

# **EUROPEAN SYMPOSIUM**

## **WATER IN HOSPITALS REIMS JUNE 2005**

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# Presentation of building :

**1999 :**

**Handover of keys**

**220 000 m2 building including :**

- . A high-rise tower : 65 m, 20 levels  
(16 floors and 4 basement floors)**
- . 1 150 offices (rooms)**
- . 40 meeting rooms**
- . 3 canteens**
- . 1 sickbay**
- . Used daily by almost 4.000 persons**
- . 1.200-space car park**

**plus :**

- . 11 different water networks  
(4 shw, 4 scw, 2 sprinklers, 1 fire)**
- . 680 showers**
- . 150 shared washrooms**
- . Stored shw production : 30 m3**

( shw : sanitary hot water ; scw : sanitary cold water )

# Hydraulic networks :

## Materials :

- . All new copper networks
- . Dead legs in Per

## Configuration :

- . Includes half high-pressure networks
- . Heating cords in place to maintain shw at 35 °C
- . All networks (shw and scw) routed through the same insulated ducts (sanitary cold water at 32 °C at the most remote points)
- . No return flow feature for networks (mainly shw)

## Management :

- . No precise knowledge of the networks  
« on the basis of the operating problems encountered »
- . Building services area with the highest incident rate !
- . No bacteriological analysis conducted ; only physico-chemical monitoring analyses from which findings were not followed up

# An unfamiliar problem :

## After the network had been in use :

- . Very high « initial flow» Legionella values (450 000 CFU/L)
- . No knowledge of the problem in the in-house technical service or the private maintenance firm
- . No partner to place the problems in context or take the best decisions
- . Representative sample ?

## Quick and painful realisation :

- . Meeting with the local health authorities (DDASS and city council)
- . Scheduling additional tests
- . Scheduling counter-measure analyses
- . Performing a comprehensive health risk analysis as a matter of urgency
- . Setting up an in-house working party
- . In-house notification to occupants of building

# Technical changes made :

## . Immediately taken out of use :

- All shw networks (WC, individual kitchens, hot beverages making areas, etc...)
- All heating tapes

## . Systematic replacement of :

- All non-return valves and some disconnectors
- All pressure reducing valves which had become «culture media»
- All steel valves by stainless-steel valves
- Steel shw reservoir tanks by stainless-steel shw reservoir tanks (6000 l)

## . Provision of :

- A chemical preventive solution : an electrochlorination unit
- Water meters on all networks
- A return flow feature on the shw network which caused the problem
- A return flow feature on the scw network
- Shortened dead legs (sanitation facilities)
- Six-monthly rebalancing of networks
- Automatic draining in showers with anti-aerosol control in shower heads
- Aerators at all wash basins
- Local shw production

# Changes in network operation :

- . Introduction of :
  - Systematic flushing at all usage points (once a week for 4 minutes)
  - A sanitation logbook for hydraulic networks
  - A specialised centre of competence on water quality at the private maintenance contractor
  
- . Establishing operating protocols :
  - Network use specification
  - Network disinfection
  - Sampling plus transport of sample flasks, ... etc
  
- . Updating of :
  - Hydraulic schematics and drawings needed for proper operation
  - Health risk analyses every 3 years for a reassessment of network-specific risk
  - Maintenance protocols for main items of equipment

# Network monitoring and control changes :

. Introduction of :

- Systematic monthly sampling (at least 40 locations) after running water for 2 minutes in order, firstly, to ensure network control
- Biofilm analysis by a specialised laboratory
- Daily, weekly and monthly meter readings and checking of logs for all items of equipment making up the networks (chlorine rate, t°..)
- Monthly checking of sanitation logbooks for hydraulic networks
- Quality monitoring indicators
- A single controller and client liaison officer, on a full-time basis, to run the networks (operations monitoring, works monitoring, invitation to tender for works, in-house meetings, Health, Safety and working Conditions Committee presence...)

# Conclusions after 3 years :

The results :

- Nearly 660 *Légionella* tests, based on initial flow
- consistent results 98 % negative
- Génotyping : 4 different strains in our 4 buildings  
( Lp 1, Lp 12 , Lp 7 and L anisa)
- A network which has been contaminated remains contaminated :  
whenever attention was less focused, results became positive again  
(between 600 CFU/L and 5000 CFU/L)
- The source of contamination still has to be determined (shw or  
scw ?), a scientific approach is needed.

The *Legionella* problem has made it possible for us to :

- Familiarise ourselves with our networks, about which, until then,  
we had no knowledge.
- Gain a degree of control over our networks
- Learn how to ensure and maintain quality within our networks

## Conclusions after 3 years : (2)

Ongoing adjustments essential in the following areas :

- Frequency of flushing in dead legs :
  - 2002 : 1 flushing per week (5 mins)
  - 2003 : 1 flushing per week (5 mins) + 1 partial flushing (3 mins)
  - 2005 : 2 flushings per week (2 mins) : **1 flushing every 3 days !**
- Systematic sampling:
  - 2002 : 30 monthly samples
  - 2003 : 40 monthly samples
  - 2005 : 40 quarterly samples because results are consistent
  - (If results become positive again, we shall revert to monthly sampling)
- Biofilm analysis has shown that :
  - - Legionella still exists at 61 °C and adapts to t°
  - - Biofilm is found in our buildings in main circuits (not in dead legs )
  - - Initial flows' tests for Legionella are sometimes positive....