Overview of microbiological analysis considerations Associated with BS 8580

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Health Protection Agency

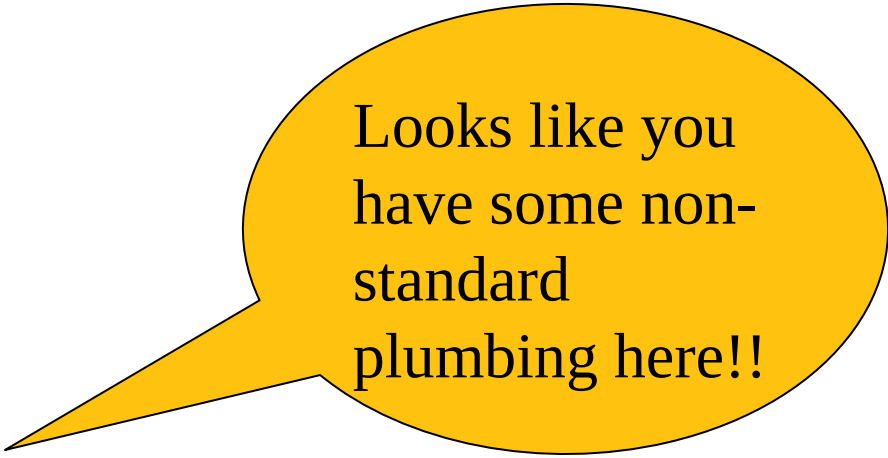
Microbiological analysis for risk assessment purposes

- **Some important questions?**
- Desktop exercise
- Is the microbiological monitoring fit for purpose?
- **Do you need to samples?**
- Are you trained to take samples
- When and what are samples are needed?

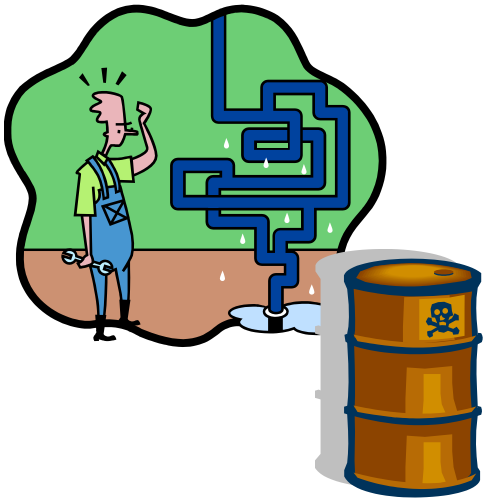
When are samples needed?
For Novel systems /systems not previously assessed

When are samples are needed (2)?

- **If systems have been modified**



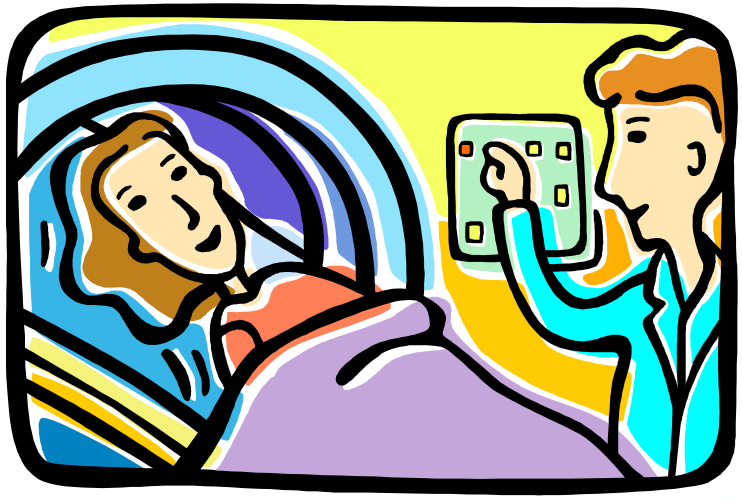
When are samples needed (3)
Validation of a water treatment regimes



- **Especially if recent changes in:-**
- The system
- The treatment regime
  - E.g. Biocide used , dosing levels / intervals
- The sampling points
- Key personnel
- Service providers / samplers etc
- Recent monitoring results
  - Temperature, pH, Biocide levels, microbiological etc

When are samples needed (4)
Where there is a susceptible population

E.g. Hospital wards with 'at risk' patients - eg those immunologically compromised. (L8 paragraph 185)



When are samples are needed (5)?

- **If you come across a system you consider maybe a risk:**

  - For example if the current treatment / monitoring regime gives cause for concern
  - There is evidence of colonisation
  - **You have cause to question validity of :-**
  - test results
  - Appropriateness of sampling points, timimg, biocide neutralisation etc
  - Sampler training

THE QUALITY OF THE SAMPLE RESULT IS DEPENDENT ON THE QUALITY OF THE SAMPLE

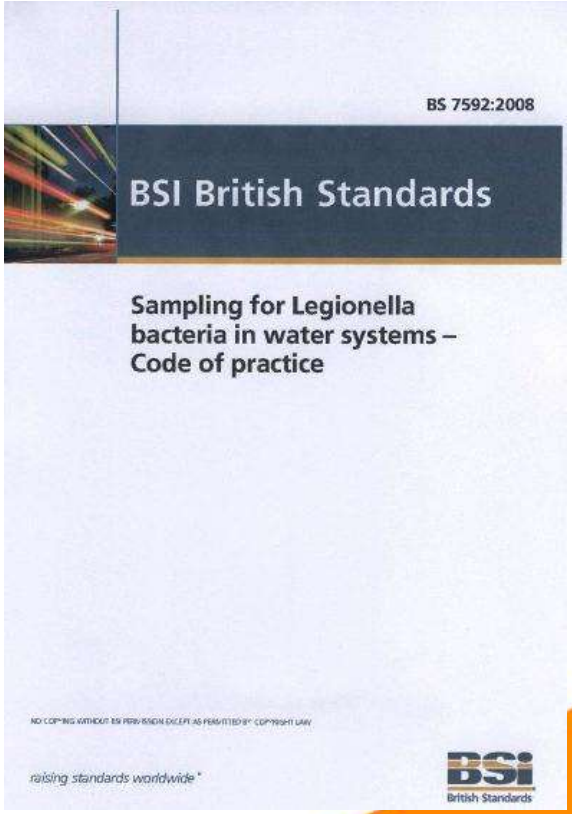
Samples must be taken appropriately - Samplers need training: –

Overview of training required

- **knowledge of systems to be assessed / sampled**
- **knowledge of the ecology of the organisms and factors affecting their occurrence**
- **Sufficient knowledge of systems and microbiology to determine**
  - Any safety hazards
  - What samples to take- dipslides/ water/biofilms etc
  - Where from - appropriate sampling points,
  - When – timimg, usage, biocide dosing etc
  - What analysis
  - The appropriate interpretation of results
- **labelling and record keeping**
- **legal requirements**

- **BS 7592:2008Sampling for *Legionella* Bacteria in Water Systems- Code of Practice**
  www.bsigroup.com/bs7592.

  - Samples should be taken according to BS 7592:2008
  - Use basic microbiological sampling aseptic technique-



Where to sample?

Samples should be taken, wherever possible, from locations considered most likely to contain the highest numbers of the target e.g. legionellae

Reviews of risk assessments should include a critical assessment of the microbiological monitoring

Ie :-

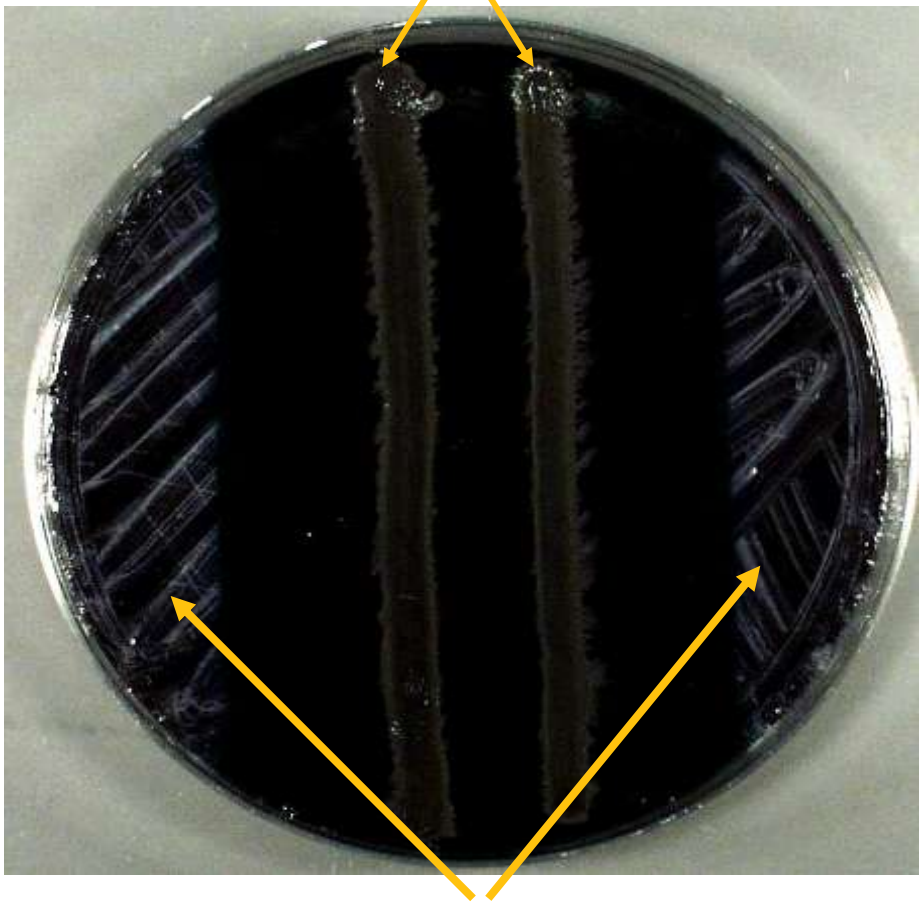
- **Is the microbiological monitoring valid in previous risk assessments?**
- **Innappropriate sampling and analysis may give a false sense of security**
- **Is the method of sampling and testing carried out competently?**
- **Is the sensitivity and specificity of the methods used fit for purpose?**

Questions to ask re:- sample results

- **Were samplers trained to take samples according to BS 7592**
- **Were the sampling sites appropriate ?**
- **Were samples collected when the biocide concentration was at its lowest?**
- **Was the biocide neutralised**
- (180 – 200 mg /L sodium thiosulphate pentahydrate should neutralise up to 50 mg/ L of free and combined chlorine)
- **How long did it take to get to the laboratory and was the analysis started on the same day ? (ideally samples should be collected and analysed within 24 hours)**
- **Was the lab. competent, UKAS accredited for the test and performing consistently well in the EQA scheme**
- **What does the lab do if they observe a high background count?**
- **High background counts can inhibit / mask legionellae**

Inhibition of *L. pneumophila* by background flora

Pseudomonas aeruginosa



L. pneumophila

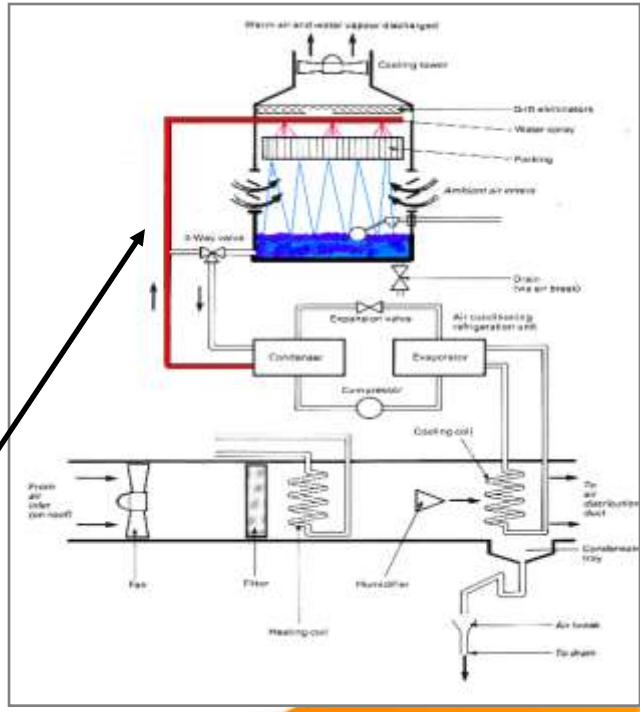
Use of heterotroph counts

- Monitoring of heterotroph levels can give information on the water condition / hygiene of the system
- Single samples not useful- but heterotrophs can be useful if trends are analysed – anomalies investigated and appropriate investigations/ remedial actions taken
- Can be useful to determine if a disinfection has been effective
- No direct correlation with levels of legionellae present
- Check accuracy of sampling and analysis
- **E.g. Some problems observed with dipslides**
- Samples not incubated appropriately e.g. On a windowsill, plant room shelf
- Confluent growth not identified and reported as negative

Cooling tower questions

•Were samples taken from areas representative of the highest risk

- **When counts were likely to be at their highest**
- For example
- When (and where) the biocide concentration was at its lowest
- ? just after the pumps are switched on
- From the warmest part of system (return to the tower)
- From the pond – opposite make up water inlet
- Post flush samples from sample taps on make up supply



HCW Systems

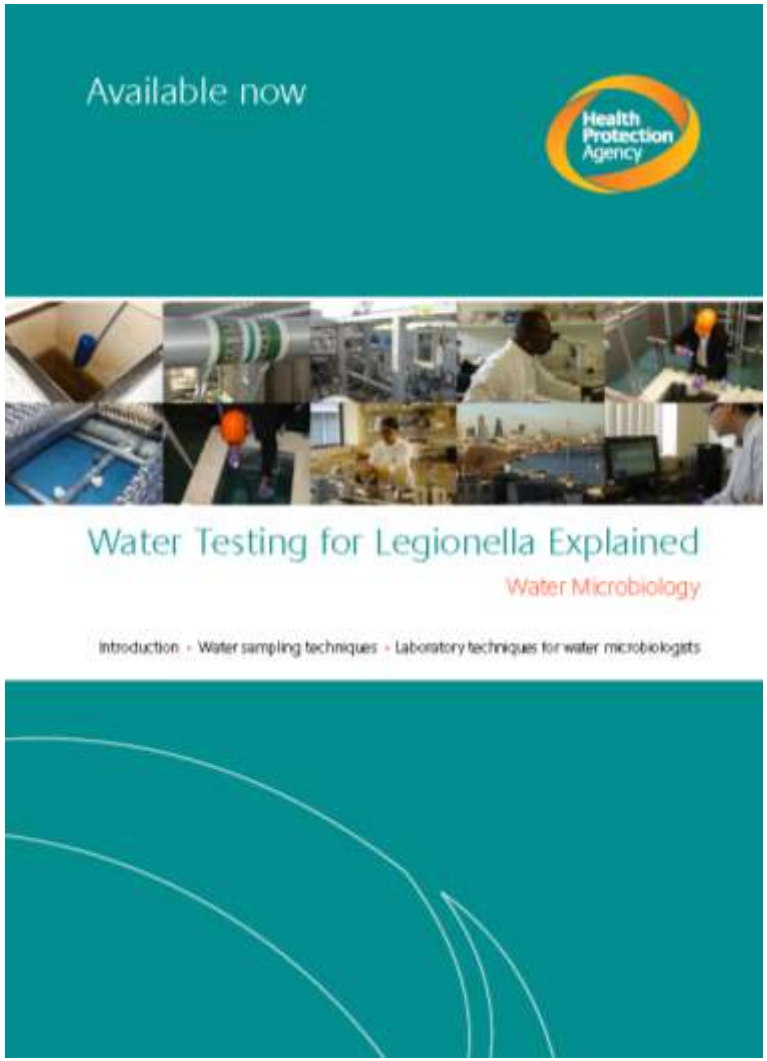
Was temperature monitoring used in the risk assessment process to determine the most appropriate sampling points.

- Were samples taken from the warmest point in a cold water system
- The coolest part of the hot water system,
- Collected from outlets connected directly to the hot water system and not via a thermostatic mixer valve
- Usage of outlets considered

Safety

- For routine monitoring purposes the systems should already have a risk assessment : suitable controls and monitoring procedures should already be in place.
- The risk to samplers during sampling should therefore, be minimised.
- However, if not the case, it is advisable that appropriate precautions are taken during sampling operations to minimise the production of, and exposure to, aerosols.
- Individual staff who may be particularly prone to an increased risk of *Legionella* infection due to underlying conditions or immuno-suppression should not be involved in sampling operations.

Further information from:-
the HPA DVD – Water testing for Legionella explained



Four short films

1. General background
2. Basic sampling techniques
3. Sampling in the field
4. Laboratory techniques

Cost: £18

Order from:

Dr. John V Lee,

GEZI,

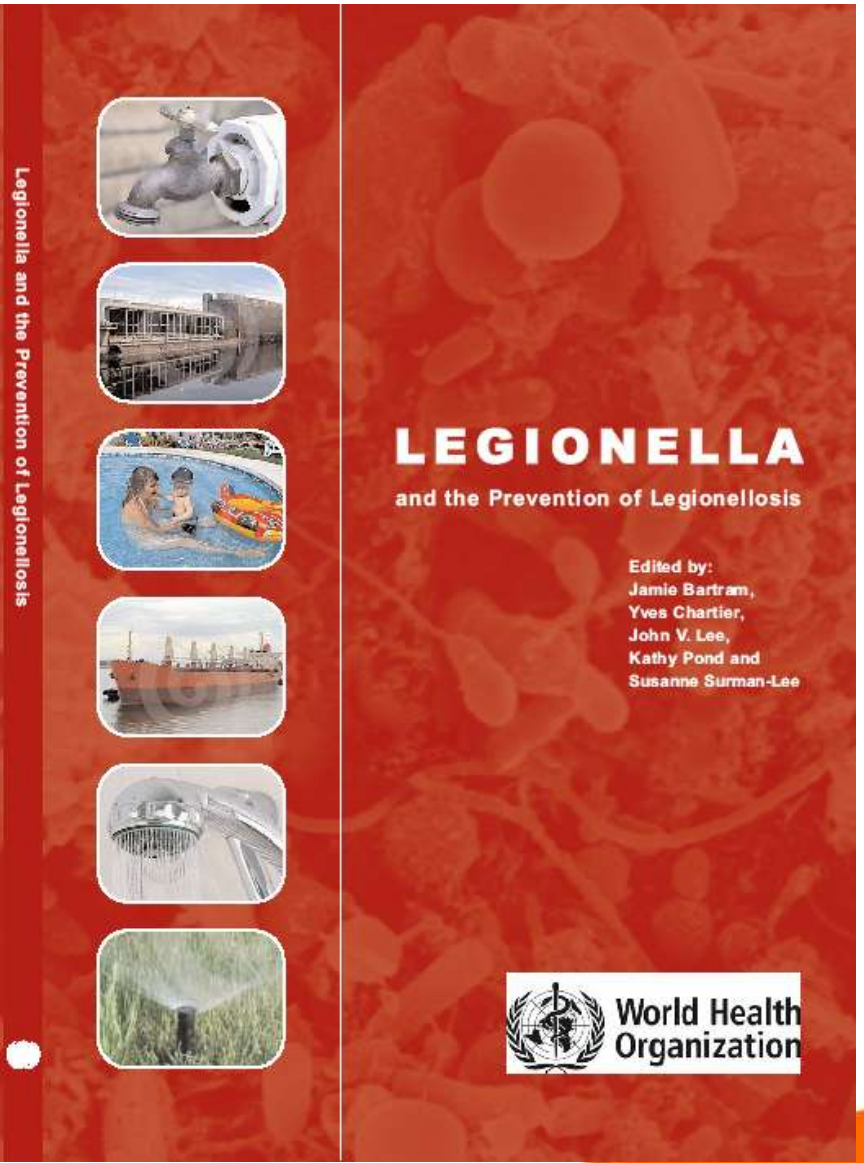
HPA Centre for Infections,

61 Colindale Avenue,

London, NW9 5HT

Email John.V.Lee@hpa.org.uk

WHO book



Legionella and the prevention of legionellosis

Eds: Bartram J, Chartier Y, Lee JV, Pond K & Surman-Lee S

World Health Organization 2007 236pp $36

ISBN-13 9789241562973

ISBN-10 92 4 156297 8

Purchase from WHO bookshop at:

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http://www.who.int/water_sanitation_health/emerging/legionella.pdf

Conclusions

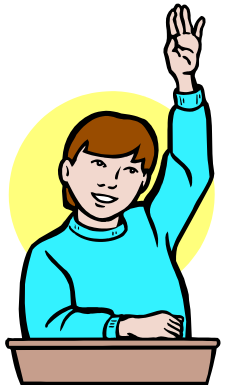
Risk assessors need not only an understanding of:-

- **The systems to be assessed**
- **Risk assessment processes BS 8580**

But also

- ***Legionella* ecology**
- **Sampling procedures to BS 7592**
- **Aspects of microbioloical analysis and the interpretation of results**

Thank you for listening



Are there any questions?