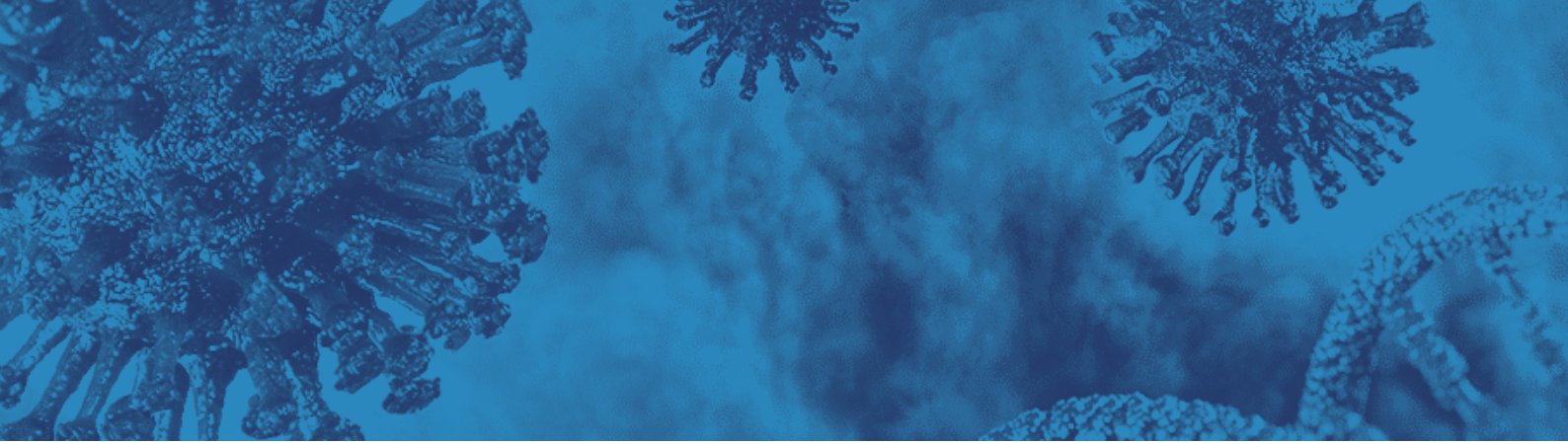


GUARDIAN
Air & Water Hygiene Specialists

A WCS Group Company

Locked down but not forgotten

Water quality is deteriorating in underused buildings, posing a threat to returning occupants and building operations.



Background

In March 2020, the UK went into lockdown to slow the spread of Covid 19. Employees were advised to work from home and the government made financial provisions to support businesses and workers.

By April 2020, ONS figures showed 46.6% of people in employment (32.6 million) did some work from home, rising to 57.2% in London.^[1] This is a marked rise from 2019, when only 5% worked mainly from home and 12% did some work from home.^[2]

The knock-on effect of the sudden rise in remote working is that large commercial buildings designed to host thousands of people are operating at a vastly reduced capacity.

The Crown Estate, whose property portfolio extends to 5 million square feet of office space across the West End, saw average occupancy across its London offices buildings drop to 10-15% by the end of August 2020.^[3]

In July 2020, Barclays CEO, Jes Staley, said that around 60,000 staff were working from home, with 20,000 working from offices.^[4] He indicated long-term shifts in working culture in April 2020 when he said, "The notion of putting 7,000 people in a building may be a thing of the past."^[5]

While building occupancy is slowly improving, with continued uncertainty surrounding local and national lockdowns, there is no clear trajectory. In the face of a challenging future, the role of the facilities manager has changed - from monitoring, responding and correcting building services, to coming up with flexible preventative solutions that predict future events, with a focus on end-users and outcomes.^[6]

10-15%
average occupancy across The Crown Estate London offices



1 <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/coronavirusandhomeworkingintheuklabourmarket/2019>

2 <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/coronavirusandhomeworkingintheuklabourmarket/2019>

3 <https://www.standard.co.uk/business/the-crown-estate-says-more-workers-returning-to-west-end-offices-a4550341.html>

4 <https://www.bbc.co.uk/news/business-53579428>

5 <https://www.bbc.co.uk/news/business-52467965>

6 The i-FM 2021 Trends and Opportunities Executive Summary (<https://www.i-fm.net/trends2021>)

The Problem

Due to the unprecedented nature of the crisis, many businesses had little time to implement contingency plans or were unprepared for the realities of the lockdown. This has led to unoccupied buildings being left without proper water system maintenance strategies in place.

Many building owners adapted to different regimes focussing only on the most essential tasks, which may tick a box, but are unfortunately not enough to prevent Legionella and other bacteria from proliferating, potentially leading to costly and potentially dangerous problems.

Understandably, the primary focus of businesses and facilities managers has been to prevent the spread of Covid-19, however, it is not the only threat. Water systems and pipework in dormant buildings provide perfect conditions for dangerous pathogens such as legionella and other bacteria to thrive, risking both the health of occupants as buildings return to use, and the general condition of the water system – a high-value asset.

Guardian Water Treatment has observed a number of large commercial buildings electing to manually run off taps and outlets to prevent water from stagnating during periods of low usage. Even if done on a regular basis, this is unlikely to replicate normal water usage in a building designed to host thousands of people.

Over the course of the pandemic, we have seen a significant increase in TVC (Total Viable Count - which gives an estimate of the total concentration of microorganisms) failure rates and positive legionella samples when compared to the same period last year.

Flushing out the taps from time to time to prevent water from stagnating is not enough when buildings are at very low occupancy; in these scenarios a more holistic approach to building management is required.

Water quality indicators

There are three types of sample that indicate water quality and are key to public health:

- TVC samples analysed at 22° C;
- TVC samples analysed at 37° C; and
- Legionella samples.

TVC is a microbiological test that indicates the general level of contamination within a potable water system. It detects “viable” microorganisms present in the sample but doesn’t look at specific species.

Samples tested at 22°C will mimic growth of bacteria at ambient temperatures, whereas samples tested at 37°C are more indicative of bacteria which grows at body temperature.

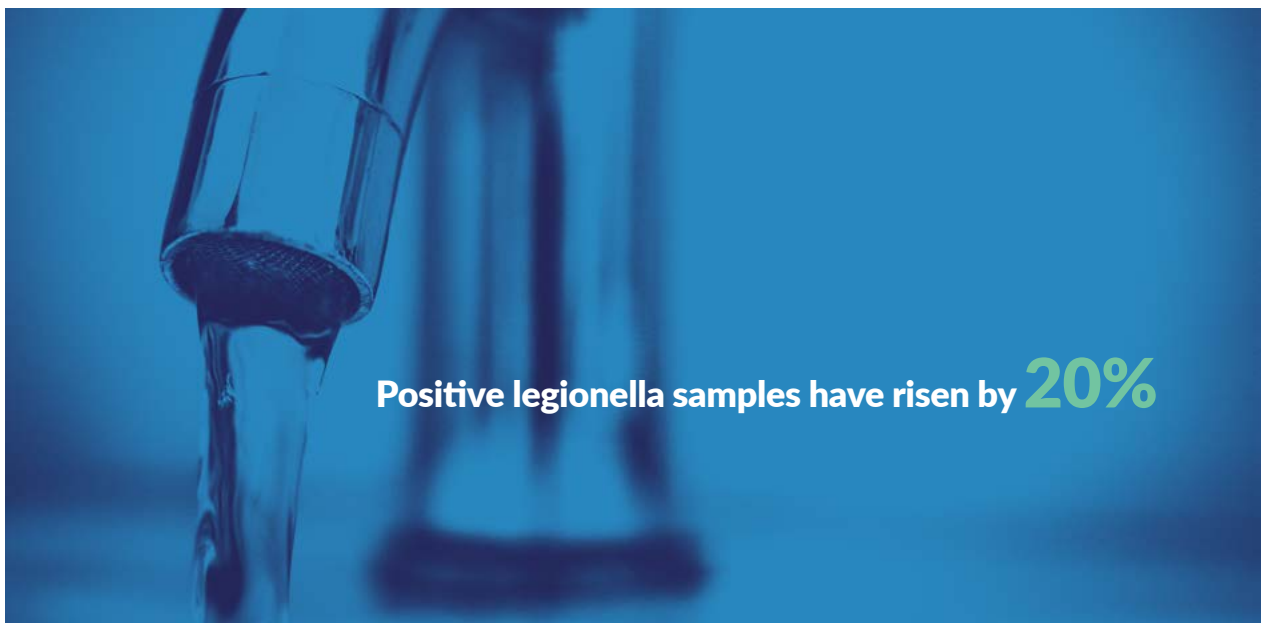
Potentially deadly waterborne pathogens such as legionella thrive at body temperature.

Failure rates are rising

Guardian Water Treatment took over 30,000 samples from London buildings during the six months from April 2020 (first full month of lockdown). Most of the buildings in the sample were following manual flushing regimes.

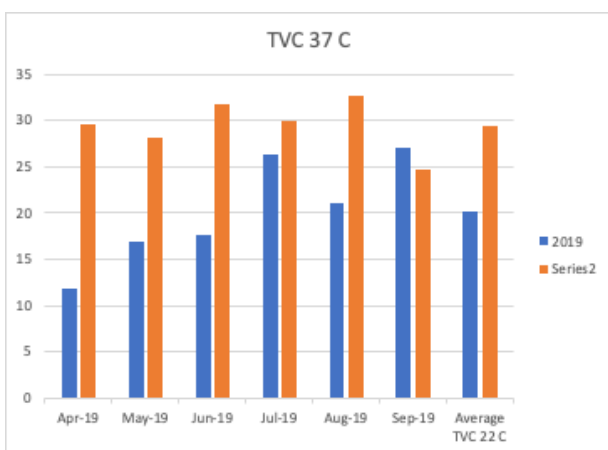
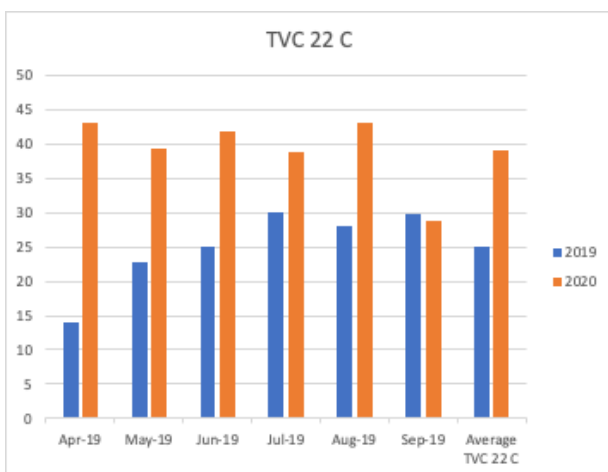
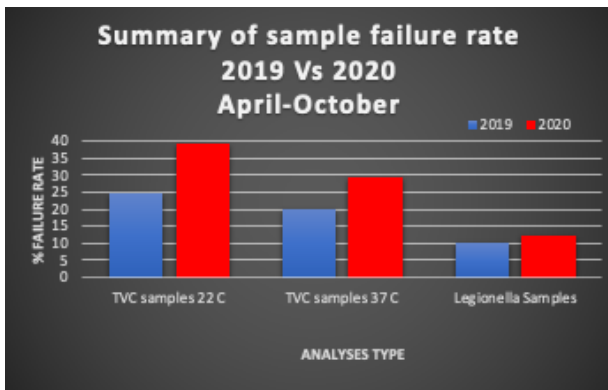
Results show a significant increase in failure rates across the board, for both TVC samples and positive legionella results. Comparing the results year-on-year, the data shows:

- The number of ‘out of specification’ TVC results (water samples that carry unacceptable levels of microbiological contamination) has risen by more than 50%; and
- More worryingly, the rate of detection for positive legionella samples has also risen by around 20% in conjunction with the lockdown.
- These results indicate that while flushing does help to prevent stagnation and legionella growth, overall microbiological control is likely to be compromised if flushing is treated as a stand-alone solution.



Sample failure rate 2020 compared to 2019

	% rise	Year-on-year
TVC samples analysed at 22° C	14.17	57%
TVC samples analysed at 37° C	9.36	47%
Legionella samples	2.03	20%



Increased risk to human health

The figures from our observational sample suggest a link between periods of low occupancy and increased contamination leading to water quality issues, increased TVC failure rates and general system degradation.

The services within large commercial buildings are designed to their capacity, a point that is particularly important when it comes to water systems.

When buildings are at peak capacity, water systems are in constant use and harmful bacteria has little chance to take-hold. With fewer people and reduced usage, water systems can become a breeding ground for pathogens if maintenance regimes are not upheld, adjusted and in some cases increased to meet the change of usage.

Manual flushing, even if carried out on a regular basis, does not replicate normal usage in a large commercial building. Water will stagnate and debris will build up in the system. Deposits such as sludge, rust or biofilm provide essential nutrients required for microbial growth, while also creating pockets for legionella and other bacteria to collect and breed.

The solution

In challenging circumstances where there is a risk to human health, you really can't be too careful. Assuming an unused building needs little or no maintenance is a mistake that will cost more in the long run – prevention is always better than cure.

This period of low occupancy is unprecedented and special care must be taken to ensure that adjustments to maintenance, operation and treatment are having the desired effect.

Legionella risk assessment

As there is an increased risk of legionella in underused buildings, facilities managers and responsible parties must review their Legionella Risk Assessment ensure compliance with ACoP L8 - a Legionella risk assessment should always be reviewed when there is a significant change to a buildings usage.

Following a risk assessment, legionella control and treatment measures can be implemented, including chemical and non-chemical options, where required. Steps to prevent the risk of legionella might include:

- Implement system cleaning regime, including flushing and chemical dosing
- Proper control of any water spray
- Temperature control – keeping water cool or hot to prevent favourable conditions for legionella
- Removal of redundant pipework and re-design of any other locations where water can stagnate
- Avoidance of materials that encourage legionella growth as detailed by WRAS
- Replacing water-based HVAC plant, such as a wet cooling tower with a dry, air-cooled system
- Water testing and monitoring to check any remedial works have been effective
- Record keeping of the risk assessment itself and where maintenance and repair work has taken place – if you have five or more employees you must record any significant findings by law.



A Legionella risk assessment should always be reviewed when there is a significant change to a buildings usage

Chemical treatments

Chloride dioxide is a fast-acting biocide commonly used in potable systems to control TVC levels, legionella and other harmful bacteria. Treated water used to flush the system provides a constant low level defence that is far more effective than flushing alone.

Ultralox40®

Ultralox40® is an extremely efficacious fast-acting stable biocide (hypochlorous acid or HOCl). HOCl is manufactured naturally by white blood cells (neutrophils) as part of the body's defence against pathogens.

HSG 274 Legionella Technical Guidance cites "hypochlorous acid (HOCl) the form of chlorine that is most effective as a biocide". It breaks down biofilm and is highly effective against pathogens and bacteria.

Ultralox40® is particularly useful for systems with low and high pressure, high bacteria counts, embedded or systematic biofilm challenges. It can be used as a permanent secondary disinfection for stubborn systems where repeated flushing and on-off dosing has been ineffective.

Small and medium applications

Ultralox is widely used in healthcare settings but is suitable for use across a range of small and medium applications.

Delivered in 25L, 200L or 1,000L package sizes, Ultralox40® can be dosed into incoming mains or a break tank, via fixed or mobile delivery and control systems that can be purchased or hired. The standard mobile or free-standing skid mounted systems can be retrofitted and are suitable for systems up to 40m³ /day. 200L systems are better suited for 50-60m³ /day requirements.

GENOX Generator System

GENOX Produces low hazard, HOCl biocide NEUTHOX® for primary and secondary disinfection, offering a safer alternative to chlorine dioxide.

The GENOX Generator System uses the electrolysis of brine to generate a biocide (NEUTHOX®) on demand. NEUTHOX® is a powerful, proven disinfectant that controls biofilm and destroys Legionella and Pseudomonas and is effective even at 40-50°C.

The active ingredient in NEUTHOX® is hypochlorous acid (HOCl) which is produced naturally in the human body within white blood cells to fight infection and is lethal to pathogens.

It is low hazard, easy to handle and easy to dose. Generation is inexpensive and HOCl is stored securely in a drum, requiring only water, salt and electricity. The GENOX Generator is available in a wide range of compact units, allowing for simple retro fitting in small spaces.

How it works

HOCl renders bacteria inactive and achieves results by a two-stage disruptive process.

1. On breaching the bacteria cell wall, it interacts chemically with the cell's proteins, attacking the cell's DNA and causing the whole cell to die. The cell floods with water and acidic fluid and dies.
2. Once the bacteria have been destroyed, its co-dependent relationship with the biofilm is disrupted and the biofilm begins to break up, bringing Legionella and Pseudomonas levels back or permanently under control to acceptable levels.



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