



ProEconomy | orca

Copper and Silver Water Treatment

# Case Study

## Great Ormond Street Hospital Southwood Building

Controlling *Legionella* risk at Great Ormond Street Hospital Southwood building using copper and silver ionisation.

## Background and Introduction

### *Legionella pneumophila*

*Legionella pneumophila* is the causative agent of Legionnaire's disease, and it is an aerobic gram-negative bacterium with fastidious growth requirements (Horwitz and Silverstein, 1980). The first report about Legionnaires' disease was in 1976, from when it has been increasingly recognised as an important cause of pneumonia in hospitals and community around the world (David *et al.*, 2016). *L. pneumophila* affects all age groups but it is particularly dangerous for people with a compromised immune system such as hospital patients, babies and the elderly (Horwitz and Silverstein, 1980).

### Control Methods

There are various methods that have been applied during recent years to control *L. pneumophila* such as temperature control and intermittent shock injection of chlorine into the water. However, some studies have found that these measures do not control the bacterial effectively. For example, according to the research from the UK Building Services Research and Information Association (BSRIA) in 1996, only 13% of the samples were free from *L. pneumophila* using the temperature control approach. Besides, injecting chlorine into water works effectively in the short time but it is difficult to maintain the concentration of chlorine at a suitable level (Lin *et al.*, 1998; Sidari *et al.*, 2004).

Copper and silver ionisation (CSI) is an effectively relatively new method to control *L. pneumophila*, which was initiated by NASA in the 1960s and was firstly applied in the USA in 1990 (Albright *et al.*, 1967; Lin *et al.*, 2011).

### The ProEconomy copper and silver ionisation Orca system

CSI controls *Legionella* by releasing copper and silver ions through the flowing water which then weakens and damages bacterial cells. The trade name Orca was given by ProEconomy to their CSI system. The Orca system can be easily installed into the existing water system and is updated continuously to ensure control of *Legionella* and other pathogens, such as *Pseudomonas aeruginosa* in the water system.

There are many institutions that have used and approved the Orca system, which proved that the system can help to control the bacteria effectively. For example, the UK Approved Code of Practice ACOP (L8) from the HSE as well as and the UK HTM 04-01 guidance for NHS both suggested that the CSI system is an excellent method for controlling *L. pneumophila*. Meanwhile, the CSI system has been fully tested by the UK Water Regulation Advisory Scheme (WRAS) and proved that except for effective bacterial control, this system does not have any possible harm to humans, animals and the environment.

ProEconomy Ltd has been working with the CSI system since 1993. A large amount of hospitals data collected over the years has demonstrated the excellent control ability of the Orca system based on analysis of long-term data records. In this report, we will focus on the changes of *L. pneumophila* levels at

the Southwood Building of Great Ormond Street Hospital from January 2012 to January 2018, after applying the Orca System. Then to observe how the Orca System works at this site based on the monthly data records.

### Study area

Great Ormond Street Hospital (GOSH) is an international child healthcare institution established in 1852. GOSH receives approximately 252,000 outpatient visits and in-patient visits from the UK and overseas every year, and it is one of the largest hospitals in the UK which can provide the most comprehensive health services for children.

This case study reports on the Southwood Building only. After the system had been commissioned in January 2012, 1411 samples have been collected monthly in different outlets up to 2018. Besides *L. pneumophila*, the concentration of copper and silver, temperature and TVC in each outlet are also recorded.

### Results and Discussion

To overview the changes of *L. pneumophila* levels from January 2012, we summarised the total number of samples taken, number of *Legionella*-positive as well as the percentage of positives monthly and annually. As figure 1 shows, at the beginning, out of 164 samples, 39 were positive for *Legionella* ranging from 100 cfu/L to 9400 cfu/L. The percentage of *L. pneumophila* increased slightly from 2012 and reached a peak in 2013. From 2014 to 2017 the rate of *Legionella* positives declined to 12.6% with only 25 positives out of 199 samples being recorded in 2017.

The monthly records showed fluctuation (Figure 2). Specifically, *Legionella* positives increased from early summer and usually reached a peak during August to September, which are coincided with warmer part of the year in the UK; *Legionella* numbers are usually higher in warmer weather. However, there was an overall decreasing trend.

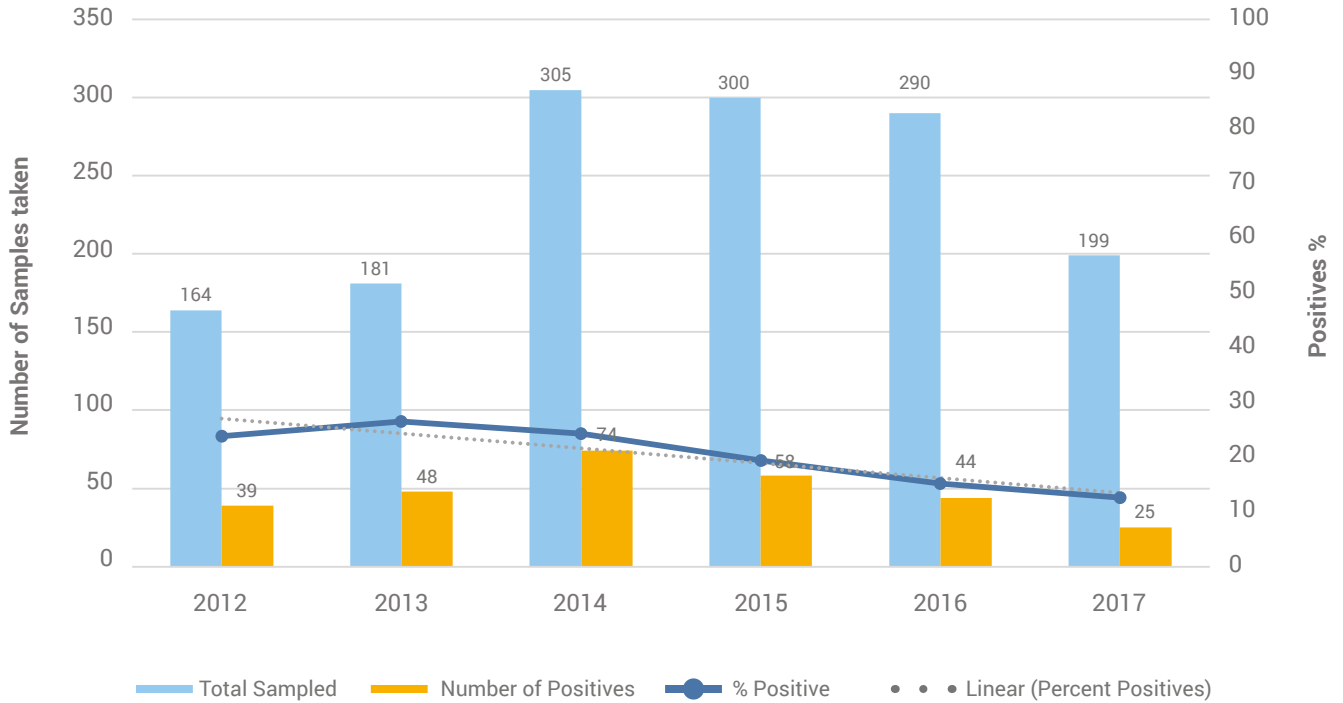


Figure 1. Legionella pneumophila annual data, Southwood Building, GOSH site, 2012-2017.

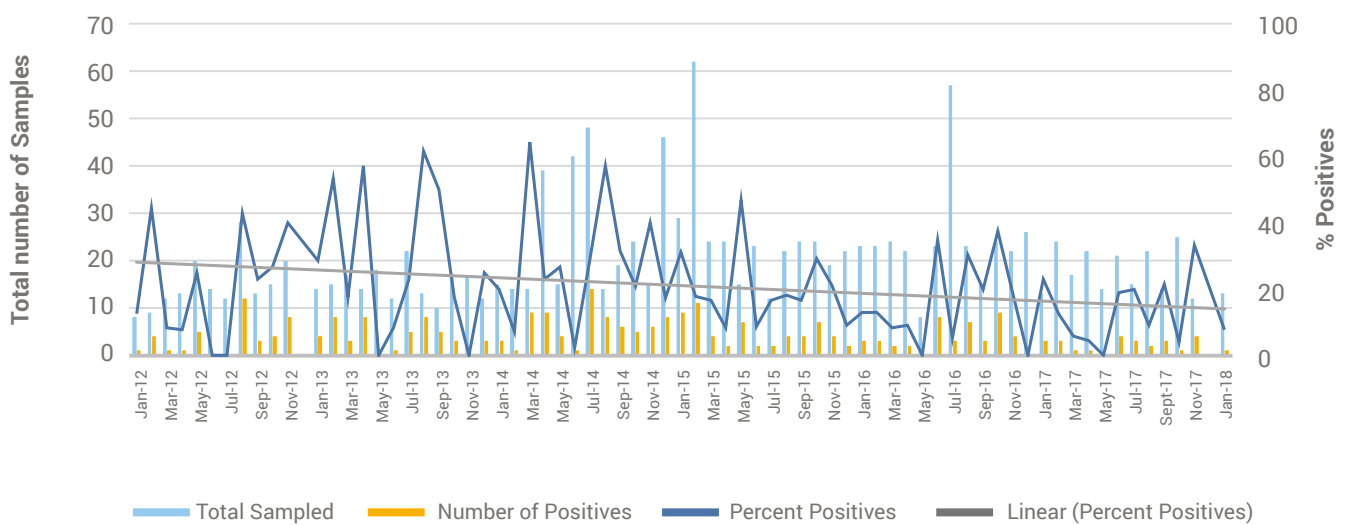


Figure 2. Legionella pneumophila monthly data, Southwood Building, GOSH site, 2012-2018

## Conclusion

In this case study we focused on the changes of *L. pneumophila* at different outlets in the Southwood building of GOSH from January 2012 to December 2017. After analysing the recorded dataset, it can be observed that *L. pneumophila* rates reduced after applying the CSI Orca system. Moreover, *Legionella* decreased at each outlet. In conclusion, the CSI system could control *L. pneumophila* effectively at this site.

**Study carried out and written by Yizhong Wang, Intern MSc Student, King's College London.**

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## References

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