

**WORCESTERSHIRE COUNTY COUNCIL**

## **WATER QUALITY**

### **Management Arrangements for the Control of Legionella and Maintenance of Wholesome Water Quality in County Council Buildings**

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# INDEX

## Section

- 1 Introduction**
  - 1.1 Strategy
  - 1.2 Definition of Legionella Risk Categories
  - 1.3 Legionella Risk Assessment Priorities and Methodology
    - Table 1 Management Action
    - Table 2 Programme of Implementation
  
- 2 Management Policy Statement**
  
- 3 Roles and Responsibilities**
  - 3.1 Director of Corporate Services / Head of Property Services
  - 3.2 Property Services Staff
    - 3.2.1 The Water Quality Group
  - 3.3 Heads of Establishments / Officer-in-Charge
  - 3.4 Contractors
  
- 4 Survey Programme**
  - 4.1 Full Legionella Risk Assessment
  - 4.2 Visual Survey and Risk Assessment Reviews
  - 4.3 Routine Maintenance and Operational Monitoring
    - Table 3 Summary and Responsibilities
  - 4.4 Special Areas
  
- 5 Sampling and Testing for Legionella**
  - 5.1 Sampling and Testing for General Water Quality
  - 5.2 Testing and Analysis
  - 5.3 Action following Legionella Sampling

## **INDEX (cont'd)**

### **Section**

#### **6 Maintenance of Records**

6.1 Central Records

6.2 Site based Records

#### **7 Cleaning and Disinfection Procedures**

7.1 Minor Plumbing Alterations

7.2 Major Plumbing Alterations

7.3 Certification

#### **8 Management of Works**

8.1 Strategy

8.2 Emergency Procedures

8.3 Action in the Event of an Outbreak

#### **9 Air Conditioning and Mechanical Ventilation**

9.1 General

9.2 Fresh Air Inlet

9.3 Cooling / chiller coils

9.4 Humidifiers

9.5 Drainage traps

9.6 Design of Air Conditioning and Mechanical Ventilation Systems

## **INDEX (cont'd)**

### **Section**

## **APPENDICES**

- 1 Schedule of Worcestershire County Council Properties
- 2 Water Sampling for Legionella
- 3 Contractors Cleaning and Disinfection Procedures
- 4 BACS /WMSoc recommended Code of Conduct
- 5 System Design Standards for Hot and Cold Water
- 6 Advice to Building Occupiers concerning Regular Flushing of Showers
- 7 Extract from HSE AcoP L8  
'Action in the Event of an Outbreak'
- 8 Design Guidance for Air Conditioning and Ventilation Systems
- 9 Written Scheme for controlling the risk of exposure to Legionella bacteria in Worcestershire County Council premises

## **1 Introduction**

- 1.1 Worcestershire County Council accepts that it has a responsibility to protect employees and others who may be affected by its business operations against the risk of legionella infection (legionellosis) arising from plant, equipment, facilities, work or work-related activities, and will implement the procedures in this document to ensure that this responsibility is met.

This document sets out the guidance and strategy that Worcestershire County Council will follow, and includes the framework of the procedures for achieving and maintaining it. This framework defines the stages and describes the objectives at each stage; specifies the management, operational and specialist responsibilities and lays down a clear management and communication structure to ensure that it fails safe, wherever practicable.

This document is designed to cover all water and air “risk systems” and not solely from the legionellosis viewpoint. The provision of safe and wholesome water supplies is also considered vital to the services provided from County Council properties, and the document includes guidance and procedures for the checking, inspection, testing, recording and managing all water and air systems within these buildings in order to achieve this.

This guidance was originally issued following reorganisation of Local Authorities in 1998. It was revised following publication of the HSE Approved Code of Practice in 2000. A further scrutiny of the policy was undertaken by the Chief Engineer in 2002, and a Water Quality Group was set up to further develop the policy and implement its requirements.

The current revision in 2003 reflects the restructuring of Property Services in June 2003 and revises the duties and responsibilities of individual Officers.

This guidance further acknowledges that the County Council owns several hundred sites, many of which comprise several separate buildings. As such, the wording of the ACoP must be interpreted in recognition of this property portfolio. Further attention is paid to the fact that property is bought, sold, leased, constructed, extended, modified and demolished on a regular basis. Hence, although the Council’s Water Quality guidance itself may not change, the schedule of buildings to which it applies will be subject to continual change. The document therefore has been extended to include initial Legionella Risk Assessments for newly acquired or modified buildings.

A new Appendix (Appendix 1) has also been added. This Appendix can be kept under continual review, and revised as the property portfolio changes. It forms the basis of the Council’s prioritised programme of Risk Assessments and remedial works.

### **1.2 Definition of Risk Categories**

Initial assessments of risk have been undertaken by members of the Water Quality Group. The risk assessment took into account:

- (a) the age, complexity and condition of the water and air system in the buildings
- (b) the susceptibility of the occupants and visitors

Within the vast majority of the Council's premises, the susceptibility of the occupants will be no greater than that of the general population, and the water and air services will be of average complexity and in reasonable condition. Most premises, therefore, will pose a STANDARD RISK.

However, certain sites such as Homes for Older People will have occupants whose susceptibility to infection could be higher than average. Some premises may have swimming pools, showers and other water and air systems which increase the risk of aerosol generation, or where the age and complexity of installed systems increase the risk of bacterial growth due to stagnation or other factors. They may also have shared-use sports facilities where members of the public are given access, where the occupants susceptibility to infection cannot be defined or categorised. Such premises will pose a higher than average risk. By comparison with Healthcare Premises, where the occupants can frequently be highly susceptible to infection or immuno-compromised by virtue of their condition or treatment, Local Authority premises do not pose a 'high' risk. By comparison with the average, however, these premises pose an increased level of risk and for the purposes of this policy they are classed as INCREASED RISK.

There will also be premises with minimal water systems, no mechanisms for aerosol generation and no water storage, such as Branch Libraries, Offices, Depots etc. These premises have been assessed as posing a LOW RISK.

Finally, there is an additional category of premises which form a special group within the STANDARD RISK group, namely Schools. Schools are occupied in the main by young people and children, who are less susceptible to infection than adults, and there have been no known cases of legionellosis attributable to School premises. This low risk population, however, is balanced by the fact that the pattern of School usage is highly intermittent, with several long unoccupied periods where stagnation can occur in water systems. Historically, Schools were also often equipped with large capacity water storage cisterns. For these reasons, Schools have been listed separately under the STANDARD RISK category.

## 1.3

**Risk Assessment Priorities and Methodology**

This revised Water Quality guidance sets out to introduce the concept of Legionella Risk Assessment and Review on a prioritised basis. It is considered desirable to undertake a full Legionella Risk Assessment on all sites in order to update the Authority's records. It also makes sense when carrying out inspections and sampling visits to assess the potential for bacterial growth other than Legionella, and water quality degradation that may arise from storage or transmission of drinking water within Council premises. However, with some 480 sites in the County Council's portfolio, it will be necessary to develop a programme, based on priorities, which will run over several years. The four categories on which this priority system is based are shown in Appendix 1 and defined as follows:

<b>LIST PRIORITY</b>	<b>RISK FACTOR</b>	<b>TYPE OF PREMISES OR SYSTEMS</b>
A	Increased	Homes for Older People Special Schools Residential Premises Hostels and Group Homes Day Centres for Older People Homes for Mentally Ill People Outdoor Education Centres Sport & Leisure Centres Schools with Swimming Pools and Community Sports Facilities Social Education Centres
B	Standard (Non-Education)	Offices (larger/complex systems) Day Centres Youth Centres Caravan Sites Caretaker's and School Houses
C	Standard (Education)	Schools of all types without swimming pools and community use sports facilities.
D	Low	Libraries Offices (smaller) Picnic sites Countryside Centres

The following Table 1 sets out the sequence of management actions and priorities which the County Council intends to implement in order to manage the control of legionella as part of its overall Water Quality management update and revision.

**TABLE 1**

<b>STEP</b>	<b>ACTION</b>	<b>BY WHOM</b>	<b>TARGET COMPLETION</b>
1	Revise and issue Water Quality guidance	Water Quality Group Chair	Completed
2	Undertake Initial Assessments of Risk and prepare prioritised list of premises	Water Quality Group Members	Completed
3	Undertake Full Risk Assessments for Priority 'A' premises	Shared between Specialist Contractors and Scientific Services	Completed
4	Undertake remedial works as required at Priority 'A' premises	Specialist and Maintenance Contractors	Q2 2005/06
5	Undertake Full Risk Assessments for Priority 'B' and 'C' premises	Shared between Specialist Contractors and Scientific Services	Q2 2006/07
6	Undertake remedial works as required at Priority 'B' and 'C' premises	Specialist and Maintenance Contractors	Q2 2007/08
7	Undertake Full Risk Assessments for Priority 'D' premises	Scientific Services & Property Services	Q3 2007/08
8	Undertake remedial works as required at Priority 'D' premises	Specialist and Maintenance Contractors	Q4 2008/09
9	Review all Full Risk Assessments every 2 years or when original Assessment becomes invalid	Scientific Services & Property Services	Ongoing
10	Complete current programme of training for WCC Staff, Consultants & Contractors	Water Quality Group and/or professional Training Consultant	Q4 2003/04
11	Undertake 2-yearly refresher training	Training Consultant	On-going

## **2 Management Policy**

The overall policy for the management of water services can be summarised as follows:

- 2.1 To have clear procedures for the design and management of water services in buildings.
- 2.2 To have specific lines of responsibility for the management of water services.
- 2.3 To identify locations with high risk users of premises.
- 2.4 To identify, where possible, potential risk areas due to materials, storage methods, poor installation etc within the buildings.
- 2.5 To check on a regular basis the quality of the water within the buildings.
- 2.6 To ensure an adequate number of supply points of drinking (potable) water within the buildings, (see Section 1.4). A separate Action Plan will be prepared by the Water Management Officer.
- 2.7 To train staff and contractors to ensure that works carried out on water services comply with legislation and County Council policy.
- 2.8 To ensure that any risk of contamination is removed or reduced in an efficient, cost effective manner with the minimum disruption to building users.

## **3 Management Roles and Responsibilities**

### **3.1 Director of Corporate Services / Head of Property Services**

The Director of Corporate Services will be regarded as the “Duty Holder” under HSE Guidance Note L8. The Head of Property Services is responsible for the overall policies relating to the maintenance and operation of County Council buildings.

### **3.2 Property Services and Scientific Services Staff**

#### **Client Support Unit Manager**

Water policy, strategy for implementation, resource allocation and monitoring of water services management.

#### **Chief Engineer**

Advising on technical issues and co-ordinating the work of the Water Quality Group. Recommending revisions to guidance and procedures in the light of technical development. Ensuring guidance is implemented during design, installation and commissioning of water services.

### **Client Support Group Leader**

Management of team, liaison with Contractors and Scientific Services. Guidance to Heads of Establishments. Management of budgets and programmes.

### **Principal Mechanical Engineer**

Undertake the role of Responsible Person as laid down in the HSC Approved Code of Practice L8. Technical monitoring of Water Management Officer. Liaison with Contractors and monitoring of treatment programme.

### **Project Designers / Contract Administrators**

Implementation of guidance in the context of the projects being managed.

### **Property Risk Management Officer**

Administrative and Line Manager of the Water Management Officer. Implementation and management of survey / testing / treatment programme. Assisting building users and day-to-day liaison with Scientific Services. Management of water management records.

### **Water Management Officer**

Implementation of surveying, testing and treatment programme, monitoring of water and management of records.

### **Head of Scientific Services**

Provide Laboratory facilities complying with UKAS requirements for water sampling and testing as needed for the achievement of the policy objectives. Provide staff to participate in the Risk Assessment process.

#### **3.2.1 Water Quality Group**

The Water Quality Group was set up in 2002 to be the body responsible for reviewing and determining guidance and detailed procedures designed to minimise risks to health from water systems in general and Legionella bacteria in particular.

The Water Quality Group holds regular meetings and issues formal Minutes. The membership of the Group is as follows:

- Chief Engineer (Group Leader Engineering Services) – Chair
- Responsible Person – Legionella (Principal Mechanical Engineer)
- Water Scientist (Worcestershire Scientific Services)
- Team Leader Principal Mechanical Engineer (Design Unit)
- Maintenance Engineer (Mechanical – North Worcestershire)

- Maintenance Engineer (Mechanical – South Worcestershire)
- Water Management Officer
- Corporate Health and Safety Manager

The Water Quality Group forms one of the working groups within the Engineering Policy Group chaired by the Chief Engineer.

### 3.3 **Heads of Establishment / Officers-in-Charge**

Co-operating with Property Services for surveys. Provision of adequate funding for surveys, testing, remedial works, if devolved budget holders.

Arranging for guidance to be complied with by other providers of service.

Undertaking the 'occupier's duties' in Section 4.3 and Table 3.

### 3.4 **Contractors**

All Specialist Contractors working on water supply systems should comply with the Recommended Code of Conduct for Service Providers (Appendix 4). Service Contractors should comply with the standard specification within the Mechanical Services Maintenance Contract.

## 4 **Survey Programme**

### 4.1 **Full Legionella Risk Assessment**

A full Legionella Risk Assessment is required by the HSC ACoP L8 for premises where

- the existing Risk Assessment is no longer valid;
- the building is newly acquired;
- the building is newly constructed;
- the water services have been substantially modified

Paragraphs 23 – 38 of the ACoP define the requirements for a suitable and sufficient Risk Assessment. The Water Quality Group have reviewed commercially available Risk Assessment methodologies, and currently the following systems and providers are approved for County Council premises:

Worcestershire County Council, Scientific Services Division  
 Hertel Ltd, Specialist Contractor, Hereford  
 Aqua Protec Ltd, Specialist Contractor, Redditch  
 The "Water Guardian" service provided by Severn Trent plc

The above systems appear to satisfy the above requirements of the Approved Code of Practice.

## 4.2 Visual Survey and Risk Assessment Review

An inspection will be carried out on all water supplies, storage and distribution services in accordance with the following:

	<b>Inspection</b>	<b>Risk Assessment Review</b>
a) Residential properties (not housing)	Annually	Bi-annually
b) Properties with hydro therapy pools	Annually	Bi-annually
c) Swimming Pools	Annually	Bi-annually
d) Dual Use Sports Facilities	Annually	Bi-annually
e) All other properties and premises	Annually	Bi-annually

All in compliance with ACoP L8 Paragraph 38. The Risk Assessment shall also be reviewed whenever a particular premises is substantially extended or modified.

## 4.3 Routine Maintenance and Operational Monitoring Requirements

The following Tables summarise the requirements of ACoP L8 and specify the organisations responsible for carrying out the relevant actions. References: ACoP paragraphs 181 – 182, Checklist 2, Table 3.

**Table 3**

<b>Frequency</b>	<b>Action</b>	<b>Responsibility</b>
Weekly	Flush little-used outlets to drain without release of aerosols. Record.	Occupier
Weekly	Check and record blended water temperatures from thermostatic mixing valves where fitted. Confirm that stable temperature is attained within one minute.	Occupier (2)
Monthly	Check water temperatures at sentinel taps. Hot water >50°C after 1 minute, cold water <20°C after 2 minutes. Record,	Occupier (2)
Monthly	Check calorifier temperatures. Flow 60°C, return >50°C. Record.	Occupier (3)
Quarterly or as necessary	Dismantle, clean and descale shower heads and hoses. Record.	Occupier (1)
Six monthly	Measure incoming water temperature to cold water cisterns and water temperature remote from float valve. Record.	Maintenance Contractor
Six monthly (January and July)	Measure cold water temperature rise between incoming main and most distant outlet. Record.	Occupier (4)
Annually	Take sample and record condition of water from HWS calorifier drains.	Maintenance Contractor
Annually	Open and inspect internal surfaces of HWS calorifiers for scale and sludge and clean or descale as necessary. Record.	Maintenance Contractor
Annually	Check and record temperatures at a representative number of taps throughout the system, on a rotational basis.	Occupier (2)
Annually	Inspect cold water cisterns and carry out remedial work as necessary. Record work done and report outstanding defects.	Maintenance Contractor
Annually	Physically inspect the hot and cold water systems and check accuracy of schematic drawings. Note changes. Check for under-used fittings and report recommendations.	Scientific Services and/or Specialist Contractors
Bi-annually	Undertake Risk Assessment Review	Scientific Services or Contractors

## Notes

- (1) May be undertaken by competent Caretaker or maintenance operative using proprietary domestic kettle descaler (COSHH Regulations apply to use of chemicals at work), or by Maintenance Contractor. However, the person responsible must be clearly defined by the Occupier. Currently undertaken twice yearly at premises covered by Mechanical Maintenance Service Contract.
- (2) Shall be done using a simple digital thermometer with immersion probe.
- (3) Readings to be taken from fitted temperature gauges.
- (4) Should be done using digital thermometer as in (2). Sample points can be the nearest tap to the incoming main, and the most distant tap. These 'sentinel taps' should be labelled permanently to identify them.

Samples are to be taken at the same time as the visual survey is undertaken. In addition samples will be taken at a greater frequency, to be agreed with Scientific Services, where the water supply is obtained from a private source.

### 4.4 Special Areas

Samples shall be taken at an increased frequency to be agreed with Scientific Services in special circumstances, such as:

Re-circulated / grey water systems  
Storm water storage systems  
Outdoor resource water sports areas  
Rainwater harvesting systems  
Private or untreated water supplies and bore holes

## 5 Sampling and Testing for Legionella

Routine sampling and analysis of water for Legionella is not recommended under normal circumstances in hot and cold water systems. HSC guidance, in ACoP L8, does not recommend routine sampling for Legionella other than in specific circumstances, and lists the following requirements for particular systems where routine testing for Legionella should be undertaken.

- (a) Where water distribution temperatures are reduced and biocides are used to control bacterial growth – monthly sampling.
- (b) Where biocide or temperature levels are out of control – weekly sampling until system is back in control.
- (c) Where a Legionella outbreak is suspected.

(d) Hospital wards.

The complexity of the system will determine the number of samples taken but should never be less than 2 samples of cold water and 2 samples of hot water.

### 5.1 **Sampling and Testing for General Water Quality**

It is not possible to define, in this policy, a common sampling frequency for all property types. The actual frequency of sampling will be recommended by Scientific Services or Property Services, having regard to the standard of the installation and the outcome of the Risk Assessment at each premises.

For example, DfES guidance in Section 5 of Building Bulletin 87 suggests that, under normal circumstances in Schools, routine water sampling for general bacteriological quality should be undertaken between two and four times per year, whereas HSC ACoP L8 is not specific.

The complexity of the system will determine the number of samples taken but should never be less than 2 samples of cold water and 2 samples of hot water per water system.

### 5.2 **Testing and Analysis**

The samples will be taken in accordance with an agreed and documented sampling procedure to defined quality standards (Appendix 2 is an example).

Samples will be sent for testing and analysis to Worcestershire Scientific Services, or other UKAS accredited laboratory, under controlled environmental conditions. Reports will be sent to the Water Management Officer for action and / or recording.

### 5.3 **Action following Legionella Sampling**

The following guidance is extracted from HSE ACoP L8 Table 4:

<b>Legionella Bacteria (cfu/ml)</b>	<b>Action required</b>
Less than 100	None specifically required
Over 100 but less than 1,000	Either: (a) If only one or two samples are positive, system should be re-sampled. If a similar count is found again, a review of the control measures and risk assessment should be carried out to identify any remedial actions

<b>Legionella Bacteria (cfu/ml)</b>	<b>Action required</b>
	(b) If the majority of samples are positive, the system may be colonised, albeit at a low level, with legionella. Disinfection of the system should be considered but an immediate review of control measures and risk assessment should be carried out to identify any other remedial action required.
Over 1,000	The system should be re-sampled and an immediate review of the control measures and risk assessment carried out to identify any remedial actions, including possible disinfection of the system.

## 6 Maintenance of Records

6.1 Property Services will hold a central database for each property containing the records stipulated in Paragraphs 66 – 69 of the ACoP, including:

- a) Records of most recent Full Legionella Risk Assessment
- b) Test results of samples from survey, if applicable
- c) Any amendments made to water services since survey
- d) Record of any remedial works

### 6.2 Site-Based Records

The Head of Establishment or Officer-in-charge will create and maintain a site log book containing records of the actions for which he / she is responsible, as detailed in Table 3 of this policy. Such records should be completed by the occupier, contractor or other responsible person at the time the checks or work are undertaken.

## 7 Cleaning and Disinfecting Procedures

Cleaning and disinfecting of water supplies when necessary, following adverse results from testing of sample or alterations carried out to water services, will be carried out by approved Contractors in accordance with BS 6700 and the Standard Conditions, Practices and Procedures for Contractors (Appendix 3).

## 7.1 **Minor Plumbing Alterations**

Where small alterations or maintenance tasks on water systems have been carried out, then re-commissioning may require no more than thorough flushing of the systems. This can be followed by sampling and analysis of the water if considered necessary by the Supervising Officer, although this is not expected to be required after minor maintenance-related works such as replacement of individual water fittings. This relaxation is only permissible where the extent of the work is small (fewer than 6 fittings and less than 5 metres of new pipe per service, as a guide) and all fittings and pipe used on the installation are new and EITHER taken from the manufacturer's sealed packing just before use, OR pre-chlorinated immediately before use.

Pre-chlorination can be simply achieved by immersing and agitating the fittings for 5 minutes in a 1,000ppm solution of sodium hypochlorite. This can be made up on site by diluting commercial or household bleach (containing approximately 5% sodium hypochlorite) with clean cold water in the ratio of 1:50 (20ml bleach per litre of water). The COSHH Regulations apply to the use of such solutions at work – a Risk Assessment should be prepared by the Contractor and the appropriate physical precautions must be taken.

To avoid the need to disinfect large systems following relatively minor extensions and alterations, it is recommended that biocide injection points are provided at the point where the new pipework joins the existing system. Biocide injection points take the form of valves, tees and a drain valve or physically removable section of pipe. This enables biocide to be injected into the new section of pipework and circulated or drawn through all new fittings. The removable section must be taken out or the drain valve locked open to prevent any possibility of biocide (a Class 5 fluid) from contaminating the existing fresh water pipework during the disinfection process.

Work should only be undertaken by properly trained, experienced and qualified operatives or Contractors.

## 7.2 **Major Plumbing Alterations**

On larger installations or where fittings have been re-used and are not new and sealed, the new or altered section of pipework must be cleaned and disinfected by a specialist Contractor using an approved biocide, in accordance with BS 6700 and / or Appendix 3, followed by sampling and analysis.

Major extensions and new buildings must be disinfected before being brought into use, and in many cases it may be more convenient for a specialist Contractor to disinfect the entire buildings systems from the tank or source, in accordance with Appendix 3.

Notification must be made to the Water Undertaker (Severn Trent throughout most of Worcestershire) in accordance with the Water Supply

(Water Fittings) Regulations 1999. Work should only be undertaken by properly trained, experienced and qualified operatives or Contractors who are accredited under a quality assurance scheme for plumbers (Severn Trent 'Watermark' scheme or equivalent).

### 7.3 Certification

In accordance with standard conditions of contract, the following Certificates should be obtained from the Contractor before new or significantly altered water systems are accepted at hand-over:

Certificate of Disinfection in accordance with BS 6700

Results of water analysis from UKAS-accredited Laboratory.

### Notes from the Water Supply (Water Fittings) Regulations 1999 on notifications to Water Suppliers

#### NOTIFICATIONS

Under the Water Supply (Water Fittings) Regulations 1999 if any of the following are to be done or installed, the Water Undertaking must be notified before commencing the work:

Erection of a building or other structure

Extension or alteration of a water system (other than in a dwelling)

Change of premises use

Installation of any of the following, other than as a like-for-like replacement:

- Bath of over 230 litres capacity
- Bidet
- Shower unit of a specified type
- Pump or booster
- Reverse osmosis unit
- Water treatment unit
- RPZ valve or other mechanical device (category 4 or 5 fluids)
- Garden watering system
- Water system laid outside a building

Construction of a pond or swimming pool

The Water Undertaking has 10 days to grant or withhold consent and/or impose conditions. After 10 days have expired and nothing has been heard, consent is deemed to have been given. Approved contractors (members of 'Watermark' or similar approval schemes) are exempt from certain of the above, but on completion of the work they must send a copy of the Contractors Certificate to the Water Undertaking. **With effect from 1 April 2005 only Watermark approved contractors will be permitted to undertake plumbing work on Worcestershire County Council premises.**

## **8 Management of Works**

### **8.1 Strategy**

Following receipt of the Full Legionella Risk Assessment, review or report from Maintenance Contractors, a scrutiny will be carried out by the Water Management Officer in liaison with the Principal Mechanical Engineer. This scrutiny will be recorded on the database together with the actions taken or proposed.

Proposals for remedial works will be prepared in conjunction with the Water Quality Group and a costed Report submitted to the budget holder with recommendations.

### **8.2 Emergency Procedure**

All staff in the County Council should be aware of the risk from contaminated water services. Any member of staff identifying a possible risk of contamination must contact their supervisor immediately who will contact Property Services. The first point of contact should be Property Services Water Management Officer Tel (01905) 766138 or Principal Mechanical Engineer Tel (01905) 766430 during working hours and (01905) 766457 out of normal working hours.

If contamination of potable (drinking) water by pathogenic or harmful substances is suspected, all supply points should be labelled as unfit for drinking and a supply of bottled water obtained and used until the supply is checked and cleared by Property Services/Scientific Services. Legionella contamination is not normally an issue for potable supplies, other causes for concern being more frequent / relevant.

If contamination of stored water or hot water system is suspected, showers and baths should be taken out of use until checked and cleared by Property Services and/or Scientific Services.

### **8.3 Action in the Event of an Outbreak of Legionellosis**

Detailed procedures are given in HSE ACoP L8, Appendix 2. Members of Property Services and Scientific Services staff will co-operate with any investigation undertaken by a properly constituted authority.

A copy of the relevant Clauses in the ACoP is attached to this policy as Appendix 7.

## **9 Air Conditioning and Mechanical Ventilation**

Air conditioning and mechanical ventilation plant can create conditions in which legionella bacteria can multiply. The following operational recommendations are based on NHS Estates Health Technical Memorandum 2025, which is acknowledged to represent the best available guidance in this field.

## 9.1 **General**

Air conditioning and ventilation plant and ductwork should be inspected to see that it is clean and to report on its general condition. After several years in service, even in the case of a correctly filtered plant, there may be signs of dirt accumulation, and consideration should be given to cleansing the system. Accumulation of dirt in a relatively short period is indicative either of a failure of the filtration system or that the wrong filters are being used. In particularly polluted areas, it may be appropriate to consider the installation of a higher grade of filter as well as a pre-filter. The quality of filter housing and, in particular the seals is a critical factor in maintaining the efficacy of the filtration system by ensuring that air does not bypass the filter panels.

## 9.2 **Fresh Air Inlet**

In the case of existing installations the use of portable smoke generators or smoke bombs may be helpful in visualising the discharge plume from cooling towers and discharges from extract systems in order to assess any potential risk.

## 9.3 **Cooling / Chiller Coils**

Cooling / chiller coils precipitate water by condensing the vapour present in the air. This will occur during 'sensible' cooling as well as during dehumidification. It is good practice to fit downstream eliminator plates. Consideration should be given to installing downstream eliminator plates in existing plant.

## 9.4 **Humidifiers**

If the humidifier is not to be used for an appreciable period of time, it and any break tank should be drained down, either manually or automatically, and left empty. Existing capillary cell humidifiers or systems which rely on recirculated water, for example spray coil systems, should be taken out of service or replaced.

The cleanliness of the water supply and the effectiveness of any water treatment regimen should be regularly checked to a procedure agreed by the infection control team. The addition of treatment chemicals for continuous control of water quality for humidifiers / air handling units should be avoided. Consideration could be given to installing a UV system to control microbiological growth. UV systems, however, rely on high quality filtration to ensure the effective exposure of micro-organisms to the UV irradiation. The performance of the filter and the UV detection system should be regularly checked.

Internal surfaces likely to be wetted should be regularly inspected. In the event of fouling, specialist cleaning may be necessary.

Providing the water supply is suitable, existing spinning disc humidifiers may be retained in service. Spinning disc humidifiers are known to present a considerable risk of causing humidifier fever once contaminated, and require to be kept clean and well maintained.

The frequencies utilised in ultrasonic humidifiers cannot be considered as effective for the control of micro-organisms. The supply of water to the humidifier should be free from viable bacteria. Regular inspection and cleaning is required.

There should be a clear statement of the microbiological and chemical COSHH assessment of the operation of all humidifiers, water treatment regimens and monitoring procedures.

The procedures should be detailed in both the operating and maintenance manuals produced for each plant.

#### 9.5 **Drainage Traps**

Plant condensate drainage traps, where fitted, should be checked monthly to ensure that the water level is correct.

#### 9.6 **Design of Air Conditioning and Mechanical Ventilation Systems**

The definitive design guidance for air handling and air conditioning plant and systems is NHS Estates Health Technical Memorandum 2025. Although such high standards are generally not applicable outside the Health Care Sector, they do represent the best practice. Appendix 8 is an extract from NHS Estates Guidance which summarises the requirements which will be applicable to Worcestershire County Council premises.

## Appendix 1

### Schedule of Worcestershire County Council Properties

LIST PRIORITY	RISK FACTOR	TYPE OF PREMISES OR SYSTEMS
A	Increased	Homes for Older People Special Schools Residential Premises Hostels and Group Homes Day Centres for Older People Homes for Mentally Ill People Outdoor Education Centres Sport & Leisure Centres Schools with Swimming Pools and Community Sports Facilities Social Education Centres
B	Standard (Non-Education)	Offices (larger/complex systems) Day Centres Youth Centres Caravan Sites Caretaker's and School Houses
C	Standard (Education)	Schools of all types without swimming pools and community use sports facilities.
D	Low	Libraries Offices (smaller) Picnic sites Countryside Centres

## Appendix 2

### Water Sampling for Legionella and Other Bacteriological Testing

#### General guidance

Note that full, documented and accredited procedures and method statements exist and are maintained by Worcestershire Scientific Services and other competent authorities

Samples should be taken as follows if indicated:

- a) Cold water system – from the cold water storage cistern or from the stored water outlet nearest to the cistern from which the outlet is supplied and the furthest outlet from the cistern. Samples may also be required from outlets in areas of particular concern, eg kitchen taps, aerosol-producing outlets such as showers, outlets off long pipe runs, etc.
- b) Hot water systems – from calorifier outlet or nearest tap to the calorifier outlet plus the return supply to the calorifier or nearest tap to that return supply. Samples should also be taken if possible from the base of the calorifier where drain valves have been fitted. The furthest outlet from the calorifier should also be sampled.

The complexity of the system needs to be taken into account in determining the number of samples to take. For example if there is more than one ring main present in the building, taps on each ring will need to be sampled. In order to be representative of the system as a whole, samples should be of treated circulating water and not taken from temporarily stored water, eg a TMV controlled taps and showers. These may require sampling but this should be determined by risk assessment.

#### Water samples taken from cold water rising mains

Ensure tap is direct from rising main and not passing through a water softener or inline filter. Where possible, select a metal tap that is clean and that the washer or gland is not leaking. If possible select a tap without an anti-splash device. Sample in the manner specified by Worcestershire Scientific Services, Severn Trent Water, OGC, PHLS, British Standards or other competent authority according to the analysis to be done.

#### Water sample taken from stored water system (hot or cold, mains or tank fed)

Establish that the supply is actually from a storage cistern or vessel, and that the outlet is likely to be representative of all such outlets. Where possible select a metal tap that is clean and that the washer or gland is not leaking. If possible select a tap without an anti-splash device. Sample in the manner specified by Worcestershire Scientific Services, Severn Trent Water, OGC, PHLS, British Standards or other competent authority according to the analysis to be done.

### **Sampling from a water storage cistern (directly)**

Carefully remove access lid, wearing disposable gloves and use a sterile dipper to dip the cistern and fill an appropriate sample bottle. Do not fill sample bottle over cistern access to prevent contamination of cistern by inadvertently dropping cap or bottle into cistern.

### **Sampling from showers**

Select a suitably representative shower. Sample in the manner specified by Worcestershire Scientific Services, Severn Trent Water, OGC, PHLS, British Standards or other competent authority according to the analysis to be done. If contamination of the shower mixer, hose or spray head is suspected or is to be investigated, samples should be taken without first flushing the shower, taking normal precautions against contamination.

### **Identification and Transportation**

Label each sample bottle as it is taken with site location for sampling point, date, time, temperature and sampler's name. Samples should be placed in a cool box or refrigerated container as necessary and transported to the analysing laboratory within 12 hours.



### Worcestershire County Council

#### Property Services

##### **Standard Conditions, Practices and Procedures for Contractors engaged in cleaning and/or disinfection of water systems using stabilised CHLORINE DIOXIDE for and on behalf of Worcestershire County Council Property Services**

##### **(1) General**

- (a) The disinfection of water systems using chlorine dioxide must be carried out in compliance with the following conditions, practices and procedures. Any deviations from these conditions, practices and procedures must be agreed in writing with Property Services before they can be implemented.
- (b) Scientific Services have carried out investigative work using the brand “Purogene” as the source of Chlorine Dioxide. The substance has proved satisfactory and is presently the only source of Chlorine Dioxide to be used in disinfection procedures. Other sources of Chlorine Dioxide are available commercially and their use would be considered, if scientific evidence as to their suitability and efficiency is provided and approved by the County Analyst and Scientific Advisor.
- (c) Prior to the commencement of all work the contractor must contact Property Services. Adequate notice of the proposed starting date must be given in order to ensure all arrangements necessary for each type of property can be made.
- (d) The contractor must ensure all staff working on the water supply will have received adequate training in respect of health and hygiene, cleaning and water treatment and this standard of training must be to the satisfaction of Property Services. At no time should any operative, who is suspected of, or is suffering from any infectious disease be permitted to work on the water supply until satisfactory medical clearance has been obtained.
- (e) Any special arrangements required by each property will be co-ordinated through Property Services, each contractor will be expected to adhere strictly to those requirements prior to the commencement of, and throughout any contract.
- (f) All inspections and on-site analysis will be carried out by or under the direction of staff from Property Services. This will include all chlorine dioxide (Purogene) testing together with other necessary testing. Testing must be to acceptable standard methods.

- (g) During the cleaning and disinfecting operation, all contractors and their staff must comply with any operational and safety requirements (within the terms of the contract) requested by the member of staff on the site from Scientific Services or Property Services Department.
- (h) The contractor must ensure that all staff are fully equipped and trained in accordance with the Health and Safety at Work Act 1974 and appropriate Codes of Practice. At no time must the contractor or his staff put other occupants of the building or employees at risk through non-compliance with the Health and Safety at Work Act 1974 or any other regulations eg COSHH regulations etc.
- (i) The product "Purogene" will be used within the shelf life given to the product and in accordance with the manufacturer's recommendations.
- (j) Prior to the commencement of any contract, if pumping and discharging pipes are required, all this equipment must be fully cleansed and disinfected. On no account must this equipment have been used for any purpose other than potable water.
- (k) All waste water from the holding cisterns, vessels etc, must be discharged in a continuous pipe leading directly to the foul water drainage system. Care must be taken not to allow splashing or aerosol creation by the water.
- (l) All scale, rust, deposit and sludge must be suitably bagged in water-tight sacks and suitably disposed of at an approved waste disposal site. Records of such disposals must be available for inspection.
- (m) During the re-filling of the water cisterns/vessels, all equipment used, if via hydrant or holding cistern must be pre-disinfected to the approved standards of the County Analyst and Scientific Advisor. Approval to use any hydrant must be obtained from the Water Company.
- (n) The Contractor and his staff must ensure that the highest standard of hygiene precautions are taken during the final re-filling operation.
- (o) All lids and covers must be washed and disinfected prior to refitting.
- (p) Where any de-scaling of cisterns etc or calorifiers has been carried out, checks should have been made by the contractor to ensure that no immediate damage to the fabric of the cistern or calorifier has been made that would lead to leakage.
- (q) Prior to the contractor leaving the premises a final clearance certificate must be left with the person in charge of the premises, as to completion of the contract work and clearance of the water supply of all disinfectant.

- (r) All shower heads, spray taps and other tap outlets must be de-scaled and cleansed where necessary, and disinfected.
- (s) Following the cleaning and disinfection, bacteriological and chemical samples will be taken at agreed locations. These are to be analysed for all bacteriological and chemical parameters deemed necessary.
- (t) All sampling and testing is to be carried out in accordance with UKAS accreditation procedures where such exist, by a UKAS accredited laboratory.

## 2) **Disinfection of the System**

- (a) Prior to the commencement of the disinfection of the system all cisterns/vessels must be isolated from the main feed to the water distribution system.
- (b) An inspection of the system will dictate the sequence of operations in the cleaning and disinfection procedure.
- (c) If the inspection indicates a near absence of deposits in the vessels or cisterns and/or that the deposit will not be stirred up and distributed through the system during the operations laid down below, the following procedure will be adopted.
- (d) The water in the cisterns/vessels must be treated to a minimum of 60mg per litre of available chlorine dioxide.
- (e) This water must then be used to charge the distribution system to a minimum level of 60mg per litre of available chlorine dioxide at all outlets hot and cold. The whole system must be allowed to stand charged for a minimum period of 1 hour, during this period tests must be carried out every 20 minutes throughout the distribution system to ensure that the minimum level of 50mg per litre of chlorine dioxide has been maintained. All test and sampling points must be identified and the results of each test recorded. Systems with a large distribution network may require the cisterns refilling and treating several times to cope with water quantity needed.
- (f) **Following the charging of the system, the vessels and cisterns will be cleaned as follows:-**
  - (1) All cisterns/vessels must be isolated from the feed to the distribution system.
  - (2) The remaining water/disinfectant in the cistern/vessel must be emptied via a pumped system and discharged to a suitable foul water drainage system.

- (3) All cisterns/vessels including floats and float operated valves must be thoroughly cleansed, using a brush method etc, to remove all scale, slime and deposits as is reasonably possible. All debris, scale, rust etc to be collected into water-tight plastic bags or and disposed of at an approved disposal site. At no time must a cleaning method be used that will cause an aerosol transmission. Following this operation the cistern must be thoroughly rinsed with cold mains water.
- (4) All remaining water must be removed from the vessel/cistern by means of a wet vacuum cleaner and discharged to a foul water drainage system, if necessary repeating several times until water is clear.
- (5) The cistern will be disinfected by spraying or wiping with an active disinfectant solution of 500mg/L of available chlorine dioxide. The spraying will include the cistern lids, floats and float operated valves etc. Instructions for the preparation of the disinfection solution are to be found at (5) below.
- (6) Spray or wipe all internal surfaces of the vessel/cistern with disinfectant solution. Surfaces must be wetted for a minimum of 10 minutes.

Active disinfectant solutions may be mildly irritating when in prolonged contact with skin, suitable protection eg gloves/safety glasses must be used when preparing solutions and when in use. Suitable breathing apparatus should be used in areas with inadequate ventilation when spraying or fogging takes place.
- (7) Following the above procedures the vessel/cistern must be refilled with clean mains water the whole system flushed and rinsed until an available chlorine dioxide level of 1 milligramme per litre or less has been obtained throughout every outlet or user point.

(g) **An alternative post-clean cistern disinfection procedure is as follows:-**

- (1) After isolation the clean cisterns/vessels will be refilled and will then be charged to the minimum level of 60mg/L of available chlorine dioxide. These must be allowed to stand for a minimum period of 1 hour, during which time, tests will be carried out to ensure that the minimum level of 50mg/L of available chlorine dioxide is maintained. After this time the treated water must be pumped directly to a foul water drain and cisterns/vessels flushed with clean mains water several times and again pumped directly to waste.
- (2) The cisterns/vessels are then filled to a normal working level with clean mains water.

- (3) When the cisterns have been filled, all outlets of the distribution system must be opened, together with outlet valves to all cisterns/vessels and the system completely flushed to remove the disinfectant to a maximum level of 1mg/L chlorine dioxide.

On-site tests must be carried out throughout the distribution system to ensure that the water left within the system following the cleaning and/or disinfection will be of the same standard of that of the incoming mains water supply. All disinfectant used must have been removed to a maximum level of 1mg/L chlorine dioxide.

- (h) If the initial inspection indicates an excessive amount of deposit in the vessel/cistern, the following procedure is to be adopted for cleaning and disinfection:
  - (1) The vessel/cistern must be isolated from the feed to the distribution system and emptied via a pumped system with the deposit removed by a "wet" vacuum cleaner. The cistern is cleaned and any further deposit removed by the "wet" vacuum system. The cistern is then flushed with clean water several times (until the water is clear) and the resulting water pumped directly to a foul water drain.
  - (2) If the contents of the cistern were found to be stagnant, otherwise suspect, the water should be disinfected (60mg/L of available chlorine dioxide for 1 hour) before the cistern is emptied.
  - (3) The cistern may be disinfected by spraying (as at (2) (f) (s)).
  - (4) The cistern is then charged with water and Purogene added to a minimum level of 60mg/L of available chlorine dioxide.
  - (5) The distribution system is charged with treated water as per (2) (e) above, with both cistern and system allowed to stand for a minimum of 1 hour.
  - (6) If the cistern has not been disinfected by spraying, it must be filled to the normal working maximum level with treated water and allowed to stand for a minimum of 1 hour as per (2) (e) above.
  - (7) The whole system is then flushed with clean mains water as per (2) (g) (3) above as that clean mains water is present throughout the system.

(3) **Calorifiers**

- (a) Where de-scaling and cleaning is required, first raise the temperature to a minimum of 70°C over the whole surface of the calorifier for at least one hour, with the flow valves closed in order to obtain pasteurisation.

- (b) Following the above, drain, clean and de-scale ensuring all sludge in the base is removed (with sufficient flushing to ensure complete removal of sludge and discoloured water). The sludge is to be bagged in water-tight containers and disposed of to a suitable disposal site. Following this operation allow the surface of the calorifier to dry.
- (c) When dry, refill, ensuring that all air has been removed. Raise the temperature to a minimum of 70°C for 1 hour. Before returning the calorifier to service, open the header valves slowly in order to reduce the risk of turbulence. Return the calorifier to its normal working temperature and draw the water through the distribution system until the correct distribution temperature has been obtained. During this procedure, all safety precautions must be taken to prevent the risk of scalding to the occupants of the building.

(4) **Sprinkler, Water Cooling Towers and Air Conditioning Units**

Where these are in place, any special arrangements and methods for treatment if required will be given prior to commencement of the contract for each building and details will be included in the particular specification.

(5) **Solution for disinfection of Cisterns/Vessels by Spraying**

**Preparation of 500mg/L available Chlorine Dioxide Solution (advocated).**

Place 125ml of Purogene in a clean plastic bucket then add 12.5 grams of citric acid. Prepare in a well ventilated area, avoiding breathing in any fumes. Wait 5 minutes for activation to take place and the crystals to dissolve completely. Dilute with 5 litres of potable water (gives 500 ppm available chlorine dioxide) for use.

# **THE CONTROL OF LEGIONELLOSIS**

## **A RECOMMENDED CODE OF CONDUCT**

### **FOR SERVICE PROVIDERS**

Legislative requirements for the control of legionellosis put the responsibility for compliance clearly with the owner/operator of water systems. Under the Health and Safety at Work etc Act 1974 and the Control of Substances Hazardous to Health Regulations 1994 as regards risks from legionellosis, all owner and operators of such systems have a responsibility to ensure that the risk is minimised and kept to an acceptable level. The HSC's Approved Code of Practice stresses that whilst the tasks required to be undertaken to minimise the risk may be contracted to an external specialist, the owner/operator must take all reasonable care to ensure the competence of the service provider to carry out the work on his behalf.

This Code of Conduct is intended to give guidance alone, on the standard of service that a Client should expect from those Service Providers who agree to abide by the Code. The responsibility for the prevention and control of legionellosis lies with the Client and the Service Provider.

The guidelines outlined in this document have been designed to help owner/operators select a competent service provider by highlighting six critical areas and detailing the commitment that the owner/operator should expect from prospective service providers when making the competence assessment.

A copy of the code of conduct

Produced jointly by the  
British Association for Chemical Specialities  
and the  
Water Management Society

## Conditions of Compliance

- (1) There should be a clearly defined written agreement between the service provider\* and the client\* setting out the individual responsibilities of both parties to ensure compliance with current legislation.
- (2) Service Providers should demonstrate and document a satisfactory level of competence of their staff\* in order to achieve the objectives of this document.
- (3) The recommendations made by the service provider should be equal to, or better than, the relevant Codes of Practice and guidance documents pertaining to the system in question (see attached list).
- (4) Lines of communication and reporting between client and service provider should be defined as well as the management plan in the event of remedial or corrective action being required, including matters of evident concern outside contracted obligations.
- (5) Adequate and up to date monitoring and treatment records should be kept. These should be readily available.
- (6) The performance of the control measures should be reviewed jointly by the service provider and the client at least annually and the necessary remedial action plan agreed.

### Definitions \*

#### **SERVICE PROVIDER**

**Companies or individuals or their sub-contractors who are involved with providing:- advice, consultancy, operating, maintenance and management services or the supply of equipment or chemicals to the Client.**

#### **CLIENT**

**The owner or occupier of the premises, or his appointed representative, or other person nominated to be the “Responsible Person” as defined in HSC document. “The control of Legionella bacteria in water systems” Approved Code of Practice L8 (2000) paragraphs 23 and 39.aphs 8 and 17.**

#### **STAFF**

**Any person directly or indirectly employed in meeting the requirements of this document.**

## Service Provider Commitments

### 1. **Allocation of responsibilities:**

#### **The service provider will:**

- explain in detail the client's obligations under the legionellosis legislation.
- identify those services covered by the contract and those which should be provided by the client to meet all current obligations.
- formalise an agreement detailing the respective responsibilities for each requirement.

### 2. **Training and competence of personnel:**

#### **The service provider will:**

- supply details of the training that is provided to his personnel associated with the control of legionellosis.
- indicate how personnel competence is assessed, training needs are established, and what measures are taken to ensure that personnel are kept up to date with best practice procedures.
- assist the client to assess and meet the training needs of the client's staff.

### 3. **Control measures:**

#### **The service provider will:**

- indicate how the design, monitoring and maintenance of an appropriate programme of control measures is assessed.
- show how his company would audit preventive and corrective actions.

### 4. **Communication and management:**

#### **The service provider will:**

- detail the management systems which operate if the control programme deviates from specifications, e.g. a positive legionella result, and show how these are audited.
- indicate how his management team would communicate with the client's team in the event of any necessary actions.
- also bring to his client's attention any significant matters affecting the control of legionellosis of which he has become aware, beyond the responsibilities of his contract.

### 5. **Record keeping:**

#### **The service provider will:**

- indicate which records should be kept by both parties and where they will be kept.
- establish with the client who will be responsible for the maintenance of these records.

**6. Review:**

**The service provider will:**

- recommend a programme that will allow both parties to review formally all aspects of the agreement covering system management and the control of legionellosis.

***In each instance the service provider will provide corroboration if requested to do so.***

**It is a condition of compliance with this Code of Conduct that the service provider supplies a copy of the Code to every client, together with a copy of the Registration Certificate**

***In the event that the client believes that a service provider has not complied with the Code of Conduct, he may write, with full details, to: Code of Conduct Secretariat, Mill House, Tolson's Mill, Fazeley, Tamworth, Staffs, B78 3QB***

## APPENDIX 5

### SYSTEM DESIGN STANDARDS FOR HOT AND COLD WATER

#### Cold Water

Storage temperature:	20°C (maximum)
Storage capacity:	4 hours (where necessary) 24 hours (maximum) Avoid installing cisterns if possible
Distribution temperature:	20°C (maximum)

#### Domestic Hot Water

Storage temperature:	60°C (minimum) 65°C (maximum)
Distribution temperature:	50°C (minimum)

#### DHWS Distribution Pipework

##### Maximum length of:

- Spur – 5 metres
- Dead leg / blind end – 5 pipe diameters
- Blended pipework – 2 metres

Distances are measured from the circulating main to the point of draw-off, and INCLUDE any length of blended pipework, shower hose, etc.

#### Pumps

- |                       |  |
|-----------------------|--|
| Secondary circulation | <ul style="list-style-type: none"><li>- single pump, in return leg</li><li>- provide 'dry' standby adjacent</li><li>- use electrical plug and socket</li></ul>   |
| Anti-stratification   | <ul style="list-style-type: none"><li>- shall run for one hour per 24 hours</li><li>- must only run in times of low or no demand</li><li>- primary heat source to be 'on' during pump run period</li></ul> |

## **Distribution System Layout**

Design temperature drop: 5K (maximum)

Hydraulic balancing: avoid multiple parallel loops, aim for 'single pipe' with short return leg

## **General**

Avoid tank-fed systems if possible; use mains pressure

Select direct gas-fired water heaters in preference to calorifiers

Select electric mains-fed unvented point-of-use water heaters for small systems, but control to limit electrical maximum demand.

Avoid concealed pipework, cisterns and components and observe the requirements of the Water Regulations.

Spray taps are not to be specified.

## **Temperature Sensor Positions on New/Refurbished Projects**

Include BEMS temperature sensors in:

- Incoming mains CWS downstream of stop valve
- Cold water feed into calorifiers or water heaters
- Cold water storage tanks
- HWS flow from calorifier or water heater
- HWS return to calorifier or water heater

Install dial-pattern thermometer in storage cisterns.

Where BEMS is not installed, provide 100mm dial thermometers in the above locations to permit manual observation.

### WORCESTERSHIRE COUNTY COUNCIL

#### WATER QUALITY POLICY

##### Advice to building occupiers concerning regular flushing of showers

The statutory requirement relating to the above is the Health and Safety Commission's Approved Code of Practice L8 'Legionnaire's Disease - The control of legionella bacteria in water systems' which states as follows:

"...consideration should be given to removing infrequently used showers..." (Clause 164)

"... When outlets are not in regular use, weekly flushing of these devices for several minutes can significantly reduce the number of legionella discharged from the outlet. Once started, this procedure has to be sustained and logged..." (Clause 165)

"Where it is difficult to carry out weekly flushing, the stagnant and potentially contaminated water from the shower and associated dead-leg needs to be purged to drain before the appliance is used. It is important that this procedure is carried out with the minimum production of aerosols, eg. additional piping may be used to purge contaminated water to drain." (Clause 166)

##### Practical measures

Showers which are used less than once a week should strictly be considered as unnecessary, and be disconnected and removed in accordance with the Approved Code of Practice Clause 164.

If showers are required to remain installed for occasional use, it is important that the occupier institutes a programme of weekly flushing. So long as showers are flushed weekly, there are no special safety requirements other than to turn the shower fully on and allow to run to drain for a few minutes (five minutes is a reasonable period). However, it is important to make a written record of the date, time and name of the person who carried out the procedure. This could be kept in a simple log book.

If a shower has been unused for more than a week, for example at the start of a new school term, then the water inside it could potentially be contaminated, although routine samples and analyses by the County Scientific Services Department over many years have shown this to be extremely rare. In such cases, however, it is a wise precaution to avoid the creation of an aerosol or excessive splashing.

With flexible shower hoses, the spray head could be lowered temporarily into a bucket placed on a stool, and the water run to drain that way without creating an aerosol. In the case of fixed high-level shower heads, the most simple and practical way of achieving safe flushing is to fabricate a length of rigid plastic piping, of the required length to suit the shower, fitted with a tundish at the upper end. The tundish is positioned underneath the shower head and the discharged water is conveyed safely into the shower tray/outlet

without generating an aerosol. With careful selection of the length of the pipe, the system can be made self-supporting.

### **Cleaning shower heads**

This is no different to a shower in a domestic residence, with which most people are familiar and capable of keeping clean. Over time, scale may build up on the outlet plate but this can be removed by regular cleaning or scrubbing, or the use of a proprietary chemical descaler where a prolonged build-up has been allowed to occur (the COSHH Regulations apply to use of this at work). Properties covered by the County Council's Mechanical Maintenance Service Contract receive a six-monthly service to all showers, which includes cleaning and descaling of all shower heads. Normal domestic cleaning during the intervening period should prevent undue build-up of scale.

### WORCESTERSHIRE COUNTY COUNCIL

#### WATER QUALITY POLICY

##### Action in the Event of an Outbreak (Extracted from HSC AcoP L8)

- 1 Legionnaires disease is not notifiable under public health legislation in England and Wales but, in Scotland, legionellosis (ie all diseased caused by legionella) is notifiable under the Public Health (Notification of Infectious Disease) (Scotland) Regulations 1988.
- 2 An outbreak is defined by the Public Health Laboratory Service (PHLS) as two or more confirmed cases of legionellosis occurring in the same locality within a six month period. Location is defined in terms of the geographical proximity of the cases and requires a degree of judgment. It is the responsibility of the Proper Officer for the declaration of an outbreak. The Proper Officer is appointed by the Local Authority under public health legislation and is usually a Consultant in Communicable Disease Control (CCDC). In Scotland it is the Consultant in Public Health Medicine (CPHM) employed by the Health Board and acting as Designated Medical Officer for the Local Authority.
- 3 Local Authorities will have established incident plans to investigate major outbreaks of infectious disease including legionellosis. These are activated by the Proper Officer who involves an Outbreak Committee, whose primary purposes is to protect public health and prevent further infection. This will normally be set up to manage the incident and will involve representatives of all the agencies involved. HSE or the Local Authority EHO may be involved in the investigation of outbreaks, their aim being to pursue compliance with health and safety legislation.
- 4 The Local Authority, CCDC, or EHO acting on their behalf (often with the relevant Officer from the enforcing authorities – either HSE or the Local Authority) may make a site visit.
- 5 As part of the outbreak investigation and control, the following requests and recommendations may be made by the enforcing Authority.
  - (a) To shut down any processes which are capable of generating and disseminating airborne water droplets and keep them shut down until sampling procedures and any remedial cleaning or other work has been done. Final clearance to restart the system may be required.
  - (b) To take water samples (see paragraphs 124 – 131, Part 2) from the system before any emergency disinfection being undertaken. This will help the investigation of the cause of the illness. The investigating Officers from the Local Authority/ies may take samples or require them to be taken.

- (c) To provide staff health records to discern whether there are any further undiagnosed cases of illness, and to help prepare case histories of the people affected.
- (d) To co-operate fully in an investigation of any plant that may be suspected of being involved in the cause of the outbreak. This may involve, for example:
  - (i) tracing of all pipework runs;
  - (ii) detailed scrutiny of all operational records;
  - (iii) statements from plant operatives and managers;
  - (iv) statements from water treatment contractors or consultants.

6 Any infringement of relevant legislation may be subject to a formal investigation by the enforcing Authority.

### WORCESTERSHIRE COUNTY COUNCIL

### WATER QUALITY POLICY

#### Design Guidance for Air Conditioning and Mechanical Ventilation Systems

##### General

The design of the plant and selection of equipment within an air-conditioning or supply ventilation system should aim to minimise the distribution of excess moisture within the ductwork. The installation, and in particular the plant room layout, should provide adequate access to items of plant for inspection and, when necessary, for affecting a cleansing regimen as part of the plant maintenance programme.

All materials used in the construction of cooling coils / chiller batteries and humidifiers should withstand bio-degradation; this applies in particular to surface finishes, mastics, gaskets, insulation, etc. Natural fibrous material should not be used.

##### Fresh Air Inlet

The fresh air supply inlet(s) must be located to avoid the possibility of air being carried over from evaporative cooling towers or being discharged from other extract systems and drawn into the system.

##### Cooling / Chillers Coils

The cooling coils / batteries and their components should be designed to allow regular cleaning.

##### Humidifiers

The cleanliness of the water supply is essential for the safe operation of humidifiers. Provision should be made for draining down supply pipework and break tanks for periodic disinfection and for periods when they are not required in service. Water supply should be potable quality from a rising main.

The addition of treatment chemicals for continuous control of water quality for humidifier / air handling units should be avoided. Consideration could be given to installing a UV system to control microbiological growth. Given the limitations of UV systems, however, this will require filtration to high quality to ensure the effectiveness of exposure of organisms to the UV irradiation. As with all water treatment systems the unit should be of proved efficacy and incorporate UV monitors so that any loss of transmission can be detected.

Overriding controls separate from the normal plant humidistat should be installed. Their purpose is to prevent excessive condensation when starting up. A time delay should be incorporated into the humidifier control system such that the humidifier does not start until 30 minutes after the ventilation / plant start-up. In addition, a high limit humidistat should be installed to switch off the humidifier when the saturation reaches 70%. This humidistat is to control added moisture, it is not necessary to install a dehumidifier to reduce the humidity of the incoming air if it already exceeds 70%. The normal humidifier control system should ensure that the humidifier is switched off when the fan is not running.

### **Steam Humidifiers (Electric or Gas Fired)**

The humidifier lance design should prevent steam impinging onto the side(s) of the duct, condensing and generating excess moisture. Water supply should be taken from a rising main with short pipe runs to minimise stagnation.

### **System Drainage**

It is essential that cooling coils / humidifiers, fan scrolls (when necessary), eliminators and heat recovery systems are at a sufficient height from the floor to permit the installation of drainage pipework systems with access for maintenance.

Each device should have its own drainage trap.

A drainage / drip tray should be provided, to collect condensation on cooling coils (including the return bends and headers), and for humidifiers, eliminators and, if necessary, heat recovery devices. The drainage /drip tray should be constructed of a non-corrodible material and be so arranged that it will completely drain. To prevent 'ponding' it is essential that the drain outlet should not have an upstand. The tray should be large enough to trap all the water produced by the device. Provision should be made for easy inspection of the tray. Any jointing material used to seal the tray to the duct must not be of a type that will support microbial growth, (the Water Fittings Directory lists suitable materials). A slope of approximately 1 in 20 in all directions should be incorporated to the drain outlet position.

Drainage / drip trays should be connected to a drainage trap assembly that should discharge via a Type A air gap as laid down in BS 6281 : Part 1 : 1988. The depth of any trap should be at least twice the static pressure head generated by the fan so that the water seal is not 'blown out' during plant start-up. (See Figure 5, typical air-conditioning plant drain).

A trap need not be directly under the drainage tray if the pipework connecting the two has a continuous fall. Each trap must be of the transparent type to show (visibly) the integrity of the water seal, and should be provided with a means for filling. Permanent markers on each trap should be provided to show the water seal levels when the system fan is running at its design duty. Each installation should incorporate quick release couplings to simplify removal of the traps.

If trace heating of drainage traps is necessary to provide frost protection, insulation should not be fitted, otherwise the trap will be obscured from view.

The pipework should have a minimum fall of 1 in 60 in the direction of flow. (Transparent pipework is not necessary). Water from each trap should discharge over either an open tundish connected to a drainage stack via second trap, or a floor gully (or channel). Where the drainage pipework from the tundish outlet, which should be ventilated, discharges into a surface water drainage stack or a dedicated plant drainage stack, the connection must be via an easy swept tee.

It will be necessary to disinfect humidifiers / cooling coils etc; thus it is preferable to discharge plant drains into the foul drainage system. The surface water drainage system may be used, for example when a plant is installed on the roof, but if chemicals are used during cleaning operations it will be necessary to discharge the effluent to the foul drainage system, for example by use of a hose.

The drainage system should be constructed of a corrosion resistant material. It should be capable of removing all the moisture produced, for example during periods of maximum dehumidification load and in the event of full discharge from the humidifier during fan failure, and provide a means of safely disposing of the water via an independent drain. Drainage / drip trays for coils should be provided with a means to prevent air by-passing the coil (for example by the inclusion of suitable baffle arrangements).

### WORCESTERSHIRE COUNTY COUNCIL

#### WATER QUALITY POLICY

##### WRITTEN SCHEME FOR CONTROLLING THE RISK OF EXPOSURE TO LEGIONELLA BACTERIA IN WORCESTERSHIRE COUNTY COUNCIL PREMISES

The following written scheme is issued in accordance with HSC Approved Code of Practice L8, and contains a summary of the requirements of the County Council's Water Quality Policy, revised 2004, to which reference should also be made.

##### **(a) Schematic Diagram**

The schematic diagram for the particular premises is contained in the Water Services Log Book, located at the premises. A further copy is held by the Water Management Officer in the Property Services Division at County Hall.

##### **(b) Description of correct and safe operation of systems**

The water services systems at the premises operate under the following conditions of temperature:

Cold water storage cisterns: below 20°C

Hot water storage: 60–65°C

Hot water distribution: 60–65°C

Hot water service return: 50°C or above

Hot water to be heated to 60–65°C before first draw-off takes place

All outlets to be flushed weekly unless used more frequently

Hot water outlets with blending valves set to 41-46°C as appropriate

##### **(c) Precautions to be taken**

Design and construction of new systems and alterations to be in accordance with HSC ACoP L8, BS6700, WCC Water Quality Policy and WCC Standard Mechanical Technical Clauses/Trade Preambles appropriate to the contract.

New and modified pipework to be disinfected and sampled as per BS6700 and WCC Water Quality Policy.

Hot water outlets which pose a scalding risk to be fitted with thermostatic mixing valves within 2 metres of point of draw-off.

Showers and outlets shall be flushed in a manner that removes the possibility of creating an aerosol. With flexible shower hoses, the spray head should be lowered temporarily into a bucket placed on a stool, and the water run to drain that way without creating an aerosol. In the case of fixed high-level shower heads, the most simple and practical way of achieving safe flushing is to fabricate a length of rigid plastic piping, of the required length to suit the shower, fitted with a tundish at the upper end. The tundish is positioned underneath the shower head and the discharged water is conveyed safely into the shower tray/outlet without generating an aerosol. With careful selection of the length of the pipe, the system can be made self-supporting.

**(d) Checks to be carried out to ensure efficacy of scheme**

Checks, their frequency and the persons responsible for carrying them out are in accordance with Table 1 of this document.

**(e) Remedial actions to be taken**

The expected results of the checks set out in Table 1, and the actions to be taken in the event of non-compliance, are listed below under the reference number for each check.

(1) No reporting appropriate.

(2) Temperature at blended outlets should be nominally 43°C but specifically in the range 39°C for bidets, 41-43°C for showers, washbasins and unattended baths, and 46°C for attended baths. Record discrepancies, call in Maintenance Contractor and request adjustment or replacement.

(3) Temperatures at sentinel taps should be within range and times stated in Table 1. Record discrepancies and report to Area Engineer or Water Management Officer at Property Services, County Hall for investigation and remedial action.

(4) Temperatures at calorifiers should be within range stated in Table 1. Record discrepancies and report to Area Engineer or Water Management Officer at Property Services, County Hall for investigation and remedial action.

(5) If shower roses and hoses cannot be cleaned or descaled effectively, call in Maintenance Contractor and request replacement.

(6) Temperatures at incoming main and storage tanks should be below 20°C in all cases. Record discrepancies and report to Area Engineer or Water Management Officer at Property Services, County Hall for investigation and remedial action.

(7) Cold water temperature rise should be less than 2-3°C under constant flow conditions. Record discrepancies and report to Area Engineer or Water Management Officer at Property Services, County Hall for investigation and remedial action.

(8) Water from calorifier drains should be clean and free from visible debris. Record discrepancies and report to Area Engineer or Water Management Officer at Property Services, County Hall for investigation and remedial action.

(9) Calorifiers should be clean internally and free from sludge or heavy scaling. Record discrepancies and report to Area Engineer or Water Management Officer at Property Services, County Hall for investigation and remedial action.

(10) Compare temperature of water from taps checked with original values measured at Risk Assessment. If any differ by more than 5 degrees or fall outside the control parameters in Table 1 (3) above, record discrepancies and report to Area Engineer or Water Management Officer at Property Services, County Hall for investigation and remedial action.

(11) Cold water storage cisterns should be serviced in accordance with the requirements of the Mechanical Maintenance Service Contract. Record work done and discrepancies, and report to Area Engineer or Water Management Officer at Property Services, County Hall for investigation and remedial action.

(12) Report any discrepancies between the schematic drawing and the physical arrangements of water services found on site to Area Engineer or Water Management Officer at Property Services, County Hall for investigation and remedial action.

**Table 1**

<b>Frequency</b>	<b>Action</b>	<b>Responsibility</b>
1. Weekly	Flush little-used outlets to drain without release of aerosols. Record.	Occupier
2. Weekly	Check and record blended water temperatures from thermostatic mixing valves where fitted. Confirm that stable temperature is attained within one minute.	Occupier (2)
3. Monthly	Check water temperatures at sentinel taps. Hot water >50°C after 1 minute, cold water <20°C after 2 minutes. Record.	Occupier (2)
4. Monthly	Check calorifier temperatures. Flow 60°C, return >50°C. Record.	Occupier (3)
5. Quarterly or as necessary	Dismantle, clean and descale shower heads and hoses. Record.	Occupier (1)
6. Six monthly	Measure incoming water temperature to cold water cisterns and water temperature remote from float valve. Record.	Maintenance Contractor
7. Six monthly (January and July)	Measure cold water temperature rise between incoming main and most distant outlet. Should be less than 2-3°C. Record.	Occupier (4)
8. Annually	Take sample and record condition of water from HWS calorifier drains.	Maintenance Contractor
9. Annually	Open and inspect internal surfaces of HWS calorifiers for scale and sludge and clean or descale as necessary. Record.	Maintenance Contractor
10. Annually	Check and record temperatures at a representative number of taps throughout the system, on a rotational basis.	Occupier (2)
11. Annually	Inspect cold water cisterns and carry out remedial work as necessary. Record work done and report outstanding defects.	Maintenance Contractor
12. Annually	Physically inspect the hot and cold water systems and check accuracy of schematic drawings. Note changes. Check for under-used fittings and report recommendations.	Scientific Services and/or Specialist Contractors

## Notes

- 1) May be undertaken by competent Caretaker or maintenance operative using proprietary domestic kettle descaler (COSHH Regulations apply to use of chemicals at work), or by Maintenance Contractor. However, the person responsible must be clearly defined by the Occupier. Currently undertaken twice yearly at premises covered by Mechanical Maintenance Service Contract.
- 2) Shall be done using a simple digital thermometer with immersion probe.
- 3) Readings to be taken from fitted temperature gauges.
- 4) Should be done using digital thermometer as in (2). Sample points can be the nearest tap to the incoming main, and the most distant tap. These points should be labelled permanently to identify them.
- 5) Water samples for analysis, where appropriate, are to be taken at the same time as the visual survey is undertaken. In addition samples will be taken at a greater frequency, to be agreed with Scientific Services, where the water supply is obtained from a private source.

## Definitions and explanations

**Sentinel tap:** a 'sentinel' is a sentry who stands guard over something, watching and keeping an eye on safety, and the term is used to describe the taps which are used regularly to monitor, sample and check the water quality and temperature. Basically, the sentinel taps are defined as the first and last ones on the system. For the cold water, they will be the taps nearest to and furthest from the incoming cold water main, and for the hot water, they will be the nearest to and furthest from the hot water source, be it calorifier, tank, vessel or water heater. All buildings will have at least two cold and two hot sentinel taps, and they are usually easy to identify. For larger buildings, and campuses with several blocks, there may be more sentinel taps, which can be identified by reference to the water services schematic diagram for the site. Once identified and labelled, they will not change unless some major alterations are done to the water systems. Schematic diagrams are prepared when a formal Risk Assessment is undertaken, as part of the County Council's five-year programme of re-surveys and updates.

**Calorifier:** a calorifier is nothing more than an industrial-size version of the indirect domestic hot water cylinder found in houses. Calorifiers tend to be fitted in larger premises, High Schools etc whereas smaller properties often have point-of-use electric water heaters, which pose fewer risks. Calorifiers rely on thermal stratification where the hot water collects at the top and is drawn off for use. A pumped circulation main is often fitted in larger premises, and the returning slightly cooler water is injected back into the calorifier cylinder part way up. Cold feed water from a tank enters at the bottom. Close control and monitoring of the temperatures in and around the calorifier and pipework is necessary to ensure that water is heated to and held at 60degC before being drawn off, in order to kill any bacteria present in the feed water.

**Contacts and further advice may be obtained from:**

Worcestershire County Council Property Services Division, County Hall, Spetchley Road, Worcester WR5 2NP

Area Maintenance Engineers: (01905 76)6138 or (76)6435

Water Management Officer: (01905 76)6434

Principal Mechanical Engineer: (01905 76)6447

Chief Engineer: (01905 76)6406