow water to stagnate and generate aerosols that can potentially be spread into the environment. They are variable in nature and scale and are less likely to affect large numbers of people.

Overview of the intervention strategy

(A) Risk level 1: cooling towers and evaporative condensers

12. A series of local events (such as Safety and Health Awareness Days) will be held for groups of dutyholders and stakeholders to highlight the key issues. We will also be engaging with the supply chain and working with bodies such as water treatment companies (WTCs), cleaning companies (CCs) and members of the Occupational Safety and Health Consultants' Register (OSHCR).

13. A safety notice was issued on 27 July 2012 to draw the attention of those in control of cooling towers and evaporative condensers to their duties and responsibility to control the risks from legionella in such systems. This safety notice will be followed up by targeted compliance checks that dutyholders are, indeed, aware of the necessary precautions and that they have implemented them. The inspections will be undertaken by HSE and LA inspectors, based on responses to a questionnaire sent to all notified premises. Targeting will also prioritise on areas of high population density. Briefing material and inspection guidance for HSE and LA operational staff will be produced and access to specialist support will be available through the normal channels.

14. We will also aim to work (with industry bodies) to develop tools to help dutyholders manage legionella risks. Potential examples are 'Tool-box talk' material and electronic 'procedure management' tools to assist with effective monitoring.

⁸ An outbreak in the Netherlands in the late 1990s did result in 28 deaths, though this was in very unusual circumstances.

(B) Risk level 2:

15. A safety notice was issued on 19 September 2012 to draw attention to the key aspects of the proper management of the risks from legionella in water systems other than cooling towers and evaporative condensers

Hot and cold water systems in hospitals and care homes

16. We will engage with key stakeholders in the health care sector to promulgate the essential messages across the sector and to identify emerging issues. These will be targeted at senior managers, in-house estates management and building services, as well as via relevant associations, WTCs and CCs. In addition, HSE and LAs will consider whether individual dutyholders and/or premises warrant further interventions, depending on intelligence on their health and safety performance.

Spa Pools

17. Most spa pools will be in the leisure/hospitality sector and will be LA- enforced. In addition to engagement with sector stakeholders, LAs will consider whether individual dutyholders and/or premises warrant further interventions, depending on intelligence on their health and safety performance.

(C) Risk level 3:

18. Based on current evidence, we will not undertake direct pro-active HSE or LA interventions to premises in this category, other than the safety notice referred in paragraph 15.

Research and development

19. We will undertake research to better determine the nature and extent of the legionella risks posed by water systems and to investigate options available for risk reduction, to inform future industry good practice.

Resources and timing

20. Delivery of the interventions will begin by the last quarter of 2012 and the initial phase will last for around 18 months. As previously noted, the best estimate on the number of premises with cooling towers and evaporative condensers is currently 5800.

Evaluating success and future work

21. A range of indicators will be monitored, including assessment of the longer-term impact and need for future interventions.

Appendix 1: Summary of HSL report on legionella outbreaks and HSE formal enforcement action over recent years

Evidence base

1. Two data sets were used to form the evidence base for the proactive interventions:

- data retrieved from HSE's information systems of formal enforcement activities involving legionella since January 2007 and;
- a review GB outbreaks of Legionnaires' disease (LD) over the past ten years⁹.

2. The data were used to identify trends in failures to meet the required standard (ACoP L8). The analyses categorised formal enforcement and, where possible, outbreak data on the basis of: the type of risk system involved; the industry sector and; the causation. It should be noted that the outbreak data are based on a wider range of sources than HSE enforcement data (and includes incidents where HSE was not involved). The formal enforcement data are purely that taken by HSE during proactive and reactive work. We cannot therefore directly compare levels of compliance between sectors or risk on the basis of the separate analyses. The data are discussed more fully in the HSL report, *Legionella outbreaks and HSE investigations; an analysis of contributory factors*¹⁰ and provide sufficient information on trends to allow us to draw some general conclusions about the relative risks of different water systems.

Evaporative cooling systems including cooling towers and evaporative condensers

3. Total numbers of cases and fatalities related to evaporative cooling systems (ECS) over the 10-year period (229 infections¹¹ and 10 fatalities) may not be large compared to other hazards across GB. However, experience has shown that, when ECS are not properly managed, the resulting outbreaks often affect a considerable number of members of the public due to the range over which plumes of infected aerosols may travel. These events can therefore be categorised as low frequency, high impact, events.

4. Analysis of previous outbreaks has shown that:

- 16% were due to poorly managed ECS, but this must be set in the context that, in a significant proportion of outbreaks, the source of the outbreak remained unknown and so the figure is likely to be higher;
- in those outbreaks where ECS were identified as the source, failures could largely be traced to inadequacies in the risk assessment process and implementation of a suitable scheme of control.

⁹ Data exclude enforcement action taken in relation to the 2012 Edinburgh outbreak investigation

¹⁰ http://www.hse.gov.uk/research/hsl_pdf/2012/hex1207.pdf?eban=rss-research

¹¹ Of which 193 were Legionnaires' Disease and 36 were Pontiac fever.

5. Analyses of formal enforcement data show that:

- ECS accounted for 35% of notices, with approximately 70% of these falling within the manufacturing sector;
- similar failings (risk assessment and control measures) led to formal enforcement action being taken;
- since May 2006, a total of 11 cases have been successfully prosecuted with the majority of these relating to combined failings in risk assessment and management systems.

Hot and cold water systems (H&CWS)

6. Reported figures for infections and fatalities arising from hot and cold water systems are not well classified. Analyses of formal enforcement data reveal that:

- over 60% of notices served on legionella since January 2007 were as a result of failures to control legionella risks in H&CWS;
- 93% of these notices were served on premises in the public services sector;
- the number of prosecutions relating to H&CWS since May 2006 accounted for 43% of the total (14).

H&CWS: Hospitals

7. Outbreaks in the hospital setting can result in a significant number of cases due to the enhanced vulnerability of many hospital patients. Infection tends to be limited to those individuals exposed to water services outlets, for example in individual wards. Almost invariably such outbreaks are linked to the complex and extensive H&CWS servicing the hospital building.

H&CWS: Care homes (residential and nursing)

8. Care homes provide accommodation for a subset of the general population that is vulnerable to LD. However, the H&CWS here tend to be smaller and less complex than those in hospitals and, to date, there have been no known GB outbreaks of LD associated with nursing homes.

Spa pools

9. Some 14% outbreaks have been traced to poorly managed spa pools, resulting in 29 cases of LD with 3 deaths, as well as 226 cases of Pontiac fever.