

## Part 4

# Methods for the Investigation and Control of an Outbreak of Legionnaires' Disease in an Hotel or other Accommodation Site

### General – competent persons

The appropriate health authorities, in accordance with national arrangements for communicable disease control should investigate each outbreak. Sampling and microbiological analysis should be carried out by a laboratory that is accredited for the detection of *Legionella* species from environmental samples and capable of the recognition of *Legionella* species and serogroups. It is recommended that the engineer responsible for maintenance and operation of the water systems, assist in the sampling. The laboratory findings should be interpreted by a microbiologist experienced in the microbiology of water systems and the detection and ecology of *Legionella* species.

### 37. Sampling

#### Safety measures

Persons taking the samples should follow the recommendations given in paragraph 1.A22 in Supplement 1A of these guidelines.

### 38. Sampling the hotel's water systems

#### Aim

Confirmation or exclusion of the hotel as a source of infection

#### Objectives

- Risk assessment of the hotel water systems
- Distinguishing between local and systemic colonisation of the water systems
- Identification of sites of highest risk
- To check the regulation of the temperature, pressure and flows in the plumbing system
- Selection of the right strategy for the short term control of Legionella
- Proposal for the long term control strategy for the whole facility

Sample sites should be chosen to be representative of the whole water system. The piping plans should be consulted prior to selecting the sample points.

Distribution of sites to be sampled:

1. Systemic
  - incoming cold water to the facility
  - hot water leaving the water heater
  - circulating hot water returning to the heater

2. Basic                    the outlet nearest to the entry of the hot water into the facility  
the most distal sites within the distribution system  
the hotel room where the infected guest was accommodated
3. Complementary    guest rooms on different floors to be representative of the  
different loops of the distribution systems

### **39. How to sample**

Collect one litre samples in sterile containers containing sufficient sodium thiosulphate to neutralise any chlorine or other oxidising biocide. The temperatures are measured using a calibrated thermometer, placed in the middle of the water stream.

#### ***Systemic points***

Samples are collected in the boiler room from the discharge valves of the hot water outgoing pipeline, return water and cold water to be heated. If hot water storage heaters are installed, samples from the sludge drain valves should also be collected. If there are no suitable sample points representative of the water in the heater, the water flowing from the heater and the flow returning to the heater this fact should be recorded.

#### ***Basic and complementary points***

##### ***Hot water***

Collect the water discharging from the tap immediately after it is switched on. This "immediate" sample will be representative of the colonisation of the outlet. Leave the water running for at least a further 60 seconds, measure the temperature and collect a second sample, the "post flush sample", which will be more representative of the water flowing in the system.

Swabs - sample the inner walls of showerheads and handles with a sterile cotton swab using a rotating motion. Sample shower hoses at the point where it is attached to the fitting. Swabs should be transported in 0.5-1.0 ml of the same residual water.

Sieves on mixer valves – remove the sieves and culture any deposit within them.

##### ***Cold water***

Collect an immediate sample as for the hot water, then leave the water running for two minutes and before measuring the temperature of the flowing water. Finally collect a post-flush sample. When the water temperature is < 20°C, the number of samples can be reduced.

##### ***Water closet cisterns***

These should not be overlooked as potential sources of infection as they can become heavily colonised if the ambient temperature is high. Collect water samples directly from the cistern using a clean sterile container.

**Cooling towers**

If suitable sample points are available collect a sample from the water returning to the cooling tower in addition to a sample from the cooling tower pond, as far away from the fresh water inlet as possible. Collect samples of 200ml to 1000ml.

**Spa pools**

Collect water samples of 1000ml from the pool, filter housing and balance tank where fitted. In some investigations water from the pool has yielded few *Legionella* at the time of sampling although filter material and biofilm from inside the pipes contained large quantities of *Legionella*. This probably reflected the type and positioning of the biocide treatment and zones within the piping where the biocidal effect did not penetrate adequately. Therefore, it is also important to inspect the air and water circulation pipes and hoses for the presence of biofilm containing *Legionella*. Biofilm samples should be collected with swabs from the inside of some sections of these pipes. It is sometimes possible to do this by removing a jet but quite often sections of pipe will have to be cut out to gain adequate access.

**Air washers and humidifiers.**

Collect samples of at least 200ml directly from the source.

**Decorative fountains**

Collect samples of at least one litre.

**40. Sample transport and laboratory processing**

Samples must be kept at ambient temperature and protected from direct light. Water and swabs should be processed on the day of collection or the next day when stored at a refrigerator temperature (ISO 11731 (20)). Do not freeze samples.

During the sampling, all details that may help the implementation of possible remedial measures should be recorded. For example, obvious pressure and temperature drops or rises in the water circuits, the presence of iron sediment or sludge, the condition of aerator and taps, the occurrence of scale, and the presence of various rubber and plastic attachments.

**Warning**, it is important to follow the sampling procedure. Incorrectly collected samples make interpretation of the results difficult.

**41. Emergency action**

Emergency control measures must be carried out as soon as possible after the outbreak has been recognised but not before samples have been collected. Non-essential equipment such as spa pools and cooling towers associated with air conditioning systems can be rendered safe by switching them off until samples can be collected and remedial measures implemented. A risk assessment should be carried out and emergency control measures implemented. The exact choice of measures will depend on the risk assessment and any available epidemiological evidence. The measures will usually involve disinfection of potential sources by

high levels of chlorine or another oxidising biocide, cleaning of tanks and water heaters and raising the circulating hot water temperature if this is below 60°C. The potential control measures are discussed more fully elsewhere in this document (see Supplement 1 Part A and B).

#### **42. Long term remedial measures**

The selection of the long-term remedial measures must be based on a thorough risk assessment combined with any epidemiological information available. Effective long-term control depends on the rigorous adherence to the control measures. The measures will probably be a combination of those described elsewhere in this document. They are likely to require engineering modifications to the existing water systems as well as improvements in monitoring controls, management and staff training.