Legionella – detailed guidance – The start
North Trafford College, Manchester

- August 2003
- Building upon the HSE’s ACoP L8, speakers explained available technologies and allocated responsibilities to develop IoP guidance for plumbers
- IoP legionella guide in association with HSE – to be drafted after meeting.
Tonight’s Agenda

• The HSE guidance on legionella – What people think of it
• Provisional outline for new definitive, up-to-date, IPHE guidance
Evaluation of HSC's ACoP and Guidance
Legionnaires disease: Control of Legionella (L8)

Mindy Hadi and John Griggs
23rd May 2003, HSE, London
The current HSC Approved Code of Practice and Guidance “Legionnaires’ disease: Control of legionella bacteria in water systems” (L8) was published in 2000.

The current L8 document replaced the 1995 version of L8 and was consolidated with technical guidance document (HSG70) and the hot and cold water supplement to the technical guidance (MISC 150).
Aim of new guidance

The single document was created with the intention of:

- making the information easier to read;
- aiding understanding of the legal duties in relation to legionella control; and
- giving information on the efficacy of new and alternative control strategies and how they can be used safely and effectively.

Has it been achieved?
BRE’s role

- To undertake an independent evaluation of the 2000 version of L8 in terms of its “fitness for purpose” in the eyes of the targeted duty holders

- The work involved:
  - discussions with duty holders
  - conducting two focus groups, and
  - a questionnaire survey
Duty holders

Professional groups and experts including:

- employers and those who manage premises with hot and cold water services or wet cooling systems;
- manufacturers, importers, suppliers, designers and installers of such systems;
- suppliers of related services such as water treatment and maintenance.
Focus Groups

- Took place on June 17, 2002 at BRE involving 22 people
- The morning session represented employers and facilities managers
- The afternoon session represented the supply chain - manufacturers, suppliers, consultants and water treatment specialists
Focus Group schedule

- Introductions
- Background to the project
- Purpose of focus groups / Objectives of session
- Ease of understanding etc
- Changes to the ACoP
- Changes to guidance
- Further monitoring requirements
Issues arising from Focus Groups

- Ease of understanding eg confusion between the terms ‘duty holder’ & responsible person
- Lack of awareness of changes
- Disparity between the groups in terms of the amount of detail required
- Ease of navigation
- Level of technicality of language used
- Further monitoring requirements
- Lack of awareness of building types that come under remit of L8.
Questionnaire design 1

- Designed in conjunction with the HSE to respond to the key questions posed within the specification for the work and to address the issues raised in the focus groups.

- Draft version was piloted with representatives from a range of the target audiences, and their responses to the questionnaire were gathered through telephone interviews.
Questions were grouped into the following sections:
- Background information about the respondent’s company.
- The current L8 document as a whole
- The current L8 document, Part 1: The ACoP
- The current L8 document Part 2: Guidance
- Concluding questions

The majority of the questions required tick-box responses, with qualitative statements being requested where appropriate.
Questionnaire results

- The questionnaire was distributed to over 6,000 people.
- Returns numbered 979, of which 973 questionnaires contained valid responses.
- This gave a response rate of just over 16%; better than the anticipated rate of 10%.
- A subsequent electronic version only produced an additional 6 valid responses.
Background information

- Information about the respondent and their company
- Awareness and usage of L8
### Main work role of respondents

<table>
<thead>
<tr>
<th>Role</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Employers &amp; building managers</td>
<td>68%</td>
</tr>
<tr>
<td>Suppliers</td>
<td>16%</td>
</tr>
<tr>
<td>Designers, Installers, Manufacturers</td>
<td>6%</td>
</tr>
<tr>
<td>Consultants</td>
<td>5%</td>
</tr>
<tr>
<td>Enforcement officers</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
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<tr>
<td>Types of Premises managed (&quot;Employer&quot; group)</td>
<td></td>
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<tr>
<td>--------------------------------------------</td>
<td>--</td>
</tr>
<tr>
<td>Industrial buildings</td>
<td>52%</td>
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<tr>
<td>Commercial offices</td>
<td>24%</td>
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<tr>
<td>Warehousing</td>
<td>13%</td>
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<tr>
<td>Multi residential premises</td>
<td>12%</td>
</tr>
<tr>
<td>Education facilities</td>
<td>12%</td>
</tr>
<tr>
<td>Healthcare facilities</td>
<td>9%</td>
</tr>
<tr>
<td>Public sector offices</td>
<td>9%</td>
</tr>
<tr>
<td>Leisure facilities</td>
<td>7%</td>
</tr>
<tr>
<td>Hospital facilities</td>
<td>4%</td>
</tr>
<tr>
<td>Retail premises</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>9%</td>
</tr>
</tbody>
</table>
Number of people in the organisation ("Employer" group)
Number of sites operated by organisation ("Employer" group)
How did you find out about the current L8?
How often do you refer to L8?

- Daily
- Weekly
- Monthly
- Less than monthly
- Never
Awareness of major changes that have been introduced
The 2000 version of L8 as a whole

Consolidation of the previous documents

- 95% of respondents found the current consolidated document easier to access
Ease of understanding the wording

1 Very easy  2  3  4  5 Very difficult

- Total
- Employers
- Des, Inst, Mans
- Suppliers
- Consultants
- Enforcement
- Others
Sufficiency of detail

1. Not enough detail
2. Too much detail

Employers
Des, Inst, Mans
Suppliers
Consultants
Enforcement
Others
Additional features

The three additions that respondents would find most useful in L8 were:

- an *index*, listed by 44%;
- an *electronic version* of the document, listed by 38%; and
- *contact details* for points of clarification, listed by 35% of the total respondents.
Are the terms ‘duty holders’ and ‘responsible persons’ clearly defined?

- Although 83% of respondents considered the terms “duty holders” and “responsible persons” to be clearly defined,
- there were a great many written comments about the lack of clarity of these definitions
Is it clear when access to competent help should be sought?

- 83% of respondents thought it was.
Need for further guidance on competency

![Graph showing the need for further guidance on competency with categories: Total, Employers, Des, Inst, Mans, Suppliers, Consultants, Enforcement, Others. The graph compares the responses 'YES', 'NO', and 'Don't know' for each category.]
The type of guidance required

- 83% requested guidance in the form of recognised (certified) training courses
- 41% wanted certification of service/equipment,
- 42% wanted adherence to voluntary codes of practice
- and 10% requested guidance in some “other” form.
300 litre limit
Aware of removal of 300 litre limit?
Implications of removal of 300 litre limit

- There was no impact to their organisation from the removal of the 300 litre water volume limit for 51% of respondents.

Where there was an impact,

- it was mostly an increase in work, as stated by 20% of respondents;
- or an increase in both work and cost, true for a further 22% of respondents.
Additional burden of new record keeping requirement?

- Yes: 30
- No: 60
- Don't know: 0
Additional burdens included:
- the need for additional record keeping or monitoring procedures
- space required
- document management in general, e.g. the setting up of filing systems, the time taken to find records, the need to maintain records;
- the need to introduce IT-based record management systems;
- staff training requirements

76% of “Employers” believe they could retrieve these records if necessary in less than a day.
Confidence that suppliers will provide information regarding limitations in their services?
Confidence that suppliers will provide information regarding deficiencies in the employer’s system?
Examples of information given on limitations or deficiencies

- Cooling towers eg
  - replacement of dosage equipment
  - installation of improved blow down control system for cooling towers;
  - replacement of cooling tower;
  - re-registration of cooling towers since a change of company name

- Hot and cold water systems eg
  - inadequate water flow; removal of redundant pipework

- Temperature control eg
  - too low hot water outlet temperature

- Storage eg
  - upgrading of water storage tanks to be compliant

- Control eg
  - adjustments made to chemical treatment in terms of dosages

- Cleaning
How would you inform the ‘duty holder/responsible person’ if there were any such limitations or deficiencies?
Examples of how the ‘duty holder/responsible person uses this information

● Some acted on the advice given:
  • ‘gives instructions to carry out remedial work to comply with the regulations’.
  • involve their superiors to endorse their decisions presumably depending on the level of budgetary responsibility

● However not all duty holders make use of the information given:
  • ‘Some persons do not act, or pass work to contractors who don’t know what should be done within L8 regs’
  • ‘They understand it but think there is little they can do to put things right as they have no time or resources to carry out any work’
Cooling towers
Should there be additions or changes to the guidance on cooling tower commissioning?

- Of the 455 respondents whose work was concerned with cooling towers
  - 88% did not consider it was necessary to make any changes or additions to the guidance on cooling tower commissioning

- Suggested changes included:
  - the provision of a list of commissioning actions i.e. what parameters are to be checked - complete for handover to client to check that it is satisfactory
  - more details required e.g. a flowchart for commissioning
Arrangements made to check that cooling tower commissioning has been carried out to standard specified

- reliance on the supplier or contractor, with most respondents assuming that their contractor and water treatment supplier was reliable and competent and would carry out the commissioning or testing effectively.

- testing and monitoring post-commissioning
- internal checks and procedures, e.g. company checklists and method statements
- risk assessment procedures
- checks carried out by external bodies or independent consultants, Local Authority Officer or Health and Safety adviser
- documentation/records, e.g. certificates, commissioning documents held on site.
Should there be any additions or changes to the guidance on cooling tower monitoring?

- Only 15% of the respondents whose work is related to cooling towers would like to see additions and/or changes.

- However, 31% of the “Designers, Installers & Manufacturers” and “Suppliers” would like to see changes.
Suggested additions or changes to the guidance on cooling tower monitoring included:

- further information about action to take in times of short term system shut downs
- more information on cooling tower pack cleaning, removal or replacement.
- more guidance on controlling/monitoring continuously operated cooling towers
- additional guidance for air conditioning units including small portable air conditioning units and ‘modern fixed air conditioning units’
Have cooling tower monitoring processes changed to comply with L8?

● 48% of respondents answered “yes”

● The most frequently made change was the implementation of additional testing

● Other changes included
  • changes to documentation
  • changes to equipment or the method of control
  • consultant or advisers were visiting more.
  • staff have undergone additional training.
Clarity of the guidance on wooden slats in drift eliminators

The guidance in L8 on wooden slats in drift eliminators was believed to be clear by 88% of the respondents whose work was concerned with cooling towers.....
Replacement of wooden slats in drift eliminators

... but 19% had not replaced wooden slats in drift eliminators
## Evidence of wooden slat replacement

<table>
<thead>
<tr>
<th>Evidence</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Records kept by employers/premises managers</td>
<td>64</td>
</tr>
<tr>
<td>Contractor records</td>
<td>44</td>
</tr>
<tr>
<td>Records kept by system suppliers</td>
<td>18</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
</tr>
<tr>
<td>None</td>
<td>4</td>
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</tbody>
</table>
Hot and cold water systems
Methods of control in H+C water systems

- Most respondents (88%) thought these were described adequately
- 73% of the total felt that the information represented best practice
- More information was required on:
  - methods not listed eg alternative biocides, UV, humidification
  - most suitable methods for specific systems and premises
  - relative effectiveness of methods in different situations
  - the issue of balancing risks in thermal methods
- Diagrams and flow charts to increase clarity
Most commonly used methods of control

- Thermal
- Biocide
- UV
- Ion
- Comb
- Other
Relative prominence of methods of control

- Only 15% of the total wanted more prominence to be given to any particular method.
- Only 6% of the employers but around 1/3 of the Suppliers (35%), Designers, Installers & Manufacturers (27%) and Enforcers (38%) wanted change.
- Particular control methods cited included:
  - temperature
  - Chlorine based
  - Biocide
  - ionisation
  - group of methods eg non chemical
83% of respondents considered the recommendation on “little used outlets” was clear, as compared to 9% who did not.

Most respondents managed these by regular flushing to purge the outlets, mainly conducted weekly.

Comments included:

- better definition of what constitutes a “little used outlet” in terms of frequency of use, “we all call them “deadlegs”
- more advice and information in general, e.g. for schools and hostels that are closed for long periods
Clarity on checks and monitoring of hot and cold water systems

- The vast majority, 91%, of respondents felt the guidance on how to carry out routine checks of hot and cold water systems was clear.

- When asked about the clarity of the guidance given on monitoring, including sampling of hot and cold water systems in particular circumstances, 82% of respondents believe it is clear when this is required.

- 15% of respondents were in favour of changes and/or additions to the guidance on carrying out routine checks or monitoring of hot and cold water systems, with 85.3% against.
Suggested additions or changes to checks and monitoring of hot and cold water systems

- included:
  - advice about when microbiological monitoring is required
  - advice on cold water systems
Additions or changes to the guidance for ‘other risk systems’

- Spa & whirlpool baths
- Humidifiers & air washers
- Additional ‘other risk systems’
Additions or changes to the guidance for ‘other risk systems’- Spa & whirlpool baths
Additions or changes to the guidance for ‘other risk systems’ - Humidifiers & air washers
Q34: Additions or changes to the guidance for additional ‘other risk systems’
Additional monitoring requirements for water systems

- Most respondents, 90% of the total, did not feel that any additional monitoring requirements for water systems should be introduced
- 42% of the total thought that further monitoring would involve them in additional work and additional cost
- Additional work alone was selected by 18% of the respondents
Does L8 represent current best practice overall?
Conclusions

- Most respondents were generally satisfied with the document overall ‘perfect for my needs’
- There appears to be a divide between the different user groups with ‘Employers’ reporting most satisfaction
- Some wished to see regular revisions of the document to take innovations into account eg ‘every 2 years’
- However others thought there was too much change ‘No further changes please we have only just adjusted to these’
Recommendations

- General recommendations
- The document as a whole
- Specific issues
General recommendations

- An awareness campaign, particularly for SMEs and run in conjunction with their professional bodies
- Raise awareness amongst ‘enforcers’ ie EHOs & H&S consultants and discuss their specific requirements
- More prominence to the helpline number for enquiries
- Future versions should be reviewed to check that the language is sufficiently non technical for the employer target audience
- Provide additional guidance on technical issues for designers, installers, and manufacturers eg a supplementary document
The L8 document as a whole

- Investigate the feasibility of producing an electronic version

- In future revisions of L8:
  - Clearly highlight any changes made in L8 between revisions
  - Include an index to facilitate navigation
  - Include more checklists, diagrams, flow charts, tables
  - Include additional terms in the glossary for clarification eg of abbreviations, technical terms
Specific issues

- Clarify definitions ie ‘duty holder’, ‘responsible person’, ‘competence’

- Clarification of the term ‘little used outlet’ as this causes some confusion

- Determination of a recognised route to ‘competence’ for suppliers

- Encourage replacement of wooden slats in drift eliminators (should/shall)
Specific issues cont.

- Provide further guidance on:
  - ‘other risk systems’
  - document management systems
  - the relative advantages/disadvantages of the different methods of control

- Clarify the requirement to inform the duty holder of any limitations

- Consult with duty holders before the introduction of any further monitoring requirements.
The situation to date

The IoP's Legionella Disease – Good Practice Guide for Plumbers has been withdrawn.

The replacement Combating Legionnaires Disease – An application and treatments guide will be published by the IPHE this year.
The new Guide

- Although it is not yet complete, here is an insight into the new document.
CONTENTS

- The study and treatment of epidemic diseases
- What is the risk of infection?
- Breaking to causative link
- The presence of legionella in buildings
- What to do if a problem is suspected
- Risk assessment and management of water systems
- The basic control and monitoring requirements
- Methods of water treatment to control the spread of bacteria
- Glossary of terms
- References
THE STUDY AND TREATMENT OF EPIDEMIC DISEASES

- Legionnaires Disease was first recognised in July 1976 when an outbreak occurred among delegates attending an American Legion convention in Philadelphia. It took some months to identify the cause but scientists at the Centre for Disease Control in Atlanta isolated an aetiological agent named legionella pneumophilia. Their diagnostic tests and reviews of previous stored specimens revealed earlier outbreaks dating back to the 1940s. Due to the fact that it does not grow on conventional culture media it had escaped earlier recognition.........
WHAT IS THE RISK OF INFECTION?

- The route of infection is through inhalation of bacteria into the lungs. The more bacteria inhaled, the greater the risk of infection. The degree of risk can be assessed by examining, in turn, the four major known influences.

- a] Source of Bacteria
- b] Aerosol Generation
- c] Number of Inhaled Bacteria
- d] Susceptibility of Individuals
BREAKING THE CAUSATIVE LINK

1. Legionella bacteria enter a water system

2. Site conditions allow the bacteria to multiply

3. The infected water is atomised

4. A susceptible person may inhale the aerosol

5. That person may develop Legionnaires Disease
WHAT TO DO IF A PROBLEM IS SUSPECTED

- Reporting
- If a hazardous condition is suspected in any of the water storage or systems, the client/customer should always be made aware of it and the local Environmental Health Department informed. The reports should be tactful and careful not to cause unnecessary alarm. It is the duty of the plumbing engineer to report the problem to the client or customer [See ACoP page 6, item 23]. In addition, if a problem is suspected, ask to see the risk assessments of the customer or owner for the system being checked or worked on. This risk assessment also enables the person on whom the statutory duty falls to show that all factors and procedures needed to prevent an outbreak have been considered.
11 basic steps towards effective control are listed

Prioritise the breakdown of such sites into risk categories based on breaking the causative link – bearing in mind all possible aerosol emissions and the susceptibility of persons that may come into contact with them. The higher the risk the higher the priority that all risks must be dealt with and continue dealing with the risks until there are none.
THE BASIC CONTROL AND MONITORING REQUIREMENTS

- There is a tendency for many sites to undertake either no routine monitoring or extensive monitoring that far exceeds the HSE guidelines but fails to identify problems or undertake remedial works where they are clearly required. A proactive approach to monitoring is essential and only suitable training in the realisation and appreciation of problem areas can achieve this.

- The basic monitoring, cleaning and disinfection requirements are as follows:
Cold Water Systems

- **MONTHLY:**
  - Record temperatures at the sentinel taps (i.e., those nearest and furthest from the cold water storage cistern) after running the water for two minutes – should be less than 20 °C.
  - Record the temperature of 10% of the representative taps within the premises on each circuit, covering the entire premises over a 12-month period.

- **SIX MONTHLY:**
  - Record the incoming cold water inlet temperature (winter & summer).
  - Record the cistern cold water temperature remote from the float operated valve and the mains temperature at the float operated valve.

- **ANNUALLY:**
  - Visually inspect the cold water storage cistern – carry out any remedial cleaning and disinfection works considered necessary.
Other Systems

- Hot Water Systems
- Shower Heads, Filters and Hoses
- Little Used Outlets
- Cooling Towers and Evaporative Condensers
<table>
<thead>
<tr>
<th>Parameters to be considered</th>
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<tbody>
<tr>
<td>● Calcium hardness as mg/l CaCO3</td>
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<tr>
<td>● Magnesium hardness as mg/l CaCO3</td>
</tr>
<tr>
<td>● Total hardness as mg/l CaCO3</td>
</tr>
<tr>
<td>● Total alkalinity as mg/l CaCO3</td>
</tr>
<tr>
<td>● Chloride as mg/l Cl</td>
</tr>
<tr>
<td>● Sulphate as mg/l SO4</td>
</tr>
<tr>
<td>● Conductivity us [Total dissolved solids]</td>
</tr>
<tr>
<td>● Suspended solids mg/l</td>
</tr>
<tr>
<td>● Inhibitor(s) level mg/l</td>
</tr>
<tr>
<td>● Oxidising biocide mg/l</td>
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<tr>
<td>● Temperature oC</td>
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<tr>
<td>● pH</td>
</tr>
<tr>
<td>● Soluble iron as mg/l Fe</td>
</tr>
<tr>
<td>● Total iron as mg/l Fe</td>
</tr>
<tr>
<td>● Concentration factor</td>
</tr>
<tr>
<td>● Microbiological activity</td>
</tr>
<tr>
<td>● Legionella</td>
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</table>
METHODS OF WATER TREATMENT TO CONTROL THE SPREAD OF BACTERIA

- There are generally four accepted methods of treating water, they are:
- Chemical – various chemical treatments.
- Pasteurisation – Temperature control.
- Ionisation – Electrolytic dissolution of metals.
- Irradiation – Ultra violet light.
What is Disinfection?

- The disinfection process is sometimes misquoted, misunderstood or described as ‘sterilisation’ or ‘chlorination’. It is important that the correct terminology is used and understood.

- DISINFECTION
- STERILISATION
- CHLORINATION
- OXIDATION
Disinfection procedure for domestic hot and cold water systems

- Chemical disinfection of cistern fed hot and cold water systems
- Disinfection and Commissioning
- Post Disinfection Procedure
Alternative methods

- Pasteurisation of systems
- Ionisation disinfection of hot and cold water systems by copper and silver ions
- Irradiation of systems
GLOSSARY OF TERMS

- **EG**
- **Aerosol emissions**
  Water droplets in the form of a spray emitted from a source
- **Adjusted Biocide**
  Amount of additional biocide required to meet the correct level
- **Algae**
  A gummy nitrogenous compound
- **Asset Register**
  A complete list of all the equipment and plant on all the water systems
REFERENCES

- Control of Substances Hazardous to Health Regulations 1999
- Management of Health and Safety at Work Regulations 1999
- Health and Safety at Work Act 1974
- BS6700, 1977
- The Water Supply (Water Fittings) Regulations 1999
- The Water Quality Regulation 2000
- The WRAS Directory
- The Control of Legionella Bacteria in Water Systems, Approved Code of Practice, 2001
- Health Technical Memorandum 2040 & 2027