The Journal of the Water Management Society

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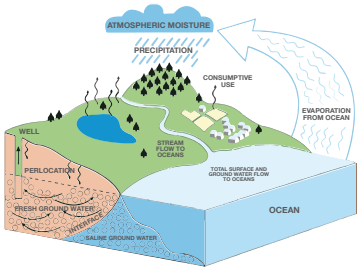

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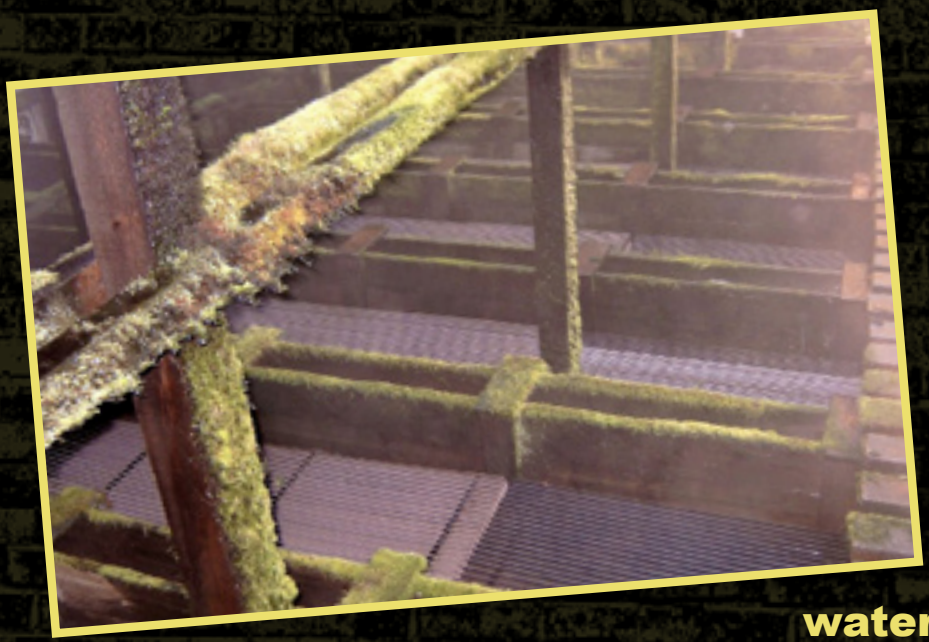

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PipeLine

Ian E Kershaw, Chairman WMSoc

When I took over as Chairman in autumn 2020 one of my goals was to improve the diversity of Society members and by extension council members. Members of council are elected from those putting their names forward, and take on the role of guiding and driving forward the society for the benefit of all. They give their time freely and many are sponsored by their companies for their attendance at council meetings and other committee meetings. Encouraged to join sub-committees, council members bring diverse backgrounds with them to discussions and help to provide a rounded view of the world of water.

Each year at the AGM the new council members are announced. The pandemic brought a change in the running of council meetings with the majority now being held remotely, and this provides the perfect opportunity for those further afield from our Fazeley headquarters to get involved.

You will see nomination forms and invitations to the AGM coming out in the summer, and now is the time to have the conversation with your managers and partners and think about joining the team. We would love to have you.

On a similar note, as announced in our Autumn 2021 edition, Dr P John Alvey stood down as director, leaving Mike Hunter and Colin Shekleton shouldering the responsibility. Following a democratic vote within the elected council members 2 new directors have been elected and I am delighted to be joining the team along with Elise Maynard. Continuing to break records and barriers Elise is the Society's first female director. We are both looking forward to taking this Society further in the coming years with the continued help of Mike and Colin.

Finally, we hope you have discovered our new look website over the past few months. It is now easier than ever to get in touch with us and we look forward to your comments and questions. We are after all here to serve you!

Kershaw

Letter to the Editor

February 02, 2022

Mr. Geoff Walker, Waterline Editor,
Water Management Society,
6, Sir Robert Peel Mill, Hoye Walk,
Fazeley, Tamworth, Staffs, B78 3QD
UK

Dear Mr. Walker,

As a permanent overseas reader of "Waterline", who became a member of the CWA/IWS/WMS on January 01, 1980 (as signed by John Lindeman and Derek Barlow), and who has lived and worked in water treatment and industrial process chemistry on every continent (except Antarctica) for nearly 60 years, I want to say how wonderful the journal has become, not just in its modern magazine format or its excellent technical papers, but in simply allowing me to maintain contact with WMS and its members, and to track and compare the changes in the profession over many years.

The winter 2021-22 hardcopy edition has just reached me, and I have enthusiastically devoured every word! Of particular interest in this edition was Dr. John Alvey's diary entry "One day in 1984 in the life of a Water Treatment Consultant in the Middle East'" His difficulties were probably more a norm in those days - not an exception, and his words brought back a flood of memories of my own water treatment days, living and working in the Middle East. John asked that we might consider sharing similar work experiences. Thus, about 5-6 years earlier than John's diary entry I was living in Iran (although I had earlier been in Salmiya, Kuwait, and later in Abu Dhabi, UAE, with Scotland and Southern Africa sandwiched in between). I have always felt really at home in the Middle East, even though, as John notes, "at-the-time traumatic experiences at work" can occur over there. I am now a US citizen and live in the USA, but my most recent trip to that part of the world (in March 2020) was to Al Khobar, Damman, Jeddah, and Riyadh in Saudi Arabia, plus Jebel Ali, Dubai, and Abu Dhabi, in the UAE.

In Iran I lived in Khorramshahr – a southwestern city close to the Abadan international airport and within easy distance of Basra, Iraq. I had a top security pass for the Persian Gulf oil island of Kharg, and worked mainly in the onshore oil and gas fields, offshore rigs, a dozen refineries and petrochemical plants; plus copper, steel, and sugar mills, all variously located in Teheran, Abadan, Shiraz, Kerman, Esfahan, the Caspian, and the northern border area with Turkey, Syria, Armenia, and Azerbaijan. Occasionally, I met John B. Bennett for lunch (a one-time a member of WMS), when he flew from Saudi Arabia to Abadan for some R&R.

The day in the life of a Water Treatment Consultant in the Middle East that I most vividly recall was actually a week in late 1978. At that time, it had become tough to travel in Iran, and early in the week (travelling to service two oil refineries) I was sitting in the jump seat of a commercial airliner, piloted by a friend of mine, on an internal flight to Teheran, when we were strafed by an Iranian Air-Force Grummon F-14. Then, on Saturday, August 19, 1978, the Cinema Rex in Abadan was set ablaze. It was the largest terrorist attack in history at that time, killing around 470 people, and triggering the 1979 Iranian Revolution. Later that week we expected a massive funeral march in the street outside my house and serious trouble in the Khorramshahr Bazaar - where a friend of mine lived (also named Colin). So, on that day I drove early from my house, north across the Karun River Bridge to the Bazaar, to pick him up – together with some clothes and his passport. I did not stop at any traffic lights because of active sniper fire, and mobs setting fire to shops selling liquor and screaming "Kill all Americans". I drove down an alley to his back yard and he raced to get in my car, but it was too late and we were surrounded by a mob that set fire to his car, stoned us, and tried to get us out of my Toyota. Within seconds there was no glass in the windows, we were beaten and covered in blood; I reversed at high speed through the mob and down the alley, then spun out onto the main road and stopped directly in front of a moving tank. The soldier on top beckoned me to follow him very closely, and he led us, heart beating, back to the bridge and safety. Back home, my pal Colin needed a valium and brandy cocktail to recover from the episode. Later that day, the British Consulate in Teheran phoned to provide moral support; to be quickly followed by a call from John Simpson of the BBC, asking to come and interview us.

That evening John Simpson and his camera and sound guys arrived and, after drinking most of my last case of beer, proceeded to interview us – as a "typical expatriate family". (It was shown sometime later on the UK BBC 9.00 pm news.) Late that night, I had to drive the BBC team back to their hotel in Abadan, as I knew a route that avoided the curfew blockades. Next day, John wanted me to accompany him to see Colin's burnt out car and looted house in the downtown Bazaar area, but I had to provide a scheduled service to the Abadan Oil Refinery and so could not go. I asked John to phone me later that day to make sure he was safe, but he never called! So, after I returned from the refinery I asked my police colonel neighbor to help us find the BBC team, which he quickly did. The colonel got the team released and they flew to Teheran. Sometime later, just before the Ayatollah Ruhollah Khomeini returned to Iran from exile in Najaf, Iraq, we drove to the airport, left the car with its keys in the parking lot, and took the last KLM flight out of Abadan to Amsterdam (without any lights or air traffic control). In early 1979 John Simpson was on the plane that took Khomeini back to Iran. Our friend, the colonel was hanged in the street, and I returned to the UK to work, but was later seconded to South Africa. I have since returned to Iran a few times, and I still love the country and its people.

- Colin Frayne

INDUSTRY UPDATES

BSRIA

BSRIA published a new Illustrated Guide to Renewable Technologies earlier this year. With the ever-increasing focus on the reduction in energy consumption and CO2 production necessary to meet the target of net zero carbon by 2050, it has become attractive for businesses to consider more deeply the use of renewable sources of energy. Covering a wide range of renewable technologies, the new guide ensures that built environment engineers remain at the vanguard of this movement.

More information available online:
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CSCA

The CSCA's 4th AGM was held on 8 March 2022 where Chris Shaw (pictured) took over as Chairman from John Smith. There are currently 25 Foundation members, 8 Sponsor members and 24 Service Provider members registered for 30 categories. CSCA Foundation, Sponsor and Registered Service Provider members benefit from the member's only technical documents (some published, some still in progress) regarding: What can change between taking a sample and analysing at a laboratory, Corrosion monitoring techniques, Methods for Calculating system volumes, Summary of European guidelines, Six port valves, The Status of BG29 & BG50 including comparisons between 2012 & 2021 versions, Sludge formation in new systems after PCC, Comment on Pseudomonas levels in BG29 & BG50, NRB test accuracy, etc. These comments and documents have been produced to provide answers to questions put to the CSCA Technical Committee by CSCA Members.

Subcommittees made up of members from the CSCA Management Committee members (Chris Shaw, David Bleicher, Mark Branson, Roger Carlin, Jill Cooper, Liz Day, Alan Edwards, Garry Kerin, Matt Morse, Chris Parsloe, Pam Simpson, John Smith, Chris Thompson, Stuart Wilton) are busy meeting to discuss CSCA registered service provider company audits, new CSCA website and closed system training courses.

For more information on joining the CSCA membership scheme which recognises good management practice by the water treatment/chemical cleaning service providers, please contact us:
www.cscassociation.org.uk
tel: 01827 219508 email: admin@cscassociation.org.uk

Using Harvested Rainwater: Should We, or Shouldn't We?

Giles Green FWM Soc., Associate Technical Director at Zeta Compliance Services, former chairman of the WMSoc Technical Committee and co-author of the WMSoc technical guide on safe management of harvested rainwater shares some thoughts on the subject.

Hardly a day goes by without there being a programme on the television illustrating some wonder of the natural world and we have become so accustomed to the spectacular that it can seem a little disappointing if there is not something new to science or, at least, never filmed before. Sadly, almost all these programmes end on a serious note, warning that all this awe-inspiring magnificence is in serious and imminent danger of being degraded or lost completely owing to mankind's activities causing habitat destruction, pollution, climate change or a pernicious combination of all three. It is not, however, the purpose of this paper to discuss our carelessness and its effect on the glories of nature, but one particular ramification which has been exercising many in the facilities management sector and that is how to assess the risks associated with harvested rainwater and to manage them safely.

A Good Reason

It is common for new building projects to include a rainwater harvesting facility, reportedly often as a condition of planning permission and this is logical when we consider that water demand is generally increasing, both per person and with more people to use their tonne-plus per week. This, combined with what seem to be more erratic patterns of rainfall leading to episodes of excess and shortage, means there are bound to be periods when the supply of water held in reservoirs is put under real strain; indeed, it is said that in much of the country consumption exceeds supply in the summer so reservoir levels typically fall from April to autumn. Whilst it is obvious that harvesting rainwater is also subject to weather variation and a prolonged period of low rainfall will empty rainwater collection tanks as well as reservoirs, harvesting and storing rainwater is equivalent to increasing effective reservoir capacity. There is, however, a problem, which is that many harvested rainwater systems are not used because the risk assessment indicates they are highly dangerous and because there is little guidance on how to operate them safely.

Legionellosis Risk Assessment

In the UK we have robust health and safety at work legislation and we have become generally, and quite rightly, conscious of waterborne microbiological risk from legionella. As a consequence, we look to our water systems to be hot or cold, never warm or cool; active not stagnant, though we sometimes conflate physical movement with freshness and; clean, sometimes even categorising a small amount of fairly inert sediment in a tank of stone-cold water with a high throughput as being as a serious and urgent danger. We often then pay rather less attention to aerosol generation and exposure and we frequently completely overlook the effectiveness of controls and how well they are implemented and managed.

If this rather critical summary of the shortcomings of assessments of one, clearly defined and well-understood, risk has any truth in it (and I suggest that it does), it has to be a concern that assessing the risks from all hazards in a system which has no temperature control, is inherently susceptible to contamination and stagnation might lead to greater confusion. It was with this in mind that the WMSoc produced its guide to the use of harvested rainwater systems, published in March 2022.

It is often said there is a legal obligation to carry out a legionellosis risk assessment of any water system, somewhat implying there is something unique about legionella. In fact, there is no law specifically requiring a legionellosis risk assessment and the laws which create the obligation apply equally to any and every other pathogen which might be present. The difference is that legionella thrive in many man-made water systems and have led to outbreaks of serious illness whilst most others do not and have not. Nonetheless, it is useful to consider legionellosis as a particular case and assess the risk by appraising the risk factors which are set out in BS 8580 1 and to consider other pathogens together in a more general way.

Legionellosis risk occurs when legionella infect the lungs and the means by which that risk can be assessed is described clearly and in detail in BS 8580 1. First, the likelihood of legionella entering the water is considered, then the likelihood of it increasing to significant concentrations in the system; next is the degree to which the water is dispersed in droplets fine enough to be inhaled, an aerosol, then; the likely extent of exposure to that aerosol. Finally, the susceptibility of whoever might inhale that aerosol is considered.

When this approach is applied to rainwater harvesting systems, it will often be the case that one or more of the risk factors is almost completely absent. For example, the occurrence of legionella in water which has condensed out of air seems unlikely, even though it is the case that rain does contain impurities. Once the water has been captured and is in an underground collection tank it is not likely to experience legionella growth conditions, having arrived at a temperature considerably below 20°C and having no source of heat above ambient temperature. Tanks above ground which are exposed to sunlight, however, are likely to gain heat and might even form a thermocline with a layer of warm water floating above a cooler mass below, making temperatures taken via drain valves meaningless in terms of legionellosis risk.

Considering these two risk factors together, could the risk assessor reasonably dismiss capture and storage in an underground tank as contributing to the risk and accept a collection tank with considerable levels of contamination as being satisfactory? And if conditions disfavour growth, how would stagnation contribute to the risk?

The protection against heat gain and increased temperature might cease once the water leaves the collection tank and growth might become significant in distribution systems. This will apply within buildings where water is used for toilet flushing for example, but it will be particularly pronounced where the water is used for irrigation because water in pipes exposed to even weak sunlight will quickly become much warmer than the air (just think about how it feels to step out of and into shadows on cold bright days) and that is a risk factor easily overlooked.

Aerosol formation at the point of capture and in the collection tank need to be recognised in the risk assessment but can be designated as a low or even negligible legionellosis risk factor if it is accepted that occurrence and growth are both insignificant (and taking into account that the tank is effectively enclosed). Aerosol formation at the points of discharge, however, is likely to be more important because the water will have passed through the distribution system where growth might be more favoured and because it is where the greatest degree of exposure takes place. Flushing a toilet or urinal both break the water surface and must be considered to create some aerosol, even though the main characteristic is the formation of a surface flow of water and coarse droplets; drip irrigation might also generate some fine water droplets but this is minuscule compared to the aerosol generation of spray irrigation or pressure jetting. There might also be other industrial processes which use harvested rainwater and each will have its own aerosol-generating tendency and each will need to be considered accordingly.

Exposure to aerosol is a risk factor which often seems to be overlooked, both in risk assessments and in schemes of control and when it is considered it frequently leads straight to the use of personal protective equipment as a control measure, which the law explicitly states should be the last (actually the fourth) resort and in addition to, rather than instead of, the others.

Finally, BS 8580 1 advocates considering the susceptibility to infection of those who might be exposed, and on that subject, there is a clear message from the Department of Health, which says in Healthcare Technical Memorandum 04-01 that rainwater should not be collected for use on, or in, healthcare premises, though that is not explicitly in the context of legionellosis risk and that introduces the question of other pathogens.

Assessing the Risk from Other Pathogens

When writing the WMSoc guide to safe operation of harvested rainwater systems, non-legionella pathogens were discussed by the drafting group and this led to some alarm, not least when prospective candidate organisms were supplemented by some which had been identified by analysis, until it was realised that it is a schoolboy error to fail to distinguish between hazard and risk.

It is true that capturing rainwater incorporates a mechanism for collecting just about anything which might be lying around, but it is also true that it provides a very good way to wash the capture surfaces so most of the contamination can be diverted. Another important consideration is that the organisms likely to be washed into a rainwater harvesting system are typically not types which thrive in cold water containing few nutrients; this is true of most faecal organisms, which probably make up most of the likely harmful flora, and these die out quickly.

Whilst BS 8580 1 is specific to legionellosis risk assessment, the principles can easily be adapted to other organisms and the infections they can cause and this approach is used in BS 8580 2, which considers risk from waterborne pathogens other than legionella.

A good example of this is faecal organisms which can cause gastroenteritis which might well be present on rain capture surfaces and could enter the collection tank. Just like for legionella, this does not provide a favourable environment for growth but, unlike for legionella, it is positively hostile, so the first two risk factors of occurrence and growth are respectively higher and very much lower. That is not to say all organisms will die off, far from it, but the flora will quickly develop a cold water environmental profile rather than one with large concentrations of gastroenteritis-inducing species.

The next risk factor in BS 8580 1 is aerosol generation and, whilst that might be significant, it needs to be broadened to include the routes by which other pathogens infect and this will vary from pathogen to pathogen, but it is likely to include inhalation, ingestion (including via the nose and eyes) and entry via wounds.

Exposure is clearly linked to the infection routes and is likely to be minimal in many instances. For example, it would be exceptional for infection via a wound to be a significant risk factor where harvested rainwater is used for flushing toilets but a risk assessment should consider unusual but foreseeable circumstances and that would include maintenance and repair, where wound infection is very much more likely and would require control measures. Jet washing with harvested rainwater, whilst advocated by one manufacturer in television and magazine advertisements a few years ago, probably ticks every box on the exposure scoresheet with sharing it with the neighbours as a post script.

Susceptibility to infection is rather difficult to appraise usefully in any detail, which returns us to the Department of Health's statement which opened this section of the discussion.

Other Hazards

There are hazardous contaminants other than pathogens and, just as health and safety law applies to any such organism as much as to legionella and requires risk assessments, so it does to other hazards. These are categorised in the WMSoc guide as chemical, radiological and exceptional. Chemical hazards include lead from flashing around roofs, zinc from galvanised steel roofs and petroleum residues in car park run off. Other chemical contamination is typically unlikely and would usually be considered as exceptional.

The risk from chemical hazards can be assessed using the strategy from BS 8580 1, adapted for each hazardous contaminant and the means by which it can be hazardous, for example considering how lead can accumulate in living tissue if it is taken up by plants or ingested by animals drinking contaminated water.

There were two surprises for me when the guide was being discussed, the first being radon accumulating in underground tanks and the second that it had not occurred to me. Its potential as a hazardous contaminant in harvested rainwater was identified from experience in another but related situation where it has been discovered that venting is not effective at removing it (in part, no doubt because it is eight times denser than air). Being an alpha emitter with a half-life of 3.8 days, radon is particularly pernicious and is considered to be a significant cause of lung cancer in areas where it occurs and risk assessment, though making use of an adaptation of the now well-established rationale, will typically require specialised support in the form of geological information and radioactivity measurement.

Safe Operation

The starting point of safe operation has to be a sound risk assessment, and it is hoped the comments above have provided some useful guidance on carrying one out. If the outcome of that assessment is that the risk is insignificant, no more need be done other than ensuring the situation does not change and increase the risk. What is more likely is that the risk will be significant, in which case UK law requires exposure to hazardous substances to be eliminated, failing which, reduced to a safe level.

When devising ways in which exposure can be eliminated, the detail of the risk assessment and clear and separate consideration of each risk factor is particularly important. For example, if the risk assessment identifies a nearly zero risk of legionella occurring in rain and an effective low-flow diverting system to wash accumulated contamination off the capture surfaces rather than allowing it into the collection tank and that the tank is not susceptible to heat gain so it is too cold for most gastroenteritis-inducing organisms to survive, it might conclude that the water stored in the tank constitutes a negligible microbiological risk under normal operating conditions. In such a situation, there is nothing to eliminate to which to apply control measures. If it then identifies potential for heat gain and increased temperature in the distribution system and concludes that might create growth conditions for legionella (which, whilst unlikely, cannot sensibly be deemed to be completely absent at all times), that is where controls would be required and, for example, a UV disinfection unit treating the water drawn from the collection tank would not reduce the risk where it actually occurs.

In practice, of course, the scheme of control will tend towards caution because there is an underlying legal duty which requires all means to be applied to reduce risk to its lowest reasonably practicable level and an established interpretation that a risk can be latent rather than currently manifest as the presence of a specific hazard at a particular time. Whilst that is to be supported, it must always be coordinated with the risk assessment to check the controls are effective and do not distract from any risk factors which are more significant by creating a false sense of security.

But What If...?

There will be some risk factors which are inherent and not amenable to elimination or control so there has to be a judgement as to whether that residual risk is acceptable and that will again draw on the details of the risk assessment. The Department of Health assumptively suggests that it is of the view that the residual risk can be acceptable for the general population by stating that it is not in healthcare premises, though that is clearly not the purpose behind their statement. Notwithstanding, when a government agency publishes an authoritative guide on safe management of water which implies harvested rainwater is safe enough for everyday use, perhaps the approach should be to try to find ways to make it that safe and to use it, rather than to focus on worst possible cases, as if to find excuses not to.

JOIN IN WITH OUR CPD ACTIVTY ON THIS ARTICLE, SEE THE NEXT PAGE.

InFocus Article Legionella Species: Prominence and Implications for Industry

Matt Morse, Manager & Nick Barsby, Chair, Legionella Control Association

Legionella Anisa being the most prominent species, over and above Legionella Pneumophilia, was the surprising finding from the recently released information from the Legionella Control Association ([1])(LCA). The fact that over 53% of them had L. anisa from a dataset of 70,000 positive results, compared to 32% *L. pneumophilia* was unexpected. It had been a long-held industry opinion that *L. pneumophilia* was the bigger concern and the biggest risk. This approach was based on data (Joseph, 2002 [2]) which found *"70% of Legionella infections are caused by L. pneumophila serogroup 1, 20–30% are caused by other serogroups, and 5–10% are caused by non-pneumophila species".*

Traditionally, we have seen the response to any Legionella Species be treated as less of a risk to Human Health than *L. pneumophilia*; and even then Sero-Group 1 was always felt to be a higher risk than Sero-Groups 2-15. Yet over 25 of the Legionella Species are known to be pathogenic to humans([3]).

The data from the LCA shows that *L. anisa* is more prominent in water systems than *L. pneumophilia*; so why are we not finding *L. anisa* is clinical cases as much? The answer to this Could be the Urinary Antigen Test (UAT), that is commonly used to confirm Legionnaire's disease, has a bias towards *L. pneumophilia*; meaning that *L. anisa* would not be detected using this test. Moreover, a lot of the UAT's only look for *L. pneumophilia* Sero Group 1, not even the full range of pneumophilia. (Shimada 2009 [4]).

We have a clinical confirmation test (the UAT) that is biased towards *L. pneumophilia*, yet this species of legionella is present in around 3 in 10 positive samples, when using the LCA data as a marker. The theory would mean that as many as 7 in 10 UAT could be providing negative results when the patient is infected with Legionella. While the Polymerase Chain Reaction (PCR) method does detect these additional species it is not the routine diagnostic tool and is a cost prohibitive clinical diagnostic tool.

With the guidance, in both Health Technical Memorandum (HTM) 04-01 Part A([5]) Part B ([6]) and the Approve Code of Practice for Legionella (ACoP L8 4th Edition) ([7]), both treat all species of Legionella as an equal; the tendency to treat different species differently has evolved over time, possibly on the back of empirical evidence such as Joseph (2002). The LCA data suggests that this response is incorrect and could have dangerous consequences.

The guidance, both HTM and ACoP L8, states that when control is lost and growth conditions are present then actions should be taken to reduce the risk. These actions include review the risk assessment and mitigate the risk while remedial work is undertaken.

References

1) Post Lockdown Positivity: Emerging Legionella Species Data - https://www.legionellacontrol.org.uk/news/121/

2) Joseph C (2002a). Surveillance of Legionnaires disease in Europe. In: Marre R et al., eds. *Legionella*, Washington DC, ASM Press, 311–320.

3) Legionella Species: https://specialpathogenslab.com/legionella-species/

4) Shimada T (2009) Systematic Review and Meta analysis Urinary Antigen Tests for Legionellosis in *CHEST Journal* Volume 136, Issue 6 1576 – 1585

5) Health Technical Memorandum 04-01 *Safe water in Healthcare Premises Part A: Design, installation and commissioning* (2016) Paragraph 4.22 – 4.24

6) Health Technical Memorandum 04-01 *Safe water in Healthcare Premises Part B: Operational Management* (2016) Paragraph 7.45 – 7.49

7) Approved Code of Practice for Legionella (4th Edition) (2013) Paragraph 58

GAIN A CPD POINT BY ANSWERING THESE QUESTIONS ON THE 'USING HARVESTED RAINWATER' ARTICLE

Q1: Why might radon accumulate in underground rainwater collection tanks in some areas, but not be a concern in others?

Q2: What would be a suitable height for the draw-off from a rainwater collection tank?

Q3: What type of premises are not allowed to use harvested rainwater?

EMAIL YOUR ANSWERS IN TO ADMIN@WMSOC.ORG.UK TO GAIN YOUR CPD POINT

The answers will be published in the Summer 2022 edition. A cpd point will be awarded for correct answers received before publication of the next edition of waterline. Extra CPD points will be awarded to members who provide extra research and/or evidence and to those members whose answers are accepted for publication in Waterline.

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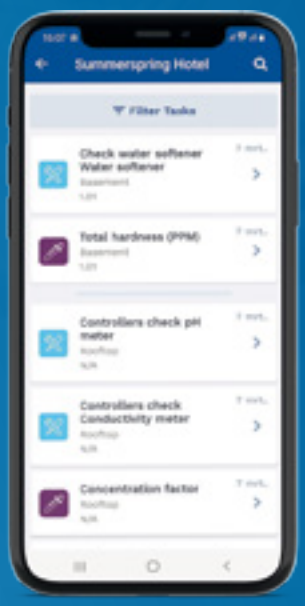

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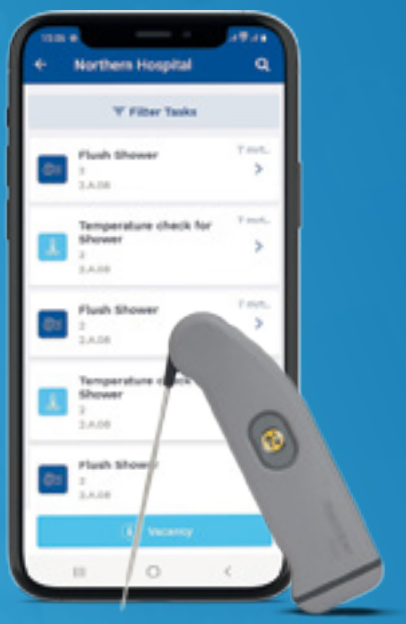

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event report

Water Management Society Water Reflections Webinar Series

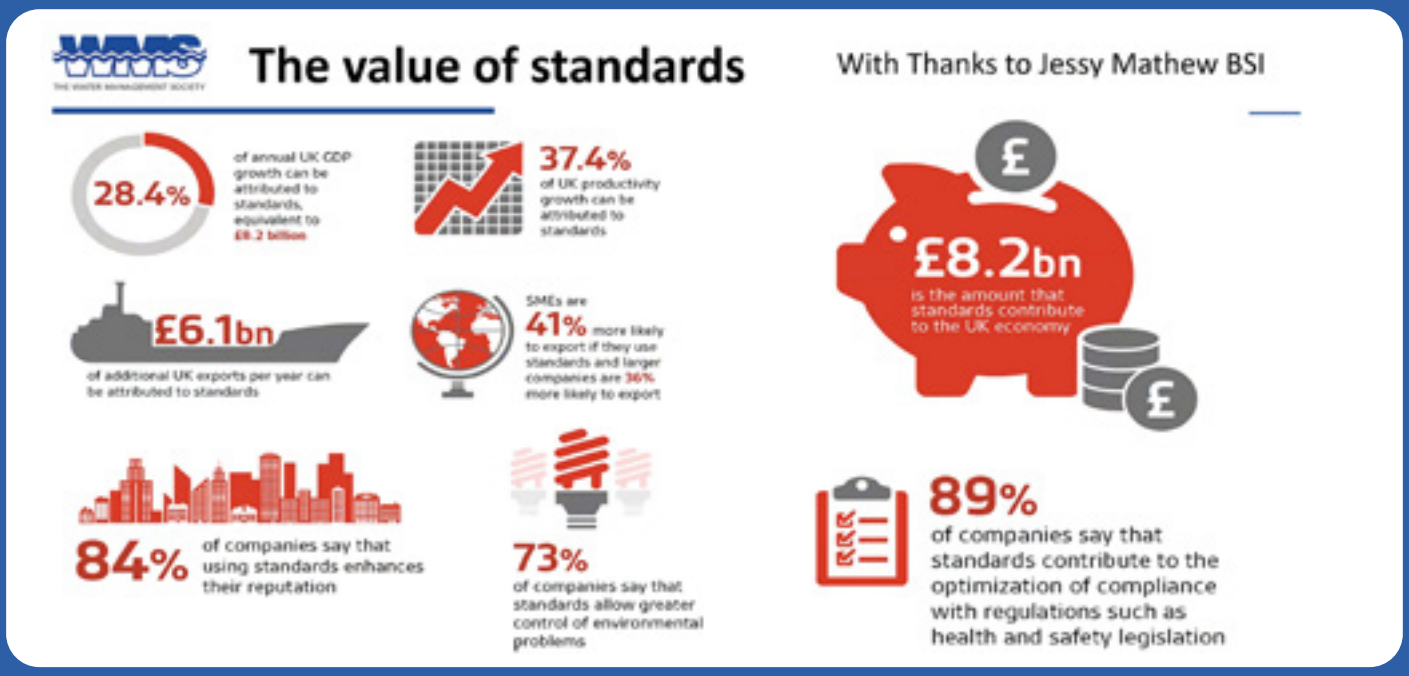
Thursday 27th January 2022 - What's New in British Water Quality Standards
Presented by Dr Susanne Lee and chaired by Jonathan Waggott

The webinar covered:

- When and why you need a Water Safety Plan; what is involved and how to comply with BS 8680:2020
- An update on the new BS 8580-2 Water quality. Part 2: Risk assessments for *Pseudomonas aeruginosa* and other waterborne pathogens - Code of practice
- An update on the revised BS 7592 Sampling for *Legionella* bacteria in water systems - Code of practice
- BSI, CEN and ISO update on water new standards and those needing revision

Susanne has sat on the BSI parent committee (EH 3/4) for over 20 years and represents the Royal Society for Public Health (RSPH). WMSoc and a large number of other organisations are involved and the committees are staffed by volunteers. She noted that many standards exist on the BSI website - a search over the last two years reveals several relevant ones (see image below).

UK industries see a financial value of the use of standards:



Legionella pneumophila numbers are rising worldwide, as are other waterborne infections – the latter are potentially liable to contribute to multi-drug resistance (MDR). Standards are one part of the armoury for managing and controlling such matters and four key water hygiene standards are:

- BS 8680:2020 – Water quality. Water safety plans. Code of practice
- BS 8580-1:2019 - Water quality. Risk assessments for *Legionella* control - Code of practice
- BS 8580-2:2022 - Water quality. Part 2: Risk assessments for *Pseudomonas aeruginosa* and other waterborne pathogens - Code of practice
- BS 7592:2022 - Sampling for *Legionella* bacteria in water systems - Code of practice

BS 8680:2020 builds on the World Health Organisation (WHO) guidance and has moved away from a sampling-based approach to one based on risk assessment. Water Safety Plans (WSPs) are to be proportionate to the size and complexity of the building and its occupants. The key steps are:

- To appoint a competent multidisciplinary Water Safety Group (WSG)
- Describe all water systems and relevant equipment
- Create a gap analysis
- Identify all relevant hazards/hazardous events
- Assess risk for all systems and equipment
- Implement a scheme of control, which is validated and verified
- Create management plans to document the governance measures, such as training, surveillance etc.

All potential hazards and hazardous events need to be identified to understand the risk, this includes biological, chemical, radiological and physical. This may be complex in larger buildings and sources such as drinking water, hot and cold water, pools, equipment, building services and other sources such as water features need to be considered along with their routes of transmission.

Water safety in new or refurbished buildings is important and a project WSP should be developed at the concept stage, to include processes to avoid inherent water safety risks. Risk assessments should be performed at each stage of the project, with clear responsibilities defined.

BS 8580-1:2019 contains the detail for performing Legionella risk assessments. These are a legal requirement and form the core of the WSP. The competence of the assessor should be matched to the complexity of the system and it is the responsibility of the Dutyholder to confirm this. The standard includes the need for:

- Asset register and schematic drawings
- Governance review
- Written scheme review
- Regular risk assessment review

It also details how the report should be written, prepared and communicated.

BS 7592:2022 contains several changes and 3 new annexes. These can be easily identified in the "track-changes" version of the standard.

Section 1 has been expanded to include more information regarding:

- Preparation for sampling
  - Sampler training
  - Task risk assessment
- Reasons for sampling
  - Routine or planned
  - Commissioning/recommissioning
  - Legionella risk assessment
  - Reactive sampling
    - Changes to or failures of controls
    - Investigations
- Sampling plans

There are 3 new annexes

- Annex A (normative) - Sampling to investigate incidents or outbreaks in hotels and other multi occupancy buildings
- Annex B (normative) – Sampling to investigate incidents or outbreaks in hospitals and other healthcare facilities
- Annex D (informative) – Flow diagram for when to use RPE.

Sampling plans should be appropriate and based on the Legionella risk assessment. Microbiological sampling should be a supplement to the physical and chemical monitoring programme. They should also have sufficient detail to identify the outlets to be sampled e.g., on a schematic diagram. If no plan is currently in place, then one should be developed. The rational for sampling and any additional parameters such as temperature, biocide levels should be agreed with the authorised /responsible person and/or WSG.

For new or refurbished systems, the commissioning brief should identify the number and location of samples, as agreed with the authorised /responsible person and/or WSG.

Importantly, each sample should be collected from an individual outlet and NOT combined from multiple outlets.

Analysis of samples should ensure independent verification that the test method used is sufficiently precise, repeatable, reproducible, sensitive and specific.

An important note is that potable water tanks should NOT be opened for routine sampling, but samples should be taken from a dedicated sample valve, or the nearest outlet to the tank. This will minimise any inadvertent contamination.

For the routine sampling of outlets, water should be representative of the worst case usage scenario i.e. only pre-flush, from unmixed outlets (unless fed by a TMV) with no disinfection or adjustment of devices or inserts. Temperature should be recorded after the sample has been taken.

This new standard also brings routine sampling requirements into line with HSG274 with regard to multi-loop systems, poorly balanced systems and hot water storage tanks/buffer vessels.

Neutralisers – EDTA is no longer recommended as it is ineffective on silver. If there are no suitable neutralisers available then samples should be collected when biocide concentration is expected to be at it's lowest, or before application and transported to the laboratory as soon as possible, for analysis within 24-48 hr.

Current published guidance is conflicting regarding transport storage conditions so this should be verified by the analysing laboratory.

Gross contamination:

- Where sampling results indicate high levels of Legionella in multiple outlets then the risk assessment and schematic diagram should inform the identification of other sample locations.
- Repeat sampling should include outlets adjacent to the positive sites and to trace back through the system in order to determine the extent of the contamination.
- Both pre and post-flush samples may be required and may require sampling from each loop.
- Likely sources are dead-legs, blind-ends, partially closed valves, TMV's and plumbed-in equipment.

Commissioning/recommissioning of new builds and refurbishments require a risk assessment based sampling plan before the system is filled with water. Samples should be collected after the system has been filled, disinfected, flushed and returned to normal operating conditions, allowing for a 48 hr settling period. If there is a delay between commissioning and occupation then repeat sampling

should be carried out not more then a month before occupation and nornal usage. Certain specialist systems may require sampling according to manufacturers or best practice guidance.

Annex A notes that aerosols can disperse within buildings, so the source may be in a different area. Temperature mapping is also of vital importance. Samples should be taken from a variety of sources including incoming cold water, softened water, hot water systems and expansion vessels. The outlets where the guest may have visited, such as showers, spa, hairdressers and a long list of other possible sources are also listed.

BS 8580-2:2022

This standard covers both Healthcare and other settings such as, educational, travel, leisure and industrial premises. Susanne emphasised the need for a multidisciplinary team. There are many papers showing contamination from a wide variety of industries, including tattoo parlours and wading pools for children. The effects can be devastating and costly, both financially and in reputation as well as many deaths. She noted some breaking news regarding a *P. aeruginosa* outbreak reported in some Norwegian hospitals. It is already recognised that *P. aeruginosa* is a particularly devasting pathogen for augmented care patients and a leading cause of illness in the immunocompromised. Multi-resistant variants are being reported with increasing frequency and aerators and incorrect usage of wash hand-basins (WHB) being noted as the source. Although many risk factors are similar to those for Legionella there are some notable additional considerations which are covered in this new standard.

The standard has 4 sections – Section 1: General for all premises, Section 2: Healthcare, Section 3: Beauty, health spa and leisure premises with recreational water systems, Section 4: Other premises and equipment. There are a number of informative annexes – Annex A: Waterborne microbial hazards and hazardous events in healthcare settings, Annex B: Pre-survey preparation, Annex C: Risk assessment example for healthcare. There are examples of risk scoring systems which are clear and uncomplicated to use. New technologies should also be risk assessed, such as "green" initiatives and external advice may be required to review and critique manufacturers' claims.

Heathcare: As for the Legionella risk assessment standard, competence is key and specialist input may be required. Pre-communication and information gathering is particularly important to ensure the relevant background information is available and that the correct personnel are involved and advised. This standard has some particularly useful images to assist those performing the survey and shows some additional factors to considers, such as identification of leakages and blockages.

Drains have been recognised as a source of waterborne infection and are linked to incorrect disposal of fluids into WHB, accumulation of wipes, paper towels, needles etc. and poor design or installation.

The standard also provides guidance for risk assessing for contamination which may have been caused by non-tuberculous mycobacteria (NTM).

Leisure: The scope does NOT include faecal pathogens. Risk assessment should consider design of pools, equipment and the surrounding environment and requires input from the persons responsible for their management.

Other premises and equipment: This may extend to outbreaks of water-borne infections which may be related to manufacturing processes, such as the manufacture of paper or cardboard. Risk assessors should review processes in place during normal operation of the system.

The questions and answers following the webinar and the recording can all be accessed via the members area of the WMS website. Please look out for future webinars and please let us know at: admin@wmsoc.org.uk if there is anything that you would particularly like to see in the future?

Sue Pipe Lifetime Achievement Award

Dr P John Alvey

As announced at our AGM in October 2021, Dr P J Alvey was awarded the Sue Pipe Lifetime Achievement Award for services to the society.

Dr P J Alvey & I E Kershaw

As that event was held virtually it was with great pleasure, and blessed good weather, that Mr I E Kershaw presented the award to John at his home in early February. We wish John a long and happy retirement and appreciate his continued work on the Waterline committee.

WMS MEMBER FEEDBACK

THE WATER MANAGEMENT SOCIETY

"As an associate member I just wanted to pass on my congratulations at the improvement in your offering to members over the last 18 months or so. Membership definitely has some benefits now whereas before I was very unclear "what I got for my money". I think your training offering is much improved along with the CPD offering for those who want it. I particularly value the webinars – for myself and my team – and the much improved magazine. So glad you make more use of modern communication methods. I now look forward to seeing clear evidence of a more diverse approach to the sector, as I genuinely believe it would benefit from a more diverse work force.

Many thanks!
Nichola Balmer AWMSoc"

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Waterscan

NEWS FROM THE WHOLE FIELD OF WATER AND ITS EFFECTIVE MANAGEMENT

Poole Harbour farmers' fertiliser pollution must be halved

Farmers have been blamed for pollution at one of Dorset's most picturesque harbours that has caused excess nitrogen levels to double since the Sixties. The Environment Agency has told farmers they must more than halve the amount of harmful nitrates pouring into Poole Harbour to reverse decades of environmental damage. The amount of nitrogen entering the harbour has more than doubled from about 1,000 tonnes per year in the Sixties to 2,300 tonnes annually now, according to the agency. Nitrogen, which is found in manure and slurry on farms, is widely used in synthetic fertilisers because it encourages plant growth, and can lead to excessive green algae growth in pollution hotspots.

Algae on Poole Harbour's mudflats have smothered the native seagrass and had a negative impact on the wetland birds and other wildlife. The harbour is a site of special scientific interest, meaning it is a priority for conservation because of its rare flora and fauna and its geological features. Under the Environment Agency and Natural England's recommendations, nitrogen volumes flowing into Poole Harbour need to fall from 2,300 tons to 1,500 tons per year.

The recommendations also require the quantity of ortho-phosphate pollution, another chemical that stimulates excessive algal growth, cut from 51 tons to 22 tons a year.

The Environment Agency said farmers must now start to implement measures to reach the targets, and by 2023 must ensure nitrogen run-off from their land does not exceed 18.1kg (40lbs) per hectare a year.

Christmas trees to reduce risk of flooding

8 million Christmas trees are dumped every New Year, generating 160,000 tons of waste. Now plans are afoot to reduce these numbers by renting and recycling trees (by retaining their root structure), and when they have grown too large, they can be donated for use in flooding mitigation.

Roots, a company based in Calderdale, already rents trees with intact roots, replanting them after the holidays. Some of these trees are now too large for domestic use and will be donated to Slow the Flow, a charity which plants trees in the Calder Valley as part of natural flood management.

The trees will be planted on moorland above Todmorden and Hebden Bridge, in West Yorkshire; two towns badly flooded on Boxing Day 2015, causing damage estimated at £150 million.

Otter numbers fall in Welsh rivers

An unexpected decline in Wales' otter population is being described as a "wake-up call" to the state of the UK's rivers. The first national survey in more than a decade found fewer signs of the mammal in almost all waterways. A check on numbers in England has now been commissioned in response.

After being wiped out in parts of the UK in the 1950s and 60s, the species had been recovering and was considered a rare success story for nature. Back then, pollution from organochlorine pesticides was blamed. Since these were withdrawn from use, otters had been spreading back across the country.

National surveys of over a thousand sites began in the 1970s, documenting a remarkable comeback in Wales. Now, according to research by Cardiff University and Natural Resources Wales (NRW), something has changed. The latest survey shows a substantive decline in otter populations for the first time. Signs of otters - such as footprints, droppings and Holts - were spotted at just over 70% of the sites visited across Wales. That is down 22% since the last survey in 2010. The worst affected regions were the Conwy, Loughor and Teifi rivers, with smaller declines evident in most other catchments.

Special Boat Services need training facility

Special Boat Service forces struggle to train because they do not have a big enough swimming pool, MP Richard Drax claims. The elite commandos need a giant pool to practise their stealth techniques using mini-submarines.

The existing facility in Poole, Dorset, was "not fit for purpose" and the frogmen rarely used it, he added. The unit, the sister service of the feared SAS, uses secret mini-submersibles to sneak into hostile territory and sabotage enemy shipping. Mr Drax said: "They need a pool of some size and depth where they can train in a realistic environment. If we can't provide our own Special Forces with the most basic facilities, then I can't think of a higher priority, other than accommodation."

The commandos routinely train in Poole Harbour and the Channel but he said the weather limited when they could train at sea — and urged the Government for "money to come cascading down."

Defence Procurement Minister Jeremy Quin said it was up to Strategic Command — which leads UK Special Forces — to prioritise its budget. He said: "If they don't get it, it is only because there are items which are even more important for our Special Forces."

Woman tries to flush monkey down the toilet after offering it cocaine

A mother-of-four caught trying to flush her pet monkey down the toilet and offering it cocaine has been spared jail. Vicky Holland, 38, made 22 videos of her mistreating the tame marmoset she fed on burgers, kebabs and sausages. A court was shown a video of the animal cowering in a toilet bowl and Holland goading it by saying she was going to flush it.

The RSPCA only became aware of the animal's misery when police raided Holland's home in Newport in a drugs bust. They seized her mobile phone and saw 'very disturbing' videos of Holland mistreating the animal, including one where she offers it cocaine. In a video, Holland can be heard saying to the marmoset: 'Want some coke? Lick my fingers'.

Holland was jailed for 20 months, suspended for two years in November 2020 over the cocaine haul and appeared in court in May 2021 where she was ordered to pay more than £4,000.

She has now been banned from keeping all animals for life and given a 12-week jail term, suspended for 12 months.

Abuser sprayed with 'Smart Water' jailed

A Wakefield man has been jailed after Smart Water evidence helped prove he had been in contact with his victim. The special liquid, which only shows up under UV light and takes months to fade from clothes and skin, was sprayed at the 31-year-old when he approached his victim.

She had been given the spray canister as part of a new initiative being used by West Yorkshire Police to prevent and detect repeat domestic abuse offences. Lee Wass, of no fixed address, visited the victim's home in Featherstone while subject to a non-molestation order.

The victim was able to spray him with the SmartTag solution and the unique tag was found on his clothing after his arrest. He was swiftly charged and convicted of breach of a non-molestation order and harassment and was jailed for 48 weeks in total after he also admitted a charge of assaulting a male and causing actual bodily harm to another male. A two-year restraining order was also put in place.

Superintendent Lee Berry, of West Yorkshire Police's Safeguarding Central Governance Unit, said: "No-one should have to live in fear in their own home."

Annual beach litter volumes fall after curb on plastic

The amount of waste washing up on the UK's beaches is falling year by year, according to the results of the 2021 Great British Beach Clean, organised by the Marine Conservation Society (MCS). Volunteers found 385 pieces of litter for every 100 metres of beach on average, down from 425 in 2020 and 558 in 2019. Single-use plastic bags have fallen from a high of 13 for every 100 metres in 2013 to just 3 in 2021. The plastic bag charge introduced in 2015 has cut their use in supermarkets by 95%.

Plastic cotton bud sticks dropped out of the top 10 most common types of rubbish following a ban in Scotland in 2019 and in England in 2020. The average of six per 100 metres in 2021 was the lowest since the beach cleans began 28 years ago and was down from 15 in 2020.

The MCS said the results were positive and showed that actions being taken at a personal, local and national level were having an impact. But it said 75% of beach litter was still plastic or polystyrene and that the government's "piecemeal" approach to phasing out single-use plastic was not good enough.

The most common items were pieces of plastic and polystyrene, followed by cigarette butts, crisp and sweet packets and lolly sticks, plastic caps and lids, and string or cord.

Bathers told to keep their mouths shut

A water company has told bathers they should 'swim with their mouths shut' to avoid swallowing sewage. Ruth Barden, an environmental director for Wessex Water, sparked fury when she made the suggestion at a council meeting in Bournemouth, Dorset.

Environment Agency manager Ian Withers was also criticised for stating reports of incidents of sewage discharge into the sea had been 'sensationalised'. Ms Barden claimed the media had misrepresented the problem despite 17 incidents of sewage spilling into the sea off the Dorset coast in one week last October. The pair spoke at a council meeting in response to dozens of sewage spills off the county's cherished beaches.

In a presentation to councillors, Ms Barden said: 'The only way you will not get ill from consuming water is if you consume tap water. If you go swimming with your mouth open it is not free from bacteria, so that is something to be aware of. Not all discharges are pollution - all our discharges are permitted and compliant and often have no adverse environmental impact. There has been a reasonable amount of misrepresentation about that in the media recently.'

Water companies argue that most storm overflows of raw sewage are heavily diluted by rainwater and have little adverse impact.

Pacific Ocean twilight zone reveals magical coral reef

One of the world's largest 'twilight zone' coral reefs has been found off the coast of Tahiti, in waters thought to be deep enough to protect it from the bleaching effects of the warming ocean. Scientists say there is no evidence the 'pristine', rose-shaped corals have yet been harmed by global warming, offering hope that more of the colonies rich in marine life could survive climate change than previously predicted.

Many shallow reefs around the world have been damaged by pollution, overfishing and coral bleaching caused by rising water temperatures. However, the newly-discovered 1.8 mile-long (3km) reef close to French Polynesia's largest island is blossoming at a depth between 115ft (35m) and 230ft (70m) in what is known as the ocean's twilight zone. Here, there is just enough light for coral to grow before the water transitions into a dark abyss.

Most of the world's known coral reefs are in warmer waters at depths of up to 82ft (25m). Laetitia Hédouin, from the National Centre of Scientific Research in France, said there could be many more undiscovered large reefs at depths of more than 100ft, because only a fifth of the world's seabed has been mapped. 'We think that deeper reefs may be better protected from global warming,' she said. 'So the discovery of this reef in such a pristine condition is good news and can inspire future conservation.' Hédouin added: 'French Polynesia suffered a significant bleaching event back in 2019, however this reef does not appear to have been significantly affected.'

Women and children first – RMS Titanic myth?

The curator of a new exhibition on the doomed ocean liner says many of the survivors who escaped on the final lifeboats were men.

The order, "Women and children first" was not carried out effectively and is "not true" says historian Claes-Goran Wetterholm, an author and expert on the doomed ocean liner. Of the last survivors escaping on the final lifeboats leaving the starboard side of the ship, he said, the majority were men.

The order, which famously came from the captain, was interpreted differently by officers on different sides of the ship, he said. "While the story goes that those who survived were women and children, it's not true: 323 men survived, 80 per cent of them got on lifeboats from the starboard side. They survived because first officer William Murdoch, who evacuated that side, didn't prevent them from getting in."

"On the port side, second officer Charles Lightoller had the rule of women and children first and he took it literally. One boat that could take 65 people rowed away with 28, leaving men behind."

Wetterholm has been promoting a shipwreck exhibition at London's Docklands which is displaying 200 artefacts that belonged to passengers and crew on the Titanic, as well as recreations of rooms on the ship to "submerge visitors in an unforgettable journey to the past".

Research at Sweden's Uppsala University in 2012, produced an 82-page study about the survivors of shipwrecks. It showed that captains and their crew are 18.7 per cent more likely to survive a sinking ship than their passengers, with "every man for himself" a more appropriate description than "women and children first". The study of 18 maritime disasters from 1852 to 2011 showed that, of the 15,000 people who died, only 17.8 per cent of the women survived compared with 34.5 per cent of the men.

Boom in stomach bug bacterium in warming UK waters

New bacteria species have been found in seas around the UK as warmer waters lead to "growing diversity" in their families, according to a new study. The study, led by the University of Exeter, found two Vibrio species – Vibrio rotiferianus and Vibrio jasicida – that have never been recorded in UK waters before. These species can harm sea creatures such as shellfish, but the increasing range of Vibrio species also raises concerns for human health. Some Vibrio bacteria can cause gastroenteritis when eaten in raw or undercooked shellfish, and the bacteria can also cause skin infections.

The researchers say the spread of Vibrio species has resulted in a "worldwide surge" of Vibriosis infections in humans and aquatic animals. "Vibrio species can often be found in UK waters in summer, when temperatures are more favourable for them," said Dr Sariqa Wagley, of the University of Exeter. The study used Met Office data to identify locations where summer sea-surface temperatures were favourable for Vibrio bacteria (based on the average number of days per year warmer than 18°C). Researchers then analysed shellfish samples from four sites used by the shellfish industry – Chichester Harbour, Osea Island, Whitstable Bay and Lyme Bay.

"We found Vibrio parahaemolyticus – the leading cause of seafood-borne gastroenteritis worldwide – at Chichester Harbour," Dr Wagley said. "Vibrio alginolyticus, which can also cause illness in humans, was identified at three of the sites that had sea-surface temperatures above 18°C (Chichester Harbour, Osea Island and Whitstable Bay). It is important to note that thorough cooking kills harmful Vibrio bacteria in seafood." He added: "Increasing abundance and diversity of Vibrio bacteria creates health risks not only for people eating seafood, but for those using the sea for recreation purposes – either due to swallowing infected seawater or from the bacteria entering exposed wounds or cuts."

Not so grim up North

The northeast of England has seen a boom in sunshine in the past 30 years compared to the rest of the country, according to scientists studying regional variations in the impacts of climate change. Parts of the northeast, including Durham and Tyne and Wear, have seen annual sunshine hours rise by more than 13 per cent since 1991 relative to the previous 30 years, compared to a rise of 5.6 per cent across the UK as a whole. It's not entirely clear why the northeast had seen such a bump in sunshine hours, nor whether it was directly attributable to human-induced climate change.

A different picture arises with rainfall which has increased by 10-14% in areas of Scotland, but with a UK average increase of 7.3%, on the same timescale.

Dr Mark McCarthy, the head of the Met Office National Climate Information Centre, said human-induced climate change was likely to be a "contributing factor". But he added that the increase in sunshine hours could also be due to the reduction in recent decades of the use of aerosols, which increase cloud cover, and the natural variability of the weather in the UK.

The 30-year period from 1991 to 2020 will form the Met Office's new benchmark for it to measure future changes to the UK's climate.

High temperatures previously experienced mostly in the south are now more likely in the north of England and Scotland. The statistics show that the UK is also experiencing fewer bouts of frost, with the number of days where the temperature drops below 0°C decreasing by an average of 11.1.

"The result of human-induced climate change in the UK is that higher temperatures are felt further north than they used to be," said Mr McCarthy. "If you look at the average temperature, for example between 1991-2020, Hull has been warmer on average than Heathrow in London was during the previous climate averaging period 1961-1990. "So average temperatures previously limited to London and parts of the far south of England are now experienced as much as 155 miles further north."

Drunk ship's captain jailed for causing oil spill

In December 2021, a court in Mauritius handed a 20-month jail sentence to the captain and first mate of a freighter that crashed into a coral reef in 2020, causing the Indian Ocean archipelago's worst environmental disaster.

Magistrate Ida Dookhy Rambarrun said the court had taken into consideration "the fact that both defendants pleaded guilty and apologised".

The MV Wakashio, a Japanese-owned, Panamanian-flagged vessel, ran aground in July 2020, spilling toxic fuel into the pristine waters of Mauritius, coating mangroves, corals and other fragile ecosystems. The vessel's captain, who was convicted by the court in the capital, Port Louis, admitted drinking during an onboard party. Sunil Kumar Nandeshwar and first officer Hitihanillage Subhoda Janendra Tilakaratna were found guilty of "endangering safe navigation". "The captain and his second-in-command were irresponsible and did not deliver as they should on their 'navigational duties'," the magistrate said.

More than 1,000 tonnes of oil seeped into waters full of marine life from a gash in the vessel's hull before salvage crews were able to remove all the remaining fuel. The accident occurred near two ecologically critical sites: Blue Bay, known for its coral gardens, and Pointe D'Esny, which hosts a mangrove forest – a crucial ecosystem as well as a weapon in the fight against global warming. In the days after the accident, thousands of volunteers marshalled along the coast wearing rubber boots and gloves, scrubbing rocks and stringing together makeshift cordons to contain the oily tide.

Hydro schemes threaten Scottish Salmon River

The 109-mile (175km) Spey - Scotland's second longest river after the Tay - flows through the Highlands and Moray. A Spey Fishery Board (SFB)-commissioned study said too much water was being diverted away from the Spey for use in generating electricity. It said water flow and levels on the river had dropped as a result.

Energy giant SSE Renewables, one of the UK's leading developers of hydro-electricity, said it prided itself on being "a responsible operator", and was working closely with regulators and fishery boards while generating "clean and flexible" hydro power.

The Spey is world-famous for its salmon fishing. Its reputation as the fastest flowing in Scotland applies to a section of the river downstream of Grantown-on-Spey where it descends markedly in altitude.

SFB said the new research showed the renewable energy projects could significantly reduce the natural flow in the Spey - by up to 24% at Boat o' Brig, near Fochabers in Moray, and by up to 61% at Kingussie in the Highlands. The Spey's ability to store groundwater in its stony riverbed has also been badly affected due to low water levels, according to the study.

SFB director Roger Knight said: "It is now abundantly clear that the scale of water transferred out of the Spey valley to generate hydro-electricity is having a devastating impact on the river. It has denuded the groundwater storage supplies and has drastically reduced the Spey's ability to cope with hotter, drier summers which are predicted to occur more frequently under climate change."

SEPA, the organisation responsible for issuing and reviewing licences to abstract water, said there were a number of projects ongoing to improve the availability of water. It said abstractions were also under review.

Castellated tower bridge at Craigellachie, River Spey

Novice rowers smash Atlantic record

Two British women with no previous rowing experience have broken the world record for the fastest female pair to cross the Atlantic. Jessica Oliver, 29, and Charlotte Harris, 30, cruised 3,000 miles to victory in the challenge ahead of 35 other teams from all over the world.

The friends battled 30ft waves, sleep deprivation, hallucinations, blisters, sharks, capsizing and even a mid-ocean collision in their boat Cosimo. They finished five days ahead of their nearest rivals in the pairs' category of the Talisker Whisky Atlantic Challenge when they reached Antigua on January 26. They also wiped the same number of days off the previous female pairs' world record in a time of 45 days, seven hours and 25 minutes. Neither had ever rowed professionally before and they had to undertake a two-year training regime to take part. The race started from La Gomera in the Canary Islands on December 12. 'We're amazed we even completed the challenge, let alone set a record,' said Miss Harris.

Own goal by Antarctic scientists

Scientists studying the origins of microplastics in Antarctica have discovered that 89% of the samples analysed came from the paint on their own ship, the Polarstern.

The area under study was the same area where, in 1915, Ernest Shackleton's ship, Endurance, got trapped and crushed by pack ice. Over the course of two expeditions with the research vessel Polastern during 2018 and 2019, the researchers took a total of 34 surface water samples and 79 subsurface water samples. They then filtered about eight million litres of seawater and discovered microplastics in it.

Initially, researchers had been shocked to find such large concentrations of microplastics in such a remote expanse of water in the Southern Ocean. To find out where these plastics came from, the team analysed the composition of the particles. They found that a significant proportion of the particles were in fact microplastics that were used as a binding agent in marine paint. Other microplastics were identified as polyethylene, polypropylene, and polyamides, commonly used in packaging materials and fishing nets, among other things.

Archaeologists believe Roman women had private bathrooms

Roman women had the option of using private bathrooms instead of sharing toilets with men, a study has found. Ceramic jars have been found discarded near the sites of Roman baths and public toilets, leading some to suspect that they may have been some kind of chamber pot. Archaeologists from Cambridge analysed material from a 1,500-year-old storage jar from Sicily and found that it once contained human waste, meaning that similar "storage" vessels held in museums around the world could in fact be chamber pots.

This would mean there was a greater abundance of conveniences in the Roman world than previously thought, and suggests that women in public places had alternatives to the communal latrines where men might be present. Romans were not known for their privacy or prudishness, with remains of ancient latrines showing that they used the bathroom in very close quarters with their fellow citizens. They would also have relaxed in the nude at bath houses, where public sex was known to take place.

Dr Piers Mitchell, of the University of Cambridge's archaeology department, said: "Communal latrines were very public. Using chamber pots in a room would have given women more privacy." New analysis of material from one of these suspected chamber pots from Sicily found that it contained ancient traces of the intestinal parasite whipworm, indicating it once contained human faeces. This provided the proof for experts at Cambridge and the University of British Columbia that chamber pots were widely used alongside the communal toilets often associated with the Romans.

The research from Cambridge and the University of British Columbia is published in the *Journal of Archaeological Science*.

New microscope to use photonics to gain insights into 'superbugs'

Scientists are building a new super-resolution microscope that uses laser light to study the inner workings and behaviours of superbugs to gain new insights into how they cause disease.

The microscope will allow scientists to peer into bacteria such as Streptococcus pneumoniae at a molecular-scale resolution – showing up objects smaller than 10,000th the thickness of a sheet of paper. A leading cause of bacterial pneumonia, meningitis and sepsis, Streptococcus pneumoniae are estimated to have caused around 335,000 deaths in children aged five years and under in 2015 worldwide.

Current technologies do not allow a resolution that enables thorough studies of bacterial properties that affect disease development. But now, this super-resolution microscope uses laser light to illuminate proteins at incredibly high resolutions, allowing scientists to gain new insights into what makes these potentially deadly bacteria so pathogenic. Although electron microscopes can show minute detail at the atomic level, they cannot analyse live specimens: electrons can easily be deflected by molecules in the air, meaning any bacteria under inspection must be held in a vacuum. Therefore, super-resolution microscopes are superior for biological analysis.

Called the 'NANO-scale Visualisation to understand Bacterial virulence and invasiveness - based on fluorescence NANOscopy and VIBrational microscopy' (NanoVIB), the project will shed new light on how superbugs can cause disease, thereby providing the basis for the development of new antimicrobials to treat bacterial infections.

In a bid to understand how bacteria cause disease, the European Commission has granted this health consortium €5,635,529 via the Photonics Public Private Partnership to build this super-resolution microscope.

100,000 fish die in Atlantic Ocean incident

Dutch-owned trawler FV Margiris, the world's second-biggest fishing vessel, has shed more than 100,000 dead fish (almost all blue whiting) into the Atlantic Ocean off France. Maritime minister, Annick Girardin, called the images of the dead fish – which formed a floating carpet of carcasses spotted by environmental campaigners – "shocking" and has asked the national fishing surveillance authority to launch an investigation.

Virginijus Sinkevicius, the European commissioner for environment, oceans and fisheries, also said he was seeking "exhaustive information and evidence about the case".

The spill, which happened on 3rd February, was caused by a rupture in the trawler's net, said fishing industry group the Pelagic Freezer-Trawler Association (PFA), which represents the vessel's owner. In a statement, the group called the spill a "very rare occurrence." They further stated that "In line with EU law, this has been recorded in the vessel's log book and reported to the authorities of the vessel's flag state Lithuania." PFA added that the dead fish would be subtracted from the vessel's quota.

The French arm of campaign group Sea Shepherd said it did not believe the incident was accidental, but rather an attempt by the trawler to discharge a type of fish that it did not want to process, a practice known as discharging bycatch which is banned under EU fishing rules.

Traffic data from marinetraffic.com showed the vessel was still engaged in fishing activities off the French coast the following day.

Wet wipes and sachets to be banned?

As part of a public consultation, the UK Government aims to tackle all problematic plastics which are polluting landscapes and wildlife.

See: https://www.openaccessgovernment.org/inside-englands-plans-to-ban-single-use-plastics/124768/ for the full report.

As set out by Environment Secretary George Eustice, single-use plastic plates, cutlery, polystyrene cups and food and beverage containers could all be banned. The Government additionally wants to enable mandatory labelling on packaging to help consumers dispose of these items correctly. The Government will additionally consult stakeholders for views on tackling regularly littered plastics such as wet wipes, tobacco filters, sachets, and single-use cups, 'shifting the responsibility to manufacturers to tackle the single-use plastics they are producing.'

England uses 1.1 billion single-use plates and 4.25 billion items of single-use cutlery, which are predominantly plastic, per year. However, only 10% are recycled upon disposal. The UK uses 2.5 billion disposable coffee cups per year. Additionally, plastic sachets are often not recycled due to their small size, which makes it hard to segregate and clean them.

Through the Environment Act, the Government's further measures to tackle plastic pollution include: Deposit Return Scheme for drinks containers; Extended Producer Responsibility; Consistent Recycling Collections for every household and business in England; Plastic Packaging Tax from April 2022 (£200 a tonne if 30% minimum threshold for recycled plastic not met); Single Use Charge on carrier bags will be increased to 10p and extended to all retailers.

Norwegian king crabs found in large numbers in Yorkshire crab pots

Norwegian king crabs, previously only caught in small numbers, have recently been discovered in their hundreds, crammed into pots off the coast of Bridlington.

While native to British waters, they have not been caught in such numbers before and have proved a winner with London restaurants so far, with many snapping up the haul for their menus. Will Murray, a chef at sustainable central London restaurant Fallow said: 'They're quite a tricky crab to prep, they have got very long spines on, but the meat is just sublime.'

Now the fishermen are investing in new, bigger pots to take advantage of the situation. Weighing roughly a kilo each, some 250 kilos of the crab have been harvested. They are being priced at £30 a kilo, similar to the price charged for lobster, and roughly three times the expected price for a brown crab.

These king crabs are very different from the Norwegian red king crab, which is invasive and grows to five foot wide, but yet is only found in its natural range, north of Tromso.

'Vaccine' to stop oyster herpes plague

French marine biologists say they have created a revolutionary "vaccine" that protects oysters from a deadly virus that has wiped out billions of shellfish in successive "plagues" off France and Britain in recent years.

French oyster farmers have lived in fear of Oyster Herpes virus type 1, or OsHV-1, since the deadly variant first struck in 2008. Contrary to coronavirus in humans, which is less harmful to the young, OsHV-1 kills off juvenile Pacific cupped oyster "spat" before they are strong enough to protect themselves. Since 2008, even in "good years", herpes - an unfortunate moniker given oysters' reputation as "the food of love" - wipes out 50 to 70 per cent of juvenile shellfish, experts say.

It has also become the bane of UK farmers, killing eight million shellfish in Whitstable, Kent in 2010. The virus, which is harmless to people, was also found in an Essex river in 2015.

Benjamin Morga, a researcher, said: "One cannot speak of a vaccine in the true sense of the word, as oysters don't have antibodies; it is rather a stimulation of its immunity. The way we did it was to inactivate the herpes virus and introduce it into the oyster, provoking an immune reaction. Certain genes in the oyster are primed to produce proteins naturally present in the shellfish that kill the virus should it come under attack."

The "pseudo-vaccine" lasts a few months, enough to tide baby oysters over the most vulnerable phase of their development.

Mr Morga confessed that the next, crucial challenge would be to find a way to distribute it en masse to oysters in their beds. He insisted he and fellow researcher Caroline Montagnani had come up with "highly promising solutions" but these remained shrouded in secrecy due to "patent issues".

Environment Agency accused of scorched earth tactics

Environmental campaigners have slammed the decision by the Environment Agency to strip a 250-metre stretch of the River Tone in Somerset of trees as part of flood management measures.
While the Environment Agency claims the destruction of the trees at the beauty spot near Taunton was “essential” to manage the risk of flooding in the area, others disagree and claim the move has put wildlife in danger and could actually increase the likelihood of floods. Dr Nick Chappell, an expert in the hydrological processes associated with nature-based solutions at the University of Lancaster, said that “green infrastructure” can be used to mitigate flood risk alongside engineering projects. “Natural solutions are not magic, you have to do enough, and of course there are co-benefits in terms of water quality, carbon sequestration and biodiversity, but you need to do them on the same scale as traditional infrastructure schemes,” he said.
Local anglers were “heartbroken” after the stretch of the river, which is well known for attracting wildlife such as Kingfishers, was stripped of trees. The banks of the river are now bare earth following the felling of the trees.
It is understood that the trees at water level were deemed to be creating a flood risk by catching debris and restricting the flow of water. The area is due to be sown with a wild flower seed mix and replanted with native trees.

Octopus demand creating strain on species

Octopus is an increasingly trendy food on restaurant menus - and now scientists plan to build a DNA database to tackle overfishing. Demand for the cephalopod meant prices hit record levels before the pandemic, as the growing popularity of sushi and tapas tempted restaurant diners around the world.
The database is being built by UK scientists to track the animals through the food chain, which will eventually allow diners to identify the source of their meal. High prices and growing demand mean illegal fishing is on the rise, and the database is part of a new global project aiming to block illegal catches from finding their way onto menus.
Fisheries for the mollusc doubled between 1980 and 2015, experts say, and there are concerns that a poorly regulated market could lead to a population decline. Octopus numbers are actually on the up as other aquatic species have declined due to overfishing. Cephalopods, including squid, have an advantage because they grow and reproduce more quickly, producing lots of eggs, and living for only a couple of years.
Octopus species are often misidentified, and their catch numbers and locations inaccurately reported, leading to fears that a lack of data could lead to overfishing, threatening their future and an important source of protein-rich food.

Britain’s largest ‘Sea Dragon’ discovered

"I rang up the county council and I said I think I've found a dinosaur," explained Joe Davis, who works at Rutland Water Nature Reserve. During landscaping work at the reserve's reservoir in February 2021, he had spotted something odd poking out of the mud. It wasn't a dinosaur. But it was the fossilised remains of a 10m-long sea predator called an ichthyosaur. And it was the largest of its type ever discovered in the UK.
A team of palaeontologists were brought in for a closer look. They concluded it was an ichthyosaur - a type of warm-blooded, air-breathing sea predator not unlike dolphins. They could grow up to 25 metres long and lived between 250 million and 90 million years ago. Dr Dean Lomax, a palaeontologist from Manchester University, was brought in to lead the excavation effort. He called the discovery "truly unprecedented" and - due to its size and completeness - "one of the greatest finds in British palaeontological history".
"Usually we think of ichthyosaurs and other marine reptiles being discovered along the Jurassic coast in Dorset or the Yorkshire coast, where many of them are exposed by the erosion of the cliffs. Here, at an inland location, it is very unusual." Rutland is more than thirty miles from the coast, but 200 million years ago higher sea levels meant it was covered by a shallow ocean.
When water levels at the Rutland reservoir were lowered again in the late summer of 2021, a team of palaeontologists came in to excavate the remains. Special attention was paid to the removal of the huge skull, which weighed almost a tonne.
Anglian Water, which manages the Rutland reservoir, is now looking for funding to enable the ichthyosaur to stay in the area and be enjoyed by the general public.

Ichthyosaur 3D rendering

Pharmaceutical drugs in rivers will affect world health

Paracetamol, nicotine, caffeine and epilepsy and diabetes drugs were widely detected in a University of York study. The research is among the most extensive undertaken on a global scale. Rivers in Pakistan, Bolivia and Ethiopia were among the most polluted. Rivers in Iceland, Norway and the Amazon rainforest fared the best.
The impact of many of the most common pharmaceutical compounds in rivers is still largely unknown. It is already well established that dissolved human contraceptives can impact the development and reproduction of fish, and scientists fear the increased presence of antibiotics in rivers could limit their effectiveness as medicines.
The study sampled water from more than 1,000 test sites in more than 100 countries. Overall, more than a quarter of the 258 rivers sampled had what are known as "active pharmaceutical ingredients" present at a level deemed unsafe for aquatic organisms.
Dr John Wilkinson, who led the research, said: "What we know now is that even the most modern efficient wastewater treatment plants aren't completely capable of degrading these compounds before they end up in rivers or lakes." The two most frequently detected pharmaceuticals were carbamazepine, which is used to treat epilepsy and nerve pain, and metformin, used to treat type 2 diabetes. High concentrations were also found of so-called "lifestyle consumables" like caffeine [coffee] and nicotine [cigarettes] as well as the painkiller paracetamol.
In Africa, artemisinin - used in anti-malarial medicine - was also found in high concentrations.
The report says the increased presence of antibiotics in rivers could also lead to the development of resistant bacteria, damaging the effectiveness of medicines and ultimately posing "a global threat to environmental and global health".
The most polluted sites were largely in low- to middle-income countries, and in areas where there was sewage dumping, poor wastewater management and pharmaceutical manufacturing.
The full report has been published in the *Proceedings of the National Academy of Sciences* journal.

EU Parliament President dies from immune system complications after Legionnaires’ disease infection

Tributes have been paid to European Parliament President David Sassoli, who died in January at the age of 65. He had been seriously ill for more than two weeks and cancelled all official activities, and had been admitted to hospital in Italy in December due to a serious complication with his immune system.
In September, Mr Sassoli was taken to hospital in Strasbourg where he was treated for a severe case of pneumonia caused by legionella. He later told his followers on social media that he had suffered a relapse while recuperating in Italy.
He worked remotely during October, officially resuming his political duties in November. But he was again hospitalised on 26 December.
"Pneumonia is an ugly beast - the important thing is to avoid relapses and the convalescence must be adequate," he said in September.

Great white shark kills British ex-pat off a Sydney beach

A swimmer died from “catastrophic injuries” after being attacked by a shark off a beach in Sydney’s south-east, on the 16th February.
Emergency services were called to Buchan Point in Malabar, off Little Bay Beach after reports a swimmer had been attacked by a shark. Marine police crews and surf lifesavers scoured the scene, according to a New South Wales police statement, and “located human remains in the water”. Parts of a wet suit were also recovered. The death is the first fatal unprovoked shark attack in Sydney since 1963. Witnesses say that the swimmer spent his final moments screaming for help and struggling to fight off the massive 14ft great white shark before being eaten alive as horrified beach goers watched on.
The swimmer has been named as Simon Nellist, 35, a former RAF engineer who had served two tours of Afghanistan. The family of the British swimmer have paid tribute, describing him as a “wonderful human being”. It is thought that he had been training for a charity swim.

Dutch consider 'hybrid' approach to Legionella monitoring

A new recommendation to the Dutch government suggests a hybrid risk approach on Legionella bacteria monitoring in implementing the new EU's tap water rules at member state levels.
Detecting bacterial cultures of Legionella was one of the prominent bones of contention during interinstitutional negotiations on the revision of the Drinking Water Directive (DWD). European lawmakers decided to extend Legionella bacteria monitoring to every potable water system in the EU as part of a new risk assessment analysis.
The European Commission initially proposed the inclusion of testing for both Legionella species (L.spp) and Legionella pneumophila in the DWD. However, scientists and health experts said this move could have led to a large amount of work, time, and financial expense for many end-users and delayed test results with immediate consequences for public health. In the final compromise reached by the EU lawmakers, member states were left free to determine their approach to testing. They can choose the methods they find most appropriate for the purposes they specify in national guidelines.
After their final approval in December 2020, the new tap water rules entered into force on 12 January 2021, with member states having two years to transpose them into national legislation.
In this context of national implementation, a new hybrid way for legionella evaluation emerged in the Netherlands after the publication of scientific analysis. The main point highlighted is that the new management plan should target Legionella pneumophila instead of Legionella species while focusing on Legionella species only for places where many people with severely weakened immune systems reside, such as hospitals. This hybrid approach requires the current 'broad' standard of testing all Legionella species being applied to hospitals, while the more pragmatic approach of targeting the more dangerous Legionella pneumophila will be requested for other buildings.

Boxing Day swim called off after sewage release

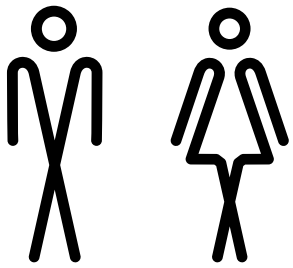
A group of swimmers in Wolvercote, Oxford, had to cancel their Boxing Day dip after Thames Water informed residents of a "sewage release" on Christmas Day. The email confirmed an "ongoing sewage release" at nearby Whitney, adding: "If you're thinking of entering the river, please remember that it can take up to four days for the sewage to clear." The email also said: "Putting untreated sewage into rivers is unacceptable to us, but after heavy rain it's sometimes necessary and permitted."
Dr Fiona Palumbo Tolan, a member of the group, said: "We were extremely disappointed not to be able to swim today. Every week we have to check for notifications of sewerage releases before being sure that it's safe to swim. Personally, I find it deeply distressing that the river is made inaccessible because of pollution from sewerage. It seems that what should be a very last resort in the case of an extreme emergency has become a very common tactic of convenience for water companies."
*Editor: Many people interchange the use of the words sewerage and sewage, but by definition:- **Sewerage** (or sewage system) is the infrastructure that conveys sewage or surface runoff (stormwater, meltwater, rainwater) using sewers. It encompasses components such as receiving drains, manholes, pumping stations, storm overflows, and screening chambers of the combined sewer or sanitary sewer. **Sewage** is wastewater that is produced by a community of people. It is typically transported through a sewer system. Sewage consists of wastewater discharged from residences and from commercial, institutional and public facilities that exist in the locality. So, what is discharged into rivers is correctly referred to as sewage, not sewerage.*

Darwin in a laboratory – assisted evolution

For the past five years, researchers have been conducting experiments to prove that their theories of 'speeded up evolution' would work. Now, they're getting ready to plant laboratory-raised corals in the ocean surrounding Coconut Island, Hawaii, to see how they survive in nature.
"Assisted evolution started out as this kind of crazy idea that you could actually help something change and allow it to survive better because it is changing," said Kira Hughes, a University of Hawaii researcher and the project's manager.
Researchers tested three methods of making corals more resilient: Selective breeding that carries on desirable traits from parents; Acclimation that conditions corals to tolerate heat by exposing them to increasing temperatures; and modifying the algae that give corals essential nutrients.
Hughes said the methods have all proven successful in the laboratory. While some other scientists worried this is meddling with nature, Hughes said the rapidly warming planet leaves no other options. "We have to intervene in order to make a change for coral reefs to survive into the future," she said.

London theatres still ignoring 'gender-neutral lavatories' complaints

In 2018 London theatres started to introduce gender-neutral lavatories, to 'reduce queues of women' at interval breaks. The latest to make the change is the Playhouse, currently hosting Cabaret, one of the top shows this year, with 5 star reviews and tickets starting at £250.
Theatregoers, particularly women, have complained many times at the change, claiming lack of privacy, having to walk past male occupied urinals, and worse. Some have posted comments on social media....'We wanted to see gender fluidity on the stage in thirties Berlin – not in the queue for the b----y loos. It's gross and invasive to share with men.' ....'Had to put the toilet seat down and toilet bowl was covered in urine. Men and women are not meant to share toilets.'....'We had to go past men with their penises out to use the toilet. This was uncomfortable for everyone.'



Editor - Not sure if I'm more shocked about the 'facilities' or the ticket price!

Britain's first dedicated water shop

Britain's first dedicated water shop, based in Fulham, is selling bottles of H2O for as much as £120. The store stocks hundreds of varieties of natural water from around the world.
It is run by Milin Patel, 40, a certified water sommelier, who insists no two types of water are the same — and that it can be paired with meals like wine. Milan said: "I call myself the Willy Wonka of natural water. I've always had a deep passion for water and want to show others how to appreciate it. There are many factors that make a water unique — different temperatures and levels of minerals change its taste and how it feels in your mouth."
Prices range from £2.50 — up to £120 (£130 with shipping) for a 75cl bottle of APSU Origin Water from a glacier in Patagonia, South America.
Milin, from London, has been a water consultant for nearly two decades and become a water sommelier — like a wine sommelier — after sitting exams.
Editor. Think I'll stick with my tap water, at less than 1 pence per litre.

Half of Earth's water 'created by the sun'

The origin of Earth's water continues to be debated by scientists - whether it was here when the planet formed or if it had an extra-terrestrial source. Now, new research points the finger at a previously uncounted point of origin: the Sun at the centre of our solar system. According to astronomers, solar radiation may have created water on the surface of dust grains carried on asteroids that smashed into our planet billions of years ago.
The study, published in the journal *Nature Astronomy*, suggests it has found a source which perfectly matches the isotopic signature of water on Earth. Led by scientists at the University of Glasgow, the research used a process called atom probe tomography to analyse different asteroid samples - some of which carry water and others which orbit too close to the Sun to do so.
Dr Luke Daly, the study's lead author, said: "The solar winds are streams of mostly hydrogen and helium ions which flow constantly from the Sun out into space. When those hydrogen ions hit an airless surface like an asteroid or a space-borne dust particle, they penetrate a few tens of nanometres below the surface, where they can affect the chemical composition of the rock. Over time, the 'space weathering' effect of the hydrogen ions can eject enough oxygen atoms from materials in the rock to create H_2O - water - trapped within minerals on the asteroid."
"Crucially, this solar wind-derived water produced by the early solar system is isotopically light" he added. "That strongly suggests that fine-grained dust, buffeted by the solar wind and drawn into the forming Earth billions of years ago, could be the source of the missing reservoir of the planet's water," Dr Daly added.

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Flint, Michigan, water crisis – chemistry was to blame

In 2013, Flint ended the city's 50-year practice of piping city water for its residents from Detroit. The chosen, cheaper alternative was to 'temporarily' pump water from the Flint River. Supply began In April 2014, treating it at its own treatment plant. Over the next year, residents complained about foul taste and odour, which city officials largely ignored. Additional events in 2014/5 were largely ignored at the time but proved to be significant:

In August, high levels of E. coli, a strong indicator of sewage or animal waste contamination, were detected in Flint's drinking water, causing Flint to put out boil water notices for certain sections of the city.

Between June and October 2015, the 3rd largest outbreak of Legionnaires' disease in U.S. history occurred in Flint, killing 12 people and sickening at least 87 people.

In September 2015 a Flint paediatrician found that blood lead levels in children citywide had doubled since 2014, and in some areas of the city, it had tripled.

Water utilities use several methods to prevent pipe corrosion: Raise the alkalinity of the water. At pH 7.3 Flint's water was not protected. Alternatively add orthophosphate to the water. Orthophosphate reacts with the lead in the pipes and forms lead phosphates, which do not leach into water and act as a protective layer to prevent lead from getting into the water. Flint did not add orthophosphate or any other corrosion inhibitor to the water, in contrast to Detroit water that had used this chemical in its treatment process for many years. Another control is maintaining fairly low levels of chloride in the water. There needs to be adequate chlorine to prevent the growth of pathogens and disease outbreaks, while too much chlorine increases the amount of lead leaching from the pipes and additionally causes the formation of disinfection by-products regulated by the EPA because of adverse health effects. Flint had very high chloride levels in the water, averaging 85 parts per million (ppm) in August 2015, compared to Detroit's treated water chloride levels of 11.4 ppm in 2014.

The foul taste and odour of the water were due to the corrosion of iron pipes. Flint has a mixture of iron, copper, and lead pipes running throughout its water distribution system. The taste and odour signalled that the mineral protective layer found inside the iron pipes was dissolving into the water. This corrosion leads to a reduction in disinfectant chlorine in the water.

High levels of E. coli and an outbreak of Legionnaires' disease caused the Flint Water Department to increase chloride levels to kill the bacteria. However, experienced water treatment operators with a knowledge of chemistry would have known that these chloride levels needed to be lowered over time to prevent the leaching of lead from the pipes into the water.

Government seek solution to radar interference from wind farms

Members of the UK offshore wind industry, the military and government are working together to test technological solutions to reduce wind farms' interference with air defence radar systems.

They are yet to decide how costs would be shared, and where mitigation technology would be located – whether on existing offshore wind infrastructure or elsewhere – but remain optimistic that they would find solutions to these issues.

Paul Cooley, director of capital projects at SSE Renewables, said that he believed any costs would be "tolerable" and that the cooperation with the military would help developers complete projects without additional permitting difficulties.

Air Vice-Marshall Linc Taylor from the Royal Air Force (RAF) described some of the proposed solutions as "really promising". He explained the challenge the military faces with offshore wind: "We've got a task to defend the UK from any adversaries coming at us. We have a responsibility to make sure all our airspace is safe. However, these blades spin round at a hell of a rate and they look, to a radar, like a target. But that wind farm is not always running at the same speed. It changes, and that affects our radar." He said that the military's attitude to offshore wind was changing – from previously seeing it as disruptive to radar systems, to now wanting to accommodate it where possible.

The UK government has raised its targets for offshore wind – to 40GW by 2030. By working together, the groups hope to be able to streamline project permitting and development by eliminating obstacles and minimising military objections to wind farms.

Number of English bathing waters classed as 'good' or 'excellent' rises again

The number of English coastal bathing waters classified as 'good' or 'excellent' has risen again according to the latest data from the Environment Agency. The new statistics show that a record 94.7% of bathing waters reached this level, up from 93.3% in 2019 (there was no classification in 2020 due to the Covid-19 pandemic).

More than 70% (70.7%) received the highest rating of 'excellent' while virtually all (99%) passed the Environment Agency's stringent water quality tests. More than twice as many coastal bathing waters are classed as 'excellent' when compared with the early 1990s when less than a third of bathing waters would have met today's standards.

A Water UK spokesperson said: "The outstanding bathing waters we enjoy today, with a record 99% passing water quality tests, are the result of decades of water company investment and different sectors and regulators working towards a common goal. We share the Environment Agency's view that we must not allow complacency to reverse this positive trend, with water companies keen to go further. In a recent report we called for a new 'Bathing Rivers' framework to support the creation of inland bathing sites in every region of England.

"This will not happen overnight but with targeted investment, effective regulation and the cooperation of other sectors, we believe we can do for inland bathing what we have done for coastal bathing."

The 2021 results represent the first time a river has been part of the classification, with the River Wharfe in Ilkley being designated in 2020. It was classified as 'poor' for 2021.

Two decades court case over 'intolerably' loud toilet

Italy's top court upheld the right to protection from noisy loos flushing in the night following a couple's 19-year ordeal in the Gulf de Poets, La Spezia.

The couple, who claimed their neighbour's noisy toilet flush kept them up all night, has won a legal battle which lasted almost two decades. The husband and wife were awarded £420 for every year they had to live with its thunderous flush, totalling £8,000 after the 19-year row.

Their ordeal began in 2003 when four brothers bought a new toilet for their seaside pad next door in Italy's Gulf of Poets, named after the famous writers who lived there. The couple complained about the loud toilet system and took the case to court in the nearby city of La Spezia. They stated how the flush was "intolerable" given that their bed was next to the connecting wall and the bedroom was too small for them to change the layout. But the judge threw out their claim, which they then took to the court of appeal in Genoa, triggering an inspection of the two flats. Investigators found that the flush "prejudiced" the couple's quality of life because it was so noisy. The four brothers then stepped forward to challenge the verdict at the Supreme Court in Rome. Despite the brothers' attempt to save the lavatory, judges ruled in favour of the couple and said the noise "infringed on their right to a good night's sleep."

One Italian newspaper, *Il Giornale*, said the story, while humorous in some respects, pointed to systemic failings. "This is the reality of the judiciary and the reason why the Italian justice system doesn't work," it said. "In far less time than this case took, Albert Einstein wrote the theory of relativity, explaining the whole Universe. At the judicial level, we are a great big, gigantic clogged loo."

Justice Supreme court, Rome, Italy

Six million households face compulsory water meters

6 million households could be forced to install water meters in a bid to cut usage after the Government declared new areas at risk of running dry, despite a fifth of supplies being lost to leaks every day. Water companies have been told to “lead by example” by cutting on waste in their own network by the Government-backed Consumer Council for Water advocacy group for the industry.

Water companies are allowed to force households to install a water meter in areas that have been declared as being at “serious” water stress risk where demand threatens to outstrip supply. Households that refuse water meter installation are placed on a more expensive flat rate, which can add £200 or more to annual bills. However, companies have been criticised for relying on households to cut their usage while they lose more than three billion litres of water every day through leaks.

South West Water, which has had two of its areas newly declared as eligible for compulsory metering, increased its leakage last year despite a target to reduce it by three per cent.

Thames Water, which has the worst record for leaks, at levels twice the national average, started rolling out compulsory monitoring in 2013.

Southern Water, which also forces households to install meters, last year missed its target to reduce its leakage by 50 per cent.

Beach hut ‘cartel’ drama in Weymouth

A ‘cartel’ of elderly ladies in Weymouth have kicked out rival tenants, according to irate owners. Since taking over management of the Greenhill Community Trust in 2019, the three directors have evicted six families and a sea swimming club. They have been accused of acting in a "shameful and snooty" manner.

Families - who have enjoyed the 45 beach chalets for more than 50 years - were told their licences would not be renewed and say they were offered "no explanation".

They say the directors - who are all in their 70s - have kept hold of their own chalets and there is a "waiting list" for new leases.

The management of the chalets was handed from the local council to the community interest company, previously the Greenhill Chalet User Group, in 2019. The chalets are priced at £1,035 per year to rent. The purchase price of beach huts in Britain has soared over recent years. Back in April last year, a report found the average asking price had shot up from £25,578 to £36,034 a year later. The most expensive hut is a 12ft by 10ft wooden cabin on Mudeford Spit, Christchurch Harbour, Dorset, with no electricity or running water, which was sold in July 2020 for £330,000.

Since being evicted, tenants have expressed shock at the lack of communication from the chalet directors. The Greenhill Community Trust said it had been granted a 30 year lease and could manage the chalets as it saw fit.

Portuguese berry growers causing water shortages

Over 1,000 litres of water per second are being pumped out of Santa Clara Lake, on the Algarve, 24/7, with over 90% going to intensive agriculture owned by foreign berry growers, 3% to clean a mine and 6% to locals, who are starting to have their water restricted and in some cases cut off.

40% of the water pumped out - it’s now too low to flow as it should into the purpose-built canals - is lost through insufficient maintenance of the said canals, (i.e. they leak), or it flows, unused, through bad management, into the sea.

The berry growers export the vast majority of their produce to northern European countries and on to supermarkets including Marks & Spencer, Waitrose and Tesco. It’s also an environmental disaster as the berry growers have already bulldozed out of existence rare and meant-to-be protected habitats, for which Portugal received funds from the EU.

The berry growers are domiciled abroad, mostly in the States and Holland and have received tax rebates from the Portuguese government.

Meanwhile the berry growers have put 1,000 hectares of a Natural Park under plastic, far more than they are permitted to do, so a "Natural Park" is now one in name only, disappearing under a sea of plastic while drinking at an ever-increasing rate the only water resource for the whole area.

Rob Moore, manager of Eat Seasonably campaign, said that growing fruit out of its natural season required “a vast amount of water and/or a vast amount of energy”.

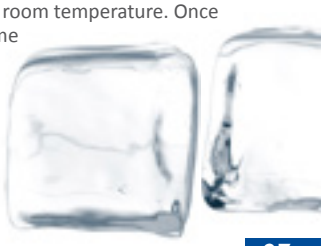
Ice cubes that never melt

A new cooling cube that never melts could revolutionize how food is kept cooled and shipped. The innovation, called jelly ice cubes, stays cold for up to 13 hours and can be reused again - it just needs to be rinsed and placed back into a freezer. Not only are the cooling cubes reusable, but they eliminate cross-contamination that occurs with meltwater and mould found in plastic ice packs.

The jelly ice cubes came about after Luxin Wang, an associate professor at University of California, Davis and part of the research, saw the amount of ice used at fish-processing plants and the cross-contamination that meltwater could spread among products or down the drain.

Gang Sun, a professor at the University of California, Davis and lead researcher, said in a statement: 'When ice melts, it's not reusable. We thought we could make a so-called solid ice to serve as a cooling medium and be reusable.’

Approximately 90 percent of the cooling cubes is made of water and are soft to the touch like a gelatin dessert when at room temperature. Once frozen, the cubes become rigid and turn an opaque colour. They can be reused a dozen times—just a quick wash with water or diluted bleach.



Toxic 'forever chemicals' found in British otters

Toxic "forever chemicals" used in non-stick saucepans and food packaging have been found in otters across England and Wales, according to a study. The substances, called PFASs, are also used in waterproof clothing, stain resistant products and fire retardants. The chemicals are linked to pregnancy complications, liver disease, cancer and other illnesses.

Scientists say concentrations of these compounds in otters are a guide to levels of pollution in the environment. The substances can leach out from products, getting into drains and sewage treatment works - from which they can then escape and contaminate the environment more widely. PFAS substances are present in farmland sludge, which can wash from fields into rivers. Factories and landfill sites are another source for the chemicals. They are known as "forever chemicals" because they don't break down easily in the environment. They contaminate fish, which can then be ingested by animals and humans. PFAS compounds can also get directly into drinking water.

Researchers tested 50 otters found dead in 2007-09 and detected PFASs in all of them. 80% of the animals had at least 12 different types of the chemicals in their livers. Despite subsequent voluntary restrictions by the industry, a similar range of PFASs were found in a more recent sample of otters that died in 2014 - 2019.

It's unclear whether the concentrations of chemicals found in the otters are high enough to cause harm. The otters mainly died in road collisions and so the precise impact of the chemicals on their health is not known.

Ocean temperatures reach new peak in 2021

New research shows that the world's oceans last year were hotter than they've ever been in recorded history — part of a long-term warming trend. According to an annual study published in the peer-reviewed journal *Advances in Atmospheric Sciences*, the past five years have been the five hottest for Earth's oceans since measurements began in the late 1950s.

Since the late 1980s, oceans have been warming eight times faster than they did during the preceding decades, and 2021 marked the third consecutive year in which the previous record for annual energy absorption was shattered.

These trends, the paper makes clear, are due to "an increase in anthropogenic greenhouse gas concentrations."

"We want to stress that global warming is actually ocean warming, and ocean warming has serious consequences," Lijing Cheng, a lead author of the report and professor of environmental science at the Institute of Atmospheric Physics at the Chinese Academy of Sciences, said. "Ocean warming keeps breaking records, which is a reminder that the world needs action to combat climate change."

As excess heat is trapped in the planet's atmosphere, oceans absorb 90% of it, leading to a sharp increase in ocean heat content. Warmer oceans supercharge weather patterns to create more powerful storms, hurricanes and intense rainfall, which leads to deadly flooding.

12 sick and 1 dead after legionella outbreak in Belgium

Twelve people of the Grobbendonk and Herentals regions in the province of Antwerp became infected with the bacterium legionella towards the end of 2021; another has died. It is believed that the legionella spread through the air from bacteria in a water purification plant nearby.

To prevent further contamination, the Agency for Care and Health took various samples from companies and organisations in Grobbendonk and Herentals and used predictive software to map potential infections and sources. On 17 December it was determined that the origin of the small outbreak in the Antwerp province was one of the water treatment plants. “We immediately took action to stop the spread of these aerosol particles. We stopped the activities at all the places on our site where aerosol particles can occur,” said Peter Vandeputte of the Albertstroom water treatment plant where the source was found.

“The contaminations originate from a rare strain of legionella bacteria, so there is a good chance that the source of contamination was only present in Albertstroom. There is always a possibility that there was a second source, but we don’t suspect that to be the case.”

“We and the Agency are confident that the source has been destroyed but we must remain vigilant. That is why the investigation is still ongoing. This is the first time we have experienced this in our company.”

The health agency scheduled a number of sampling sessions over the next few days to make sure there were no other sources of legionella in the area.

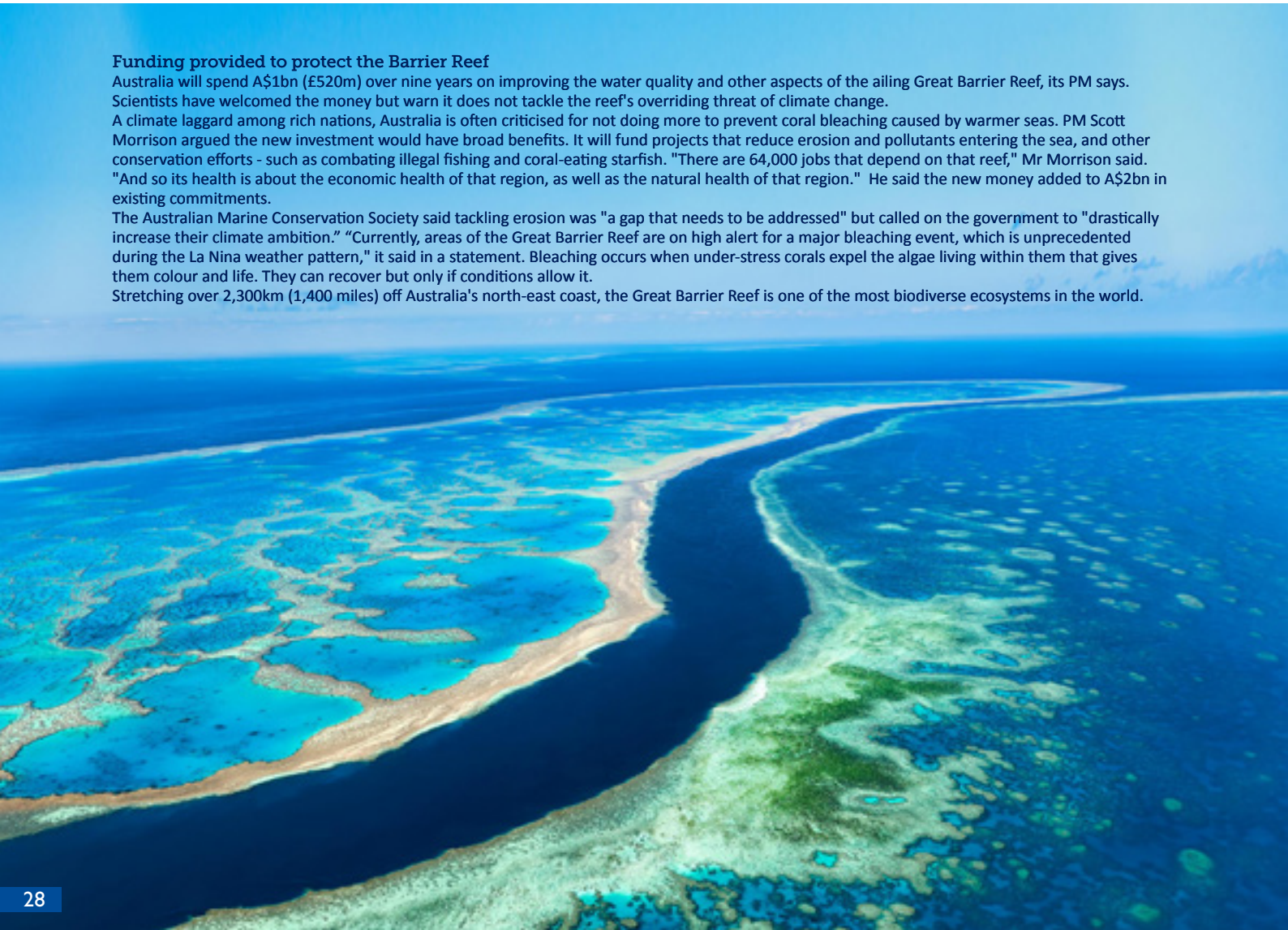
Funding provided to protect the Barrier Reef

Australia will spend A$1bn (£520m) over nine years on improving the water quality and other aspects of the ailing Great Barrier Reef, its PM says. Scientists have welcomed the money but warn it does not tackle the reef's overriding threat of climate change.

A climate laggard among rich nations, Australia is often criticised for not doing more to prevent coral bleaching caused by warmer seas. PM Scott Morrison argued the new investment would have broad benefits. It will fund projects that reduce erosion and pollutants entering the sea, and other conservation efforts - such as combating illegal fishing and coral-eating starfish. "There are 64,000 jobs that depend on that reef," Mr Morrison said. "And so its health is about the economic health of that region, as well as the natural health of that region." He said the new money added to A$2bn in existing commitments.

The Australian Marine Conservation Society said tackling erosion was "a gap that needs to be addressed" but called on the government to "drastically increase their climate ambition.” “Currently, areas of the Great Barrier Reef are on high alert for a major bleaching event, which is unprecedented during the La Nina weather pattern," it said in a statement. Bleaching occurs when under-stress corals expel the algae living within them that gives them colour and life. They can recover but only if conditions allow it.

Stretching over 2,300km (1,400 miles) off Australia's north-east coast, the Great Barrier Reef is one of the most biodiverse ecosystems in the world.



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event report

The Scottish Legionella Focus Group (SLFG) – Legionella Learning

Thursday 24th February 2022 - Glasgow Hilton Hotel

The second Legionella Focus Group meeting took place on the 24th of February 2022 at the Glasgow Hilton Hotel. Despite snow blizzards on the day, the meeting was a great success with over 54 confirmed delegates.

The event was sponsored by Zebec Energy and speakers for the event included:-

Dr Diane Lindsay - Principal Clinical Scientist for the Scottish Microbiology Reference Laboratory in Glasgow. Dr Lindsay has 30 years of experience of working on *Legionella* including the microbiological and molecular diagnosis of *L. pneumophila* and in particular the clinical significance of non-*pneumophila Legionella* species including *L. longbeachae*.

Diane delivered an excellent presentation on clinical legionellosis, how Legionnaires' disease is tested for and then provided some examples of two outbreaks. The first outbreak –92 cases in Edinburgh. Sadly 4 patients died and the source was never confirmed. *L. pneumophila* Sg 1 Knoxville was isolated in 16 of the cases, one of which had a dual infection with *L. pneumophila* sg 10. The second outbreak, 6 cases, in Scotland in 2013 involved potting compost and *L. longbeachae*. Interestingly, during this investigation, over 61 isolates were discovered using whole genome sequencing, including strains from Scotland, Australia and New Zealand. This gave the audience food for thought as there has been an increase of cases in recent years, possibly due to Lockdown.

The second speaker was Mr Alan Watson from Rock Compliance. Alan gave an honest and insightful presentation sharing his experiences during the Edinburgh Outbreak. His company at the time, Chemtech Consultancy, was one of the five companies under investigation by the HSE. Alan reminded us all that the amount of time a risk assessor has to carry out a risk assessment is nothing compared to the amount of time the HSE will have to investigate it, hence risk assessors should be competent, knowledgeable and experienced for the type of assessment they are carrying out. Thankfully in this case they were and all charges were dropped.

Finally, Mr Martin Gorevan, MD Zebec Systems Ltd. Martin gave an interesting talk entitled "Legionella Management, the Present and the Future". It discussed potential future developments such as remote monitoring, rapid microbiological monitoring and the future of the biocide.

The event ended with a question and answer session where our speakers and our committee members, Jemma Tennant Chair and Billy Ingram Vice-Chair, joined the panel to answer any questions the group might have. Thanks to the generosity of our sponsors and the commitment from our speakers, the event was an enormous success.

The next event is scheduled for the 7th of April at the Crowne Plaza in Glasgow and is open to all Public Sector Members.

CONTROLLING LEGIONNAIRES DISEASE IN DOMESTIC HOT WATER (DHW) SYSTEMS

Robert Wilson, Safesol

Abstract

Government figures show that 1,953 MTOE[1] is used for heating Domestic Hot Water in Commercial buildings. This is equivalent to 2.3% of all the energy used in the UK (excluding transport).[2] Heating DHW has a major impact on the UK's carbon footprint.

This paper asks a very simple question. In the light of ever-increasing energy prices and UK's desire to be carbon neutral by 2050, can we justify heating domestic hot water (DHW) in commercial buildings to 60°C to control *Legionella*, when the Health and Safety Executive offers a lower carbon alternative? Reducing DHW temperature to say 45°C (or lower) requires biocide addition and this option is rarely used.

This paper shows that there are considerable savings to be made by heating water to 40°C instead of 60°C even allowing for the cost of biocide addition.

Water heated to a lower temperature loses less energy as it circulates round a building. The question posed is one that consultants, architects, building managers and the water treatment / water hygiene companies dealing with the control of Legionnaires' disease need to consider carefully if we, as a nation are serious about a lower carbon future and the sustainability of our buildings.

Introduction

The present H&SE Guidance[3] offers two methods for controlling Legionella in domestic hot water systems. The first and overwhelmingly the most popular is to heat water to 60°C (or even higher) and circulate it so that the water returns to the calorifier at a temperature above 50°C (55°C in healthcare premises). This technique has been widely adopted by consultants, architects, and the water treatment industry.

Water at 60°C is accepted as a scald risk so an industry requiring the supply, installation, and servicing of thermostatic mixing valves to ensure water reaches the user at a comfortable/safe temperature has been established.

The second means of controlling legionella is to dose an oxidising biocide into the DHW circuit. This method of control eliminates the need to heat water to 60°C so water can be circulated at a lower temperature. This method comes with an additional cost – There is the cost of a dosing system and an ongoing chemical cost, but biocide treatment should eliminate the need to fit TMVs.

The treatments that can be used to control legionella in water systems include chlorine (Para 2.109), chlorine dioxide (Para 2.91), silver stabilised hydrogen peroxide (Para 2.116) and copper/silver ion (Para2.101). All these treatments are effective, and all are mentioned as possible continuous treatment of DHW in HSG 274 Part 2 (Para 2.85 Biocide Treatments). Biocides used must be registered under BPR.

This paper does not comment on available chemical treatments.

Apart from hospitals and other buildings with complex DHW pipe runs, the continuous biocide dosing method is seldom used. In hospitals constant dosing is used with temperature control as a belt and braces treatment as the NHS still regard temperature control as the Golden rule.

At a time when reducing energy use, carbon footprint and sustainability have become important issues for building owners it is, surely, time to revisit the methods for controlling legionella in DHW systems.

Here are some of the issues we need to consider:

1. *Does a change from temperature control to continuous biocide dosing really save energy?*
2. *If the answer is yes, how much energy is saved now and in the future?*
3. *What changes need to be made and is it worthwhile making these changes?*

Let's consider the questions in turn.

1. Does a change from temperature control to continuous biocide dosing really save energy?

A diagram of a typical DHW is shown below. Water leaves the calorifier at 60°C and circulates under pump pressure, round the ring main. Water is used at outlets and the DHW temperature falls as it circulates before it re-enters the calorifier.

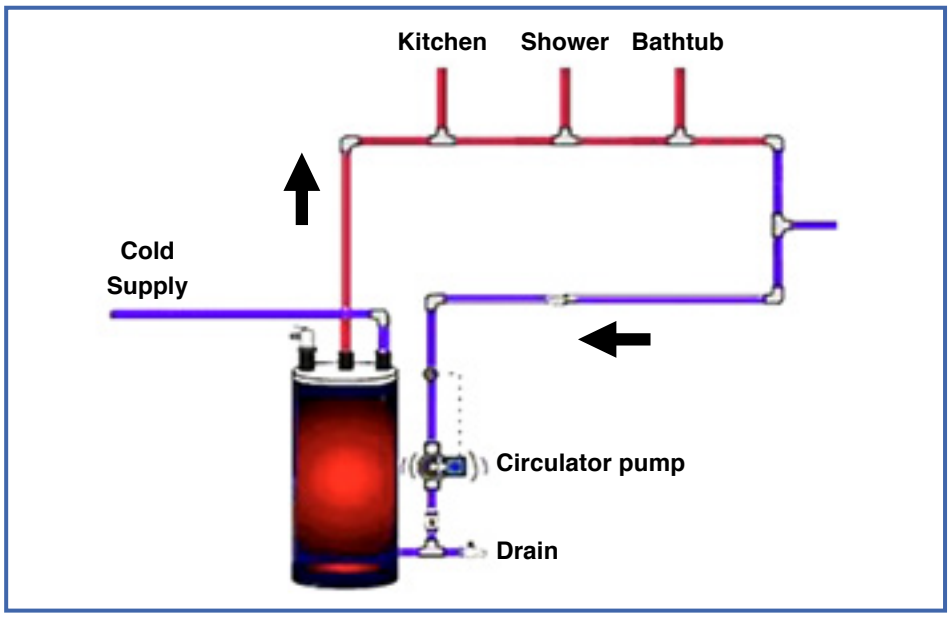

Figure 1 Simple Diagram of a Domestic Hot water System

Notes

a. Water can be heated by LPHW supplied by a boiler, a direct fired heater (Andrew's Type), or by a heat pump.

b. The DHW circuit can be complex involving many outlets over several floors in the building. The longer the circulation loop, the lower the return temperature is likely to be.

c. All DHW pipework should be insulated to minimise heat loss.

Table 1 shows the daily circulation rate of DHW through various pipe diameters – These are average flow rates at a pressure between 3 bar and 6 bar. DHW circuits can be very complex so an ultrasonic measurement of the flowrate in the system will be required to give an accurate result. These instruments are capable of measuring water flow at temperatures up to 80°C and can be hired.

Nominal Pipe Diameter	Linear Flow through Pipe (Feet per sec) Assumes 10 psi - 20 psi	Assumes 15 psi pressure drop through system Tonnes / day
50 mm (2")	13-18	804
65 mm (2.5")	15-20	1400 (derived)
80 mm (3")	16-24	2368
100 mm (4.0")	19-28	5068

Table 1: Flowrates through Pipes of Different Diameters[4]

Most UK domestic houses now have a 28mm main. Commercial buildings – Colleges, schools, offices and hotels will have larger diameter pipes. Flowrates depend on pump pressure, pipework configuration and the materials used so the table is only indicative to show the large volumes of DHW which need to be continuously reheated.

Does Reducing DHW temperature save energy? – First Consideration

While reducing DHW temperature from 60°C to 45°C should save energy, there are two aspects which must be considered.

The first one we need to consider is - If the temperature drops from 60°C to 55°C and water must be heated to get back to temperature, DHW at 45°C will also lose temperature as it circulates and must also be heated back to its original temperature. The example below shows that there is an energy saving to be made by heating DHW to the lower temperature. This calculation was supplied by Teesside University as part of their investigation into energy savings in building.

Calculation 1

The energy saving attributable to the reduced temperature at which the treated water leaves the calorifier is given by **m C p (ΔT** untreated – **ΔT** treated)

Where
m is the mass of water
Cp is the heat capacity
ΔT untreated is the difference between output and return temperature in the untreated system
ΔT treated is the difference between output and return temperature in the biocide treated system.
The return temperature in the treated system is not known and must be evaluated by calculating the cooling curve based on the data for the untreated system

T Return untreated – **T** ambient = (**T** out untreated - **T** ambient) e^{-kt}

From which, assuming similar system dynamics, the two cases treated and untreated, the unknown return temperature for the treated system can be expressed

$$T_{\text{return treated}} = T_{\text{ambient}} + (T_{\text{out treated}} - T_{\text{Ambient}}) \times \frac{(T_{\text{return untreated}} - T_{\text{ambient}})}{(T_{\text{out untreated}} - T_{\text{ambient}})}$$

Example
If we have a DHW system with water leaving the calorifier at 60°C and returning at 55°C and we want to reduce the water temperature to 45°C. The return temperature based on the above equation, would be, assuming an ambient temperature of 20°C

$$T_{\text{return}} = 20 + (45 - 20) \times \frac{(55-20)}{(60-20)} = 42^{\circ}C$$

This means that 40% less energy is used to heat water from 42°C to 45°C compared with heating water from 55°C to 60°C

Note

Water leaving a calorifier at 60°C and returning at 55° (ΔT= 5.0°C) in a building would equate to a return temperature of 42°C if the water were heated to 45°C (ΔT=3.0°C) and 37.5°C if the water were heated to 40°C. (ΔT=2.5°C). These small temperature differences coupled with the large DHW circulation rates in buildings mean significant energy savings.

Does Reducing DHW temperature save energy? – Second Consideration

The second consideration is that when water is used, for instance in running a bath, less untreated water at 60°C is used than when using water at 45°C. The same principle would apply to showers more water at 45°C would be used than water at 60°C

Calculation 2 *(see next page)* shows that in buildings where TMVs are used for temperature control, the energy used to heat the lower volume of water to 60°C will be the same as heating the higher volume of water to 45°C.

These calculations show that the main use of energy in a DHW system is in maintaining water temperature, as the water circulates round the system. DHW use in buildings should be minimise to optimise energy savings and minimise biocide use.

How Much Energy Can be Saved?

Dr C. J. Ennis of the Clean Environment Management Centre (CLEMANCE), Teesside University prepared an interactive spreadsheet[5], that allowed energy savings to be calculated for the DHW circuit in any building.

The variables that need to be inputted are:

a. Energy cost – *Most systems use gas which is cheaper than electricity – Costs are available on Building energy bills.*

b. Tonnes of DHW used each day – *The amount of water used dictates the volume of chemical that must be added to treat the system- Most buildings will have water use figures. DHW use can be estimated from Table 4.*

c. Tonnes of DHW circulated – *The flowrate through the system should be determined accurately using a calibrated ultrasonic meter or equivalent.*

d. Return temperature before treatment. *Available by measurement or by meter on return pipework.*

e. Ambient temperature in the building – *The average room temperature should be established.*

f. The spreadsheet also lets the user input concentration of oxidising biocide, and cost per litre of biocide to generate an annual biocide cost.

Calculation 2

The energy saved when reheating water replacing the volume abstracted by water users is

m treated = **Cp** (**T** out untreated **-T** Cold) – **m** untreated **Cp** (**T** out treated **-T** cold)

However, we require additional water to be supplied from the treated system compared with the untreated system to account for lower temperature. The additional mass is given by

$$\mathbf{m}\ \text{treated} = \frac{(\mathbf{T}\ \text{cold} - \mathbf{T}\ \text{out untreated})}{(\mathbf{T}\ \text{Cold} - \mathbf{T}\ \text{out treated})} \times \mathbf{m}\ \text{untreated}$$

Substituting this into the previous expression yields

Energy Saved

$$= \mathbf{m}\ \text{untreated}\ \mathbf{Cp}\ \{(\text{T untreated out}) - \mathbf{T}\ \text{cold} - \frac{(\mathbf{T}\ \text{cold} - \mathbf{T}\ \text{out untreated})(\mathbf{T}\ \text{untreated} - \mathbf{T}\ \text{Cold})}{\mathbf{T}\ \text{cold} - \mathbf{T}\ \text{untreated}}\}$$

This expression equates to zero.

The spreadsheet calculates daily or annual energy savings for the building depending on the inputted information.

The following section investigates potential savings by switching from a temperature control regime to biocide control in 4 different scenarios. A micro (small office), small (large office), a medium business (office block) and a large business (large hotel / student accommodation).

The results given in Table 4 are based on the energy prices given in Table 2, the flowrates given in Table 1, a calorifier outlet temperature of 60°C and a return temperature of 55°C

The table is purely illustrative, as every building will have its own unique energy cost, DHW use, circulation rate, and calorifier flow and return temperatures.

Energy Costs

Cost comparison websites like Power Compare list the following average prices for commercial gas.

Business Size	Average Annual Usage (kWh)	Average Price (per kWh)	Projected Price (+10%)	Projected Price (+25%)
Micro business	5,000 – 15,000	4.0 p	4.4p	5.0p
Small business	15,000 – 30,000	2.47p	2.7	3.08p
Medium Business	30,000 – 65,000	2.32	2.55	2.90p
Large Business	65,000 – 100, 000	1.94	2.13	2.43p

Table 2: Average Gas Prices

Note 1

Cost comparison sites like www.moneysupermarket.com add at least 1p per kWh to the prices given in the table. The prices given are therefore conservative. Price increases are also conservative as price increases of 40% and above are being forecast on some sites.

Type of building	Consumption per occupant		Peak demand per occupant	
	litre/day	*gal/day*	*litre/hr*	*gal/hr*
Factories (no process)	22 - 45	5 - 10	9	2
Hospitals, general	160	35	30	7
Hospitals, mental	110	25	22	5
Hostels	90	20	45	10
Hotels	90 - 160	20 - 35	45	10
Houses and flats	90 - 160	20 - 35	45	10
Offices	22	5	9	2
Schools, boarding	115	25	20	4
Schools, day	15	3	9	2

Table 3: Typical DHW use in a Building

The use of an Oxidising Biocide will introduce other additional costs that must be taken into consideration.

a. If the temperature of DHW is reduced to 45°C or less, there may be a need to install booster heaters to elevate water temperatures for kitchens or laundries. While this was a concern a decade ago when energy prices were low and stable, most washing machines and dishwashers today tend to operate at lower temperatures – most machines only have a cold-water feed. Booster heaters may still be required in certain buildings and the cost of installation and operation must be considered in the overall energy calculation.

b. It is important that if a system changes from being temperature controlled to being controlled by biocide addition, then the building owner must demonstrate that legionella control is not compromised by the change. HSG 274 para 2.87 indicates that reduction of hot water temperatures should be carried out in stages and temperatures only reduced when efficacy against legionella is confirmed. Monitoring for legionella and biocide levels in the water system should be carried out at each stage. This means that each sentinel outlet should be sampled for legionella as the calorifier temperature is reduced. Normally temperature reduction would be 5°C in 3 separate phases if calorifier outlet temperature is to be reduced from 60°C to 45°C. If Legionella Test results are acceptable then the biocide control regime can be introduced at the dose level being used. Legionella testing thereafter should be like that employed for temperature control. It is important that the level of chemical treatment is maintained throughout the system. This is easily achieved by weekly dosing pump inspection and on-site chemical residual checks.

Table 4 notes

1. These calculations are for illustration only. Each Building will have its own set of parameters, and these must be inputted to obtain actual costs.

2. The illustration uses 2" pipe flow for a micro business, 2.5" for small. 3.0" for medium and 4.0" for large and the corresponding flowrates given in Table 1.

3. Capital costs for dosing equipment, control equipment, and additional water heaters have not been included in this table. Dosing equipment costs vary considerably depending on the oxidising biocide being used. Dosing control systems for all oxidising biocides are available but also vary considerably in cost. The cost of testing, as calorifier temperatures are reduced will depend on the number of Sentinel outlets tested. Complex systems will have higher additional costs, while smaller, simpler systems will require fewer tests and less testing. All equipment and testing costs must be included in the overall evaluation.

The spreadsheet produced by Teesside University also takes this into consideration and cash savings can be

Building Size	Assumed Pipe Diam. (mm)	Avg. DHW Flow (t/d)	DHW Usage Tonne Per year	Energy Cost (p/kWh)	Annual Biocide cost (£)	Annual Energy Saving (£) 45°C	Annual Energy Saving (£) 40°C	Energy Saving (£)	
1	2	3	4	5	6	7	8	45°C	40°C
Micro Business Small Office	50	804	500	4.0	150	14,011	17,514	**13,861**	**17,364**
				4.4		15,412	19,265	**15,262**	**19,155**
				5.0		17,514	21,893	**17,364**	**21,743**
Small Business 60 people office	65	1400	1,500	2.47	900	15,141	18,926	**14,241**	**18,026**
				2.70		16,551	20,688	**15,651**	**19,788**
				3.08		18,880	23,600	**17,980**	**23,700**
Medium Business Office block / Hotel	80	2368	9,400	2.32	2820	36,061	45,076	**32,241**	**42,256**
				2.55		39,636	49,545	**36,816**	**46,725**
				2.90		45,077	56,346	**42,257**	**53,526**
Large Business Hotel / Student Accomm. / Prison	100	5068	45,740	1.94	10290	43,024	53,780	**32,734**	**43,490**
				2.13		47,237	59,046	**36,947**	**48,756**
				2.43		55,000	68,750	**44,710**	**58,460**

Table 4: Comparison of Costs (Present Temperature Control v Biocide Control

reduced accordingly. In general terms chemical costs represent 10% to 20% of the energy savings[6].

Chemical costs can, of course, be reduced by minimising DHW use.

As energy cost rises and as building manager eco-awareness increases there seems to be no real argument against reducing calorifier temperatures. Temperature control is by and large the way it has always been done and water treatment/water hygiene companies may not welcome a change in control regime. It is much easier to monitor sentinel temperatures than to install a dosing system and ensure good chemical residuals around the system. A lower temperature / biocide monitoring regime places more responsibility on water treatment/water hygiene providers as they will be in total control of legionella in the DHW system. Currently they will report out of specification temperatures, and it will generally be the Building Manager's responsibility to adjust calorifier settings.

Architects and Consultants need to consider that heating DHW to 60°C, when there is a lower carbon, energy saving alternative, is not the sustainable option.

It is time Architects, Consultants, and the Water Treatment Industry looked at the alternative option offered in HSG 274 Part 2 (Para 2.85 and following) if we as a nation are serious about energy and carbon footprint reduction.

What Changes need to be made and is it worthwhile making these changes?

The answer to this question really depends on whether the UK is committed to being net zero in carbon by 2050. If we are serious about reducing our energy use and carbon footprint then we should not continue to control legionella in DHW systems by heating water to 60°C when an alternative energy saving method is available.

New Builds

A low temperature biocide control system would comprise a calorifier that heats water to 45°C or 40°C. There is no requirement for TMVs. Water heaters may be required on the DHW, but this is increasingly less likely as more washers become eco-friendly with cold water feeds and surfactants that are improved to clean in colder water.

Prior to changing to biocide treatment on a DHW system the complete water system should be disinfected with the biocide that will be used to treat the DHW circuit. In a well-designed DHW circuit this disinfection should ensure that biocide residuals are established easily when the system is commissioned.

Site personnel should monitor levels daily for the first week and thereafter 2-3 times per week for the first month. In accordance with HSG 274 Part 2 every week thereafter.

Existing Buildings

DHW systems that have been well maintained, have been temperature compliant and disinfected in the past should not present too many issues in terms of biocide addition and control. There will be DHW systems where it will be difficult and sometimes take some time to establish and maintain a disinfectant residual. Water treatment companies will spend more time on site, particularly during the commissioning of chemical treatment.

The H&SE recommend that temperature is reduced in stages so it may take up to 3 months to reduce the Calorifier outlet temperature from 60°C to 45°C (5°C drop per month). Additional monitoring will be required during the turndown period. On site legionella testing may accelerate the process.

It is essential that the building owner gets solid evidence that chemical addition achieves the same control of legionella as the Temperature control regime.

TMVs are no longer required but may be costly to remove. They will receive more DHW with a low temperature regime and much less cold water.

References

1 - MTOE is the acronym for million tonnes oil equivalent and is a method for normalising the energy output of the different fuels used. 1 TOE is the amount of energy released by burning 1000 kg fuel oil = 4.1868 $X10^{16}$ Joules

2 - https://assets.publishingservices.gov.uk

3 - HSG274 Legionnaires' disease: Technical guidance Part 2: The control of legionella bacteria in hot and cold-water systems. This was not new guidance as the **ACOP L8 2001: Control of Legionella Bacteria in water systems** presented similar guidance.

4 - Hydrodynamic design, Part 2 Flows through a Pipe Chubb Michaud C.F wcpconline.com 03.02 2003

5 - This spread sheet which allows energy savings to be calculated is available from website: www.safesol.co.uk

6 - Chemical costs will vary depending on the biocide used and the supplier.

Which Direction Now?

THE WATER MANAGEMENT SOCIETY

A 360° view of water management

Morning Programme:

09:00 – 09:45	**Registration and Refreshments**
09:45 – 10:00	**Welcome & Introduction** *Chair – Ian Penney, DTK Water*
10:00 – 10:35	**BS 7592:2022 - Changes in Legionella sampling** *Matt Morse, Dragonfly Water Consultancy*
10:35 – 11:10	**Remote Monitoring - Are we nearly there yet?** *Dr Paul McDermott, PJM-HS Consulting Ltd*
11:10 – 11:45	**Coffee break**
11:45 – 12:20	**What does an Authorising Engineer really do?** *Peter Alesbury, Royal Botanic Gardens, Kew*
12:20 – 12:55	**Confessions of a Plumber - The 2022 remake** *Sarah Oliver, Plumber aka Sarah the Plumber*

BOOK ONLINE SCAN ME:

TRADE STANDS AVAILABLE

ONE DAY CONFERENCE

Drayton Manor Hotel - 21ST June 2022

Afternoon Programme:

13:00 – 14:00	**Lunch**
14:00 – 14:45	**Roundtable 1 – Monitoring and Testing** *Matt Morse & Dr Paul McDermott* *Moderators: Ian Penney and Emma Jorgenson*
14:45 – 15:30	**Roundtable 2 – Skills and Competence** *Peter Alesbury, Sarah Oliver* *Moderators: David Harper and Colin Shekleton*
15:30 – 16:00	**Summary and Wrap-Up** *Chair – Ian Penney, DTK Water*
16:00 – 16:30	**Close and networking**

6 CPD POINTS FOR ATTENDANCE

The WMSoc reserves the right to alter speakers and/or titles of papers if circumstances dictate. The views and opinions expressed in the event are solely those of the speakers and do not necessarily represent those of WMSoc.

AVAILABLE TO BOOK NOW:
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ANSWERS TO THE ARTICLE IN OUR WINTER 2021-22 ISSUE

CHALLENGES OF NONTUBERCULOUS MYCOBACTERIA (NTM)

Q1: Why are NTM more likely to form biofilms?

Q2: Where are NTM commonly found?

Q3: What controls should be used to minimize NTM contamination in domestic water systems?

1 cpd point

No member responses were received in relation to our CPD activity run in the Winter 2021-22 edition of Waterline. Below are the model answers provided by our expert:

A1: They are more likely to form biofilms as they are quite resistant to disinfectants and antibiotics and the outer membrane is hydrophobic. They produce extracellular slimes which protects them from disinfectants, thus increasing their survival in engineered water systems.

A2: NTMs are most commonly found in:

- Soil, especially peat-rich potting soils
- Natural Waters, especially estuaries and coastal swamps
- Human-Engineered Water Systems, including distribution systems and building plumbing
- Hospital Water, Ice, and Equipment
- Dental Units
- Household Water, especially showerheads and tap aerators
- Refrigerator Water and Ice
- Hot Tubs and Spas

A3: The following controls should be used to minimize NTM contamination in domestic water systems:

- Raise Water Heater Temperature to ›55 °C
- Avoid Stagnant Regions by Removal of Dead Ends
- Avoid Stagnant Water by Regular Flushing
- Place 0.2 Micrometer Pore Size Filters on Taps and Showerheads
- Remove and Clean Showerheads and Tap Aerators Monthly (or as per risk assessment)
- Avoid Exposure to Aerosol-Generating Devices
- Don't Drink Refrigerator Water

If you would like to get involved with this issue's CPD activity, see page 12.

course in brief NEW Online Courses

Launched in February 2022, WMSoc has released 4 online courses for delegates to access on demand from their preferred location. These online learning modules offer 1 CPD hour of learning and give an introduction into several topics as listed below.

W201 Legionella Control & the Law provides an understanding of the UK law with respect to Legionella and Legionnaires' disease, including the various acts, regulations and statutory instruments used for prosecution.

W202 Legionellosis Causes and Impacts of Infection provides an understanding of how people succumb to Legionnaires' disease, how the causal agent grows, who is most at risk and the various outcomes of exposure.

These first 2 modules are ideal for those looking for Legionella awareness training and provide a firm basis for further study. They form part of the pre-requisite for several of our classroom courses and are provided free of charge with those course bookings.

W203 An Appreciation of Hot & Cold Water Systems gives an introduction into the variety of hot & cold water systems in use, allowing the student to recognise common system components, understand their functions and the importance of proper installation in relation to Legionella control. This is ideal for service providers, operators or those wishing to learn more about risk assessing of these systems, providing additional system knowledge and understanding.

W204 Legionella Control of Hot & Cold Water Systems provides an overview of alternative methods of controlling Legionella, other than temperature control, including chemical and physical control options. This includes control with regards to the relevant legislation and guidance and an introduction to some pre-treatment plant available to improve water quality. This is ideal for owners, service providers, operators or those wishing to become risk assessors of hot & cold water systems.

All of our online courses are included in our new qualification routes and add specific knowledge to the various pathways. Further details of these courses and our classroom courses can be found online: https://bit.ly/WMS-Online

IMPORTANT – where the courses are pre-requisite, they MUST be taken prior to attending the classroom course as the exam will cover some elements of the on-line training. Certificates will NOT be issued for classroom courses until the on-line courses have also been passed.

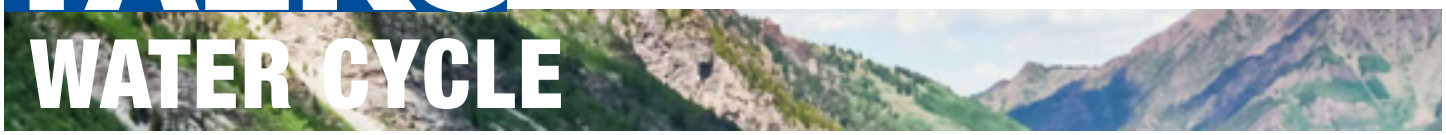
SEE ALL OF OUR TRAINING COURSES AT:
www.wmsoc.org.uk/learning
GET TRAINED. GET CERTIFIED. GET WMSoc. TRAINING.

THE WATER MANAGEMENT SOCIETY

TOOLBOX TALKS

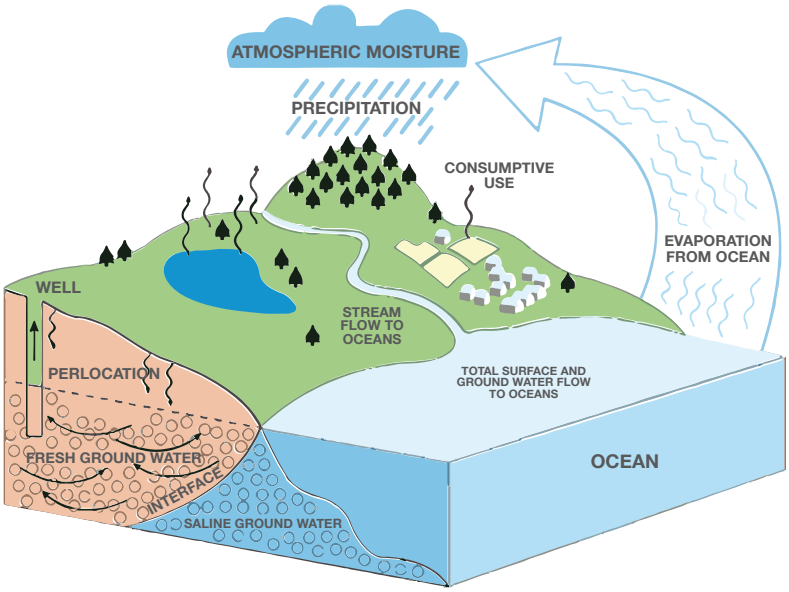
What is the global water cycle?

Earth's water cycle has been around for some 4 billion years. As water on land and in rivers and seas warms, it evaporates and by convection rises up into the cold air above, condensing as clouds which when they become too heavy, fall back to earth as rain, sleet, ice or snow. Rainwater runs off the land into streams, brooks and rivers, or is taken up by the ground and with suitable rock formations permeating to underground reservoirs of water. Some water is held as snow or ice at high altitude or near the planet's poles. During past ice-ages this 'storage' predominated and slowed the cycle.



Evaporation occurs when water changes from a liquid state to a gaseous state. Roughly, some 600 calories of heat energy is required to evaporate each gram of water. Solar radiation and other factors such as air temperature, vapour pressure, wind, and atmospheric pressure affect the process of natural evaporation. Evaporation occurs on land and water surfaces. Also evaporation can be caused by human activities (e.g. cooling towers). Evaporated water is lifted into the atmosphere by **Convection**, as water vapour. Some vapour is always present in the atmosphere, which we measure as humidity. As our world warms, water vapour volumes / humidity in the atmosphere are rising. Water vapour is a greenhouse gas. It is estimated that 86% of global evaporation occurs over the oceans*.

Condensation is the process by which water vapour changes its physical state



Water cycle diagram

from a vapour, to a liquid. Water vapour condenses onto small airborne particles to form dew, fog, or at high altitude, clouds. The formation of clouds is aided by the presence of sea salts, atmospheric ions caused by lightning, and combustion products containing sulphurous and nitrous acids. Cloud forming condensation occurs when the air temperature is too low to sustain the water vapour saturation point. When water vapour condenses back into a liquid state, the same large amount of heat (600 calories of energy per gram) that was needed to make it a vapour is released to the environment.

Precipitation is the process that occurs when any or all forms of water particles fall from the atmosphere and reach the ground. The predominant process is where water drops reach a critical size and the drop is exposed to gravity and frictional drag. A falling drop leaves a turbulent wake behind which allows smaller drops to fall faster and to join and combine with the lead drop. This can produce 'tropical rain'. The other precipitation process is ice-crystal formation. It occurs when ice develops in cold clouds or in cloud formations high in the atmosphere where freezing temperatures occur. When nearby water droplets approach the crystals some droplets condense on the crystals growing them to a critical size from where they drop as snow or ice pellets. As the pellets fall through air, closer to the ground they may melt and change into raindrops.

Dispersion of the precipitated water can be to land or into a waterway. Land precipitated water can adhere to objects on or near the planet surface or it can be carried over and through the land into stream channels, or it may penetrate into the soil, or it may be intercepted by plants. When rainfall is small and infrequent, a high percentage of precipitation is returned to the atmosphere by evaporation as the ground is too hardened to allow penetration. The portion of precipitation that appears in surface streams is called runoff. It is estimated that 78% of global precipitation occurs over the oceans*.

Infiltration is the physical process involving movement of water from the atmosphere's interface with the soil, into the soil. The infiltration rate depends on the puddling of the water at the soil surface by the impact of raindrops, the texture and structure of the soil, the initial soil moisture content, the decreasing water concentration as the water moves deeper into the soil, filling of the pores in the soil matrices, changes in the soil composition, and to the swelling of the wetted soils that in turn close cracks in the soil. Water stored in the soil can eventually become evaporate, transpired water, or subsurface runoff.

Percolation is the movement of water though the soil, and its layers, by gravity and capillary forces. Groundwater originates as surface water. Once underground, the water is moved by gravity. The boundary that separates aerated soil and the saturation zone is called the water table. Some geological formations in the earth's crust serve as natural subterranean reservoirs for storing water. When a water-bearing rock readily transmits water to wells and springs, it is called an aquifer, with precipitation eventually recharging it. Other formations can provide the conditions for water movement such as underground streams, because of the voids or pores in the rocks.

Transpiration is a biological process that occurs mostly in the day. Water inside of plants is transferred from the plant to the atmosphere as water vapour through numerous individual leaf openings. Plants transpire to move nutrients to the upper portion of the plants and to cool the leaves exposed to the sun. Transpiration is affected by the species of plants that are in the soil and by the amount of light to which the plants are exposed. Only a small portion of the water that plants absorb are retained in the plants. Vegetation generally retards evaporation from the soil. Vegetation that is shading the soil, reduces the wind velocity. Forest vegetation tends to have more moisture than the soil beneath the trees.

Runoff is flow from a drainage basin or watershed that appears in surface streams. The flow is made up partly of precipitation that falls directly on the stream, surface runoff that flows over the land surface and through channels, subsurface runoff that infiltrates the surface soils and moves laterally towards the stream, and groundwater runoff from deep percolation through the soil horizons. When each of the component flows enter the stream, they form the total runoff.

In the global water cycle there are three basic locations of water **Storage**, in the atmosphere; on the surface of the earth, and water stored in the ground. The movement of water through the water cycle can be erratic. On average, water in the atmosphere is renewed every 16 days. Soil moisture is replaced about every year. Globally, waters in wetlands are replaced about every 5 years while the residence time of lake water is about 17 years. In areas of low development by society, groundwater renewal can exceed 1,400 years. The uneven distribution and movement of water over time can cause extreme phenomena such as floods and droughts to occur.

** source: https://science.nasa.gov/earth-science/oceanography/ocean-earth-system/ocean-water-cycle*

THE THREE Cs IN WATER MANAGEMENT – HOT AND COLD-WATER SYSTEMS

By Tomek Olesinski, Director, TWO Facilities Management Ltd (www.twofm.co.uk)

When considering water in light of the national H&S regs such as ACoP L8, HSG 274 or HTM 04-01 and other related, I often wonder if there is a robust and applicable way or formula to achieve the optimum results when working on water quality and water systems either in commercial or medical environments.

Based on my experience and water industry publications I have read, I am tempted to choose a path which should incorporate both basic and robust elements of generic risk management.

I would call these elements the 'three Cs': competency – control – consistency.

1. Competency
It is important that whoever has been appointed to be responsible for water management is a trained, assessed and experienced individual. I have come across so called 'Responsible Persons' (RPs) appointed by management whose knowledge of water-risk related issues and current water industry legislation could not be described as 'adequate'. This is not fair on either the business or the appointed individuals in question.

I always compare this with being on a plane – the very fact that I have been a passenger on a plane does not make me the pilot. For that I need training (and lots of it), personal aptitude, experience and to have passed many exams and assessments of my knowledge and skill.

The very fact that the appointment has been made because the individual may have been part of an FM team in the past, or has even had some dealings with water installations, does not necessarily mean that he/she possesses the necessary knowledge and experience in the control of legionella. There is much more to it than that.

I have recently come across FM managers who have been appointed to lead water management programs who thought that the statutory revision of the LRA should be carried out *every* two years (as per ACoP L8 Third edition 2000 and subsequent reprints in 2001, 2002, 2004 and 2006).

It seemed that their knowledge of H&S water regs was out of date considering that the latest revised edition of the published Approved Code L8 2014 regulates this particular statutory action as being done *regularly* (not strictly every two years). That was one of the major changes in the said regs. There are other indicative parameters which govern the revision of the LRA (ACoP L8 or HSG274 para.14) but, they are not driven by a strict time frame. The LRA is a live document and not just one-off paper exercise. This is the '*a-b-c*' in water management practices.

If the business does not have a person who meets this criterion, it should look outside the organisation and fill this appointment with an external specialist accredited/registered by suitable independent bodies (such as the Legionella Control Association). This is evident when dealing with Legionella Risk Assessments (LRAs) – specialist help (external) should be sought when in-house expertise does not cover this area sufficiently well.

On the other hand, I have met RPs who were very knowledgeable about the control of legionella who have made it a sheer pleasure to work with them.

In terms of water management proficiency the ACoP L8 clearly stipulates that the RP *'should be suitably informed, instructed and trained and their suitability assessed'*. It is important for the appointed Responsible Person to have sufficient authority, **competence** and knowledge of the installation to ensure that operational procedures are carried out in a timely and effective manner (see ACoP L8 and HSG 274).

If this is not enough, the same publications (including HTM 04-01 for clinical environments) state that *'inadequate management, lack of training, poor communication, inappropriate maintenance and control procedures can be (not might be!) contributory factors in outbreaks of legionnaires' disease'*. That sounds serious enough to me to be not ignored or marginalised. That's why I make my personal and professional goal to refresh my knowledge of the quoted H&S regs by setting aside time every year to read them from cover to cover.

So, all in all – it is evident, that depending on the level of involvement in the whole water management process, when dealing with legionella, he/she/they should be competent and display clear evidence of appropriate and sufficient knowledge of the subject and water installations.

Both ACoP L8, HSG274 and HTM 04-01 clearly speak about the requirement of competency for appointed management roles because they carry accountability.

2. Control
It is clear that the current ACoP L8 and other related publications speak about the **control** of legionella in the water systems. As the matter of fact, in its introduction the ACoP L8 gives a statement/title *'Legionnaires' disease – the control of legionella bacteria in water systems'*.

Control is a key word.

The control is an essential part of the overall management strategy in monitoring for legionella. The strategy should identify all the elements of the water installation where the risk of pathogenic proliferation might be most relevant.

One needs to realise that we are dealing with a living organism which may and will appear here or there because it is a natural fact reserved to its existential cycle. Yes, it is not the 'friendliest' of living cells, therefore we need to take proactive steps in controlling it so it would not affect health or lives of people's lives.

Control has many facets – one of them is the application of the clearly identified maintenance tasks arising from the above-mentioned H&S publications and translated into a practical maintenance regime in the LRA which aims to maintain the water quality and the water installation in a fit for purpose condition.

Though sometimes those tasks might seem to feel mundane, nevertheless they can and will provide us with important data (like water temperature taking, also called temperature profiling) if e.g., there are any underlying engineering issues which may escalate into a potential deterioration in water quality.

The same applies to the regular flushing of little used taps/outlets and showers – this is essential in reducing the risk of water stagnation not only in the pipe work but also, when applicable, in the cold- water storage tank.

Other engineering solutions such as checking/servicing the TMVs, strainers, filters, expansion vessels, POU filters, cold water storage tanks, CALs, etc. should be incorporated into the overall strategy to maximise the controlling levels to keep both water quality and the water installation in a good and suitable condition.

3. Consistency

If you want to ride a bike, you need to peddle. That is especially relevant if you are trying to cycle up a hill.

If we are not consistent in keeping up the critical speed, sooner or later we will fall off the bike. We need to be **consistent** in keeping the bike in balance.

Consistency in the water management strategy is to follow/apply the controlling tasks (as per LRA) to be delivered by competent personnel. This way the program is set to attain the expected results.

Once the monitoring plan has evolved from the conceptual stage into practical application, we need to ensure that it is delivered, whether we feel like doing it or not. Otherwise, we may (or will!) fall, using our bicycle ride parallel.

Again, from my experience, I have seen good strategies devised for particular environments but a lack of consistent application has dampened the deliverables that were expected. Why?

There may be many reasons; however, one of the most frequently heard is that there is no available staff/skill to carry out basic maintenance tasks. Subsequently this is further explained by the popular 'cost cutting' demands.

These, and many others, might fall under the heading of what I would call the 'business behaviour or ethos' where the lack of willingness to achieve the set goals (progressing with the controlling program) will lead to a loss of consistency in keeping the water and the water systems in a safe working condition.

The effects of lack of consistency may not be immediately visible but, with time, they are bound to breed problems and challenges.

The current water industry regs and the recommendations from the LRA help us to map out what needs to be undertaken and when - so it would be very unwise to not be consistent with their guidance/ recommendations.

So, in summary, if it helps, the three Cs could provide initial steerage when it comes to our endeavours in managing risks in the area of water management, control of legionella.

CONTRACTS, PRODUCTS & PUBLICATIONS

Aquaspira delivers eco-friendly solution to Dalkeith social housing project – Press Release

Aquaspira has delivered an innovative sustainable drainage strategy, designed to reduce 315 cubic metres of excavation and saving around 20 days of construction time, at a new 79 home housing project in Dalkeith. The scheme will provide a mix of two-storey energy-efficient homes and cottage flats.

Mark Stanway from Aquaspira explains: "We were able to rethink the entire approach to construction of the drainage at this site. Seven concrete manholes were original specified each requiring a four metre wide excavation. By using a strong, compact steel reinforced push-fit solution we were able to reduce the number of vehicle movements to site by 60%, as well as cutting the amount of bedding and backfill by half. Our access units also reduced the installation of each manhole from an average of four days to around an hour, delivering dramatic cost and timing savings to the job, as well as providing a far more environmentally friendly and safer solution."

Land utilisation was maximised by using the ground beneath the estate roads for all of the stormwater storage, and a simplified, safer, and accelerated strategy used these UK-manufactured push-fit, large diameter pipes with access units as an alternative to concrete.

The pipes were installed by GBSS Civils and Plant Hire Ltd. Andy Paterson from GBSS said: "The 1800mm and 1200mm pipes were much easier to handle and install than similar size concrete pipes which, together with the rapid, very simple fitting of the prefabricated Access Units, made a massive difference to the job".

Aquaspira is on a mission to deliver low carbon construction solutions. The Lancashire-based company has been investing extensively in research and development which has seen the use of recycled materials in its products increased, as well as using solar power in the manufacturing process. The company is working with the University of Birmingham. This research can make a huge step-change in helping the construction sector achieve Government de-carbonisation targets. Aquaspira's unique light weight composite pipe already reduces the number of vehicle movements and fuel consumption when compared to traditional concrete products. All of these innovations help utility companies, housebuilders and the wider infrastructure and construction sectors reduce their impact on the environment.

Aquaspira was founded in Nelson, Lancashire, in 2007 by an experienced team which wanted to deliver strong, effective low-carbon drainage solutions using the latest composite materials and manufacturing technologies. All of its products are manufactured in the UK.

For more information: https://www.aquaspira.com

VWT UK preventing disruption at Halton Hospital with Hubgrade – Press Release

Thanks to its industry leading Hubgrade digital monitoring system, Veolia Water Technologies UK (VWT UK) was recently able to rectify a water systems breakdown at Halton General Hospital. Resolving the issue within half an hour and without needing to dispatch system engineers, VWT UK utilised Hubgrade to prevent significant on-site disruption that could adversely affect the hospital's level of care for its patients.

Since it was first installed in July 2019, the VWT water treatment system in the Endoscopy Department at Halton General Hospital had provided reliable, efficient performance. The reverse osmosis system, which comprised of VWT UK's Thermapure™ 300 Duplex Unit, as well as the company's Hubgrade digital monitoring system had supplied water to washers in the facility, effectively upholding water quality levels in the process. However, following a sudden change to the hospital's water supply, the system was unable to function – preventing any supply of water.

Simon Whittingham, Service Support Manager for Process Water at VWT UK commented: "Due to the change to the hospital's water system, microbial levels in the water dropped below what the system had been initially programmed to recognise. Unusually, the water had become too pure and was no longer triggering a response from the existing Thermapure™ 300 Duplex Unit. Fortunately, as the client was signed up to our Hubgrade digital monitoring services, we were able to resolve the problem over the phone incredibly quickly."

The experienced team from VWT UK were able to utilise remote access to the hospital's portal dashboard and identify the issue remotely, before recommending an effective remedy to the on-site technicians. As such, Halton General Hospital was able to get the system back up and running within 30 minutes. The use of Hubgrade helped to mitigate the potential for on-site disruption, which could have adversely affected the hospital's patients and staff.

Paul Jones, Halton Estates Team Leader at Halton General Hospital commented: "Thanks to the Hubgrade digital monitoring service we were able to resolve a small technical issue before it snowballed into a disruptive episode, which would have affected work on-site.

The speed with which VWT UK was able to identify and then rectify the issue was really impressive. Ultimately, without Hubgrade in place, we would have had to call a VWT UK engineer out to site and could have potentially lost crucial access to our washer systems for 24 hours."

With Hubgrade, healthcare facilities can benefit from a smart digital solution that allows its users to monitor pure water production, address specific water optimisation needs and respond to challenges throughout the water cycle. The advanced user interface provides complete monitoring of all fixed installations and mobile water treatment units, as well as remote access from VWT UK's dedicated service team to support process engineers and site operators. Additionally, in the event of an issue occurring on-site, Hubgrade can provide real time equipment data and send urgent alerts to users' tablet or smartphone devices.

For more information: https://www.veoliawatertechnologies.co.uk/services/customer-portal-remote-monitoring

Environmental Audit Committee report on water quality in rivers – Defra Press Office Blog

The report calls for action from everyone - the Government, regulators, water companies and farmers - to come together to deliver real change to improve the state of our rivers.
The government welcomes this report and will be reviewing its recommendations carefully before responding later this year.
Our Environment Act has already put in place more protections against water pollution than ever before and we are the first government to instruct water companies to take steps to significantly reduce storm overflows, which we have also put into law.
Increased monitoring and transparency are key. More than 12,000 of England's 15,000 storm overflows now have Event Duration Monitors to capture the frequency and duration of discharges, and the remaining 3,000 will have them by end of next year. All the data is published online so everyone can see what is happening.
We are also doing much more to reduce pollution from agriculture, doubling the budget for our programme which provides practical support and advice for farmers and rolling it out across the whole of England.

To read the whole of this blog visit: https://deframedia.blog.gov.uk/2022/01/13/environmental-audit-committee-report-on-water-quality-in-rivers/

To download the committee report in full: https://publications.parliament.uk/pa/cm5802/cmselect/cmenvaud/74/summary.html

Ideal Standard 'Redefines Hygiene' with Commercial Washroom Solutions

Ideal Standard, the provider of bathroom and washroom solutions, is helping specifiers to create beautiful, sustainable washrooms in a new era of hygiene with its holistic portfolio of design and performance-led commercial products.
The manufacturer has launched a new interactive washrooms brochure and solutions finder, enabling architects and designers to quickly input their requirements and instantly receive tailored information about which products will best suit a projects' needs.
Ideal Standard's innovative, award-winning commercial ranges have been developed to give specifiers everything they need to create more hygienic spaces that are also sustainable, comfortable and elegant. Whether they're used in large hotels, public buildings, high-end restaurants or office spaces, Ideal Standard's products will meet the daily, practical needs of the modern end-user in a post-pandemic world.
Over the last few years, Ideal Standard has brought various hygiene-led innovations to the market, most recently Intellimix. Designed to dispense both soap and water with every use and with the option to display timed handwashing instructions, Intellimix is completely touch-free, guaranteeing improved hygiene standards in public washrooms. Ideal for offices, leisure facilities and other high-traffic environments, such as shopping centres, hotels, restaurants and airports, the fitting significantly lowers running costs while being sustainable and reducing waste.
For more information: https://www.idealstandard.co.uk/

Israeli company aims Miriam's Well water purifier at developing world

Alumor says its solar-powered device uses just four watts of electricity, costs under half a cent per litre. The water tech company has designed an off-grid household water purification system that it says is sustainable, cheap, easy to use, and could provide millions of households in developing countries with clean drinking water.
Throughout the developing world, family members — usually women and children — commonly walk long distances to natural water sources to fill up bottles and jerry-cans. These water bodies can be contaminated by anything from faeces to chemicals, and cause diseases ranging from cholera, diarrhoea, and dysentery to hepatitis A, typhoid, and polio.
To help address this, the Alumor company has developed an appliance that it calls Miriam's Well, after the miracle source that, according to Jewish tradition, provided water to the Israelites throughout their 40 years in the wilderness.
Powered by solar energy, the modern Miriam's Well requires no electric socket.
It is fitted with advanced ultraviolet technology that kills viruses and bacteria to US National Sanitation Foundation standards, and it contains a filter that needs rinsing just a few times a year. Household members will simply connect the device to a jerry-can or other container via a pipe, and press a button.
For further information: https://alumor.tech

GUARDIAN® to expand reach with new commercial strategy – Press Release

Plexus Innovation, the remote technology company that is helping a range of industries with business improvements and enhanced compliance, has expanded its team to deliver an ambitious commercial strategy that will allow even more organisations to benefit.
Kevin Belben has joined Plexus Innovation as Commercial Manager. He brings with him over eight years' experience in the water systems remote technology sector, along with a background in business support, property and telecoms.
Working closely with Plexus Innovation's Managing Director Ian Murray, Technical Director Steve Todd and Antonia Brindle in marketing, Kevin will be concentrating on building commercial awareness and have a customer account focus.
Using his industry insight, as he is well connected especially in water hygiene services, Kevin will be introducing an ever-growing amount of people to GUARDIAN® technology and building further awareness of its many benefits. Kevin, who is from Cheshire, will be fulfilling a UK wide role. He said: "Plexus Innovation really appealed to me as my next career move as the team and I share the same ethics and drivers to help organisations to do things differently, to do them better."
For further information: https://www.plexus-innovation.com/guardian

Investment for fishing ports – gov.uk Press Release 27th December 2021

Fishing communities across the UK will benefit from better infrastructure, strengthened supply chains, new jobs and an investment in skills thanks to a £75 million boost for the sector announced by the UK Government. The investment will strengthen the sector's ability to land more fish in the UK and take them to market faster. This will be achieved by improving the capacity and efficiency of our harbours and processing facilities while boosting the long-term sustainability of the fishing industry and supporting jobs, increasing opportunities for coastal communities and levelling up across the country.
A £65 million infrastructure scheme will be made available for projects such as modernising ports and harbours alongside increasing capacity and efficiency at processing and aquaculture facilities. A competition will be run to identify the best projects, prioritising those that reduce carbon emissions, helping increase the sustainability of the sector and contributing towards the UK's commitment to reach Net Zero by 2050.
Up to £10 million will also be used to encourage new entrants into the processing, catching and aquaculture sectors, alongside training and upskilling current workers. We will do this by offering an improved package of training to people joining the industry and making it easier for people from coastal communities to progress through their career.
The full Press Release can be read / downloaded at: https://www.gov.uk/government/news/75-million-boost-to-modernise-uk-fishing-industry-and-level-up-coastal-communities

Klaran UVC LEDs for Personalized, Portable, and Germicidal Drinking Water Bottle Systems

Article synopsis:

One way to prevent waterborne diseases for safe travelling in regions with unsafe or underdeveloped water sources is by using UVC LEDs, capable of disinfecting contaminated water. Crystal IS has investigated the disinfection performance of a recent commercial development of the portable Purgaty One system (cap+bottle) by analysing test bottles against pathogens and heterotrophic contaminants. The Purgaty One systems are portable stainless-steel water bottles with UVC LEDs in the cap.

This study verified bottles' disinfection performance against Escherichia coli, Pseudomonas aeruginosa, Vibrio cholerae, and heterotrophic contaminants. The study also addressed the public health relevance of heterotrophic bacteria. The bottles were deliberately inoculated with contaminated potable water and disinfection efficacy examined using colony forming unit (CFU) assay for each bacterial strain. The heterotrophic plate count (HPC) method was used to determine the disinfection performance against environmental contaminants at day 0 and after 3 days of water in stationary condition without prior UVC exposure. All UVC irradiation experiments were performed under stationary conditions to confirm that the pre-set application cycle of 55 seconds offers the desired disinfection performance under-tested conditions.

To determine how effective the bottles whose caps were fitted with Klaran UVC LEDs were in disinfection, log reduction values (LRV) were determined using bacteria concentration between UVC ON condition and controls. The study utilized the 16S rRNA gene for characterization of isolates by identifying HPC bacteria to confirm if they belong to groups that are of public health concern.

Purgaty One systems fitted with Klaran UVC LEDs achieved 99.99% inactivation (LRV4) efficacy against E. coli and 99.9% inactivation (LRV3) against P. aeruginosa, V. cholerae, and heterotrophic contaminants. Based on 16S rRNA gene analyses, the study determined that the identified HPC isolates from UVC irradiated water are of rare public health concern. The UVC performance in bottle caps satisfactorily inactivated target pathogens and HPC contaminants even after 3 days of water stagnation.

To contact Crystal IS: Dr. Richard M. Mariita; Crystal IS Inc., an Asahi Kasei Company, Green Island, NY, United States.
Email: Richard.mariita@cisuvc.com

Access peer-reviewed article here:
https://www.frontiersin.org/articles/10.3389/fmicb.2021.719578/full

Canal and River Trust – Take care with our Hump-Back bridges

We're asking drivers to take much more care when crossing the 200-year-old hump-back bridges that span our canal network. Hump-back bridges, synonymous with Britain's canal network, were built 200 years ago for the passage of horse-drawn carts. Today's modern vehicles and HGVs cause up to £1million of damage to bridges each year.

The majority of accidents are 'hit and run', leaving us unable to recoup the cost of the damage from drivers' insurers, and diverting vital funds away from work to conserve our waterways.

Ruth Garratt, our heritage advisor, said: "Bridges are such an important part of the canal's character and the area's heritage. Each time a bridge is hit a small bit of history is lost. If motorists just slowed down a bit and paid more attention, they would save a lot of cost and aggravation. It's important that people respect the weight limit of the bridge and, if they exceed it, then we'd ask them to please find an alternative route."

Not only are these bridge strikes inconveniencing other motorists and the local community, they damage the waterways heritage and are costly to repair. Each time our charity is left to pick up the bill, which is usually in the region of £25,000 to repair.

HSE: Personal Protective Equipment at Work Regulations 1992 (PPER): Consultation response

As you may be aware, changes are being made to the PPER 1992 to align with a court judgment which decided that the Government had failed to adequately transpose Article 8(4) and 8(5) of EU Directive 89/391/EEC ("the Framework Directive") and Article 3 of EU Directive 89/656/EEC of 30 November 1989 ("the Personal Protective Equipment Directive") into UK law.

The UK implemented the PPE Directive through the Personal Protective Equipment at Work Regulations 1992 ("PPER 1992") which places duties on employers and employees in regard to PPE. The duties under the PPER 1992 apply whilst the employee is at work. The employer's duties include the assessment and provision of PPE (where it is found necessary during a risk assessment), ensuring PPE is suitable for use, the maintenance and replacement of PPE, and other duties around the information, instruction, training, and use of PPE. The employee's duties under the PPER 1992 are to report loss and defects in the PPE which they are provided, use the PPE in accordance with the training and instruction provided, and to ensure PPE is returned to the accommodation provided by the employer.

The High Court found that the PPE Directive required these duties to be extended to limb (b) workers. Therefore, HSE is making amendments to the PPER in order to align with the court's judgment.

During the summer of 2021, HSE hosted a formal public consultation on the HSE Consultation Hub on the proposed amendments to the PPER 1992, inviting stakeholders ranging from industrial sectors to businesses and workers and representatives to participate. The aim of the consultation is to understand the impact (costs and benefits) on stakeholders and businesses of extending the scope of the employers' and employees' duties under the PPER to limb (b) workers.

The HSE has published its consultation outcome which can be accessed at:

https://consultations.hse.gov.uk/hse/cd289-amends-ppe-work-regs-1992/?utm_source=govdelivery&utm_medium=email&utm_campaign=guidance-push&utm_term=consultation-outcome&utm_content=ppe-dec-2021

HSE currently plan to introduce the amending regulations in early 2022 and expect the regulations to come into force on 6 April 2022. We will also publish updated guidance to support businesses that are impacted by the changes and ensure workers are aware of their rights in respect of PPE in the workplace.

Spring launches first innovation challenge – Press Release

After a successful launch in December 2021, Spring – the water sector's innovation centre of excellence – has launched its first innovation challenge. This gives innovators of all shapes and sizes the first opportunity to share their solutions with every water company in the UK and Ireland.

Following the results of a Spring community poll, the first challenge theme was announced as Net Zero Carbon – and between 14 February and 25 April, Spring will hold two challenges on this theme. The first is a call for implementable innovations, which address the specific challenge statement "How can a reduction in operational emissions from water and wastewater treatment be achieved?"

This challenge is open from 14 February until 14 March – giving innovators four weeks to submit their solutions. The second is an open call for solutions and ideas within the theme of Achieving Net Zero Carbon, beginning in April. Submissions will be assessed by a panel of water industry carbon experts – and successful innovators will have the opportunity to collaborate with participating water companies.

For our first round of challenges, Spring is partnering with Isle Utilities to learn from their global expertise in utility innovation and change. Erin Zhang, Isle Utilities Project Director for the challenge said: "We are delighted to have joined forces with Spring to support the development and delivery of the first round of Spring Innovation Challenges. Over the last decade, Isle has worked to accelerate the adoption of new solutions and ideas in the water sector. We have been at the centre of the ecosystem, scouting for technologies and forming collaborative projects that lead to their uptake – and we're bringing this experience to Spring. We believe in collaboration and supporting Spring is part of our ambition to continue to drive innovation in the UK to meet the challenges of the next decade."

Carly Perry, Consultant Executive Lead at Spring said: "This is a huge moment for Spring and for the sector. Our first innovation challenge is the first chance to really test our platform and kick-start the iterative innovation process to improve it for future challenges. Operational net zero carbon is, arguably, the biggest innovation challenge the water sector faces at the moment. Our challenges will accelerate solutions water companies can start rolling out, delivering efficiencies and improving the services they provide for their customers.

More information about Spring – including the latest updates on our challenges and full terms and conditions – can be found at: spring-innovation.co.uk.

SEND IN YOUR CONTRACTS, PRODUCTS & PUBLICATIONS NEWS TO:
waterline@wmsoc.org.uk

25 Years of Protecta-Line, protecting our drinking water supply – Press Release

Aliaxis, the global solutions provider, is celebrating 25 years of its Protecta-Line range: the original barrier pipe and fittings system for the safe transportation of drinking water through contaminated land. A complete pipework system approved to BS 8588 requirements and for use within contaminated land, Protecta-Line was first introduced to the market in 1997, when it was the first of its kind. Since then, Protecta-Line has remained the trusted system of choice for water utilities, housebuilders, contractors and installers ever since.

With brownfield land increasingly being redeveloped to make way for new housing and associated infrastructure, specific building products and solutions are required given the potential for high levels of contaminants in the ground. When it comes to ensuring that the water supply network is unaffected and remains safe to drink, Protecta-Line offers external barrier protection, preventing any contaminants in the soil from permeating through the pipe wall, and provides peace of mind for drinking water applications.

While the core Protecta-Line product has truly stood the test of time, with its multi-layer pipe structure and approved range of fittings, various developments have been made over the years: both to expand the size range available and improve the overall system offering. Originally manufactured from 25mm to 110mm in diameter, Aliaxis can now offer Protecta-Line in sizes up to 630mm, providing customers with more choice and added flexibility. New and improved fittings have also been introduced, including an updated version of the stainless-steel mechanical fitting range in 2012 and, more recently, a complete range of self-tapping ferrules with stainless steel straps in 2021.

Speaking about the 25th Anniversary, Rich Pedley, Segment Manager – Infrastructure Networks at Aliaxis UK said: "The Protecta-Line system has been installed for over 25 years and has truly stood the test of time – testament to its continuous innovation and superior performance. In those 25 years, we've supplied enough pipework to stretch from our Huntingdon manufacturing facility here in the UK to our Sydney office in Australia and back again. We're proud that it continues to be the solution of choice for safely transporting drinking water through areas of contaminated land, used by contractors, developers and water utility companies throughout the country. Here at Aliaxis UK, we are always looking for ways in which we can further improve, develop and expand the system offering as a whole. We have exciting plans for innovation in the future, so be sure to keep your eyes peeled…"

Manufactured to BS 8588, the comprehensive Protecta-Line system offering incorporates a diverse range of fully approved fittings for various jointing methods, meeting every customer's individual requirements.

For more information on the Aliaxis Protecta-Line range, please visit: www.aliaxis.co.uk/Protecta-Line

Protecta-Line pipe

BioProbe Diagnostics to launch Rapid Legionella DNA Test

Dr Kate Reddington and Dr Thomas Barry are the founders of BioProbe Diagnostics which has developed a fast and highly sensitive testing kit for the detection of the bacteria that cause potentially fatal Legionnaire's disease. The traditional culture method of testing for Legionella only detects bacteria capable of growth and takes up to 14 days to get the results. "Our test is a breakthrough in a number of respects not least because the testing time is reduced to two-three hours," she adds.

Bio Lp-1 is a novel testing solution for the detection of Legionella pneumophila in water. A rapid and highly sensitive qPCR test, it detects and differentiates between Legionella genus, L. pneumophila (serogroups 1-16) and L. pneumophila sg1, in a single sample. Winner of the 2020 EU Fast Track to Innovation Award, this breakthrough technology has the capacity to transform the environmental global testing landscape for the human pathogen Legionella.

This novel method, using real-time PCR, provides accurate, reliable, and fast results within 24 hours, often the same day.

The company is aiming the kit at the domestic, UK and European markets, and typical customers will include companies operating in the environmental testing, water testing, industrial water testing and food production industries.

"Because Bio Lp-1 has been designed in an open-standards manner, it will work on the leading instrumentation already available on the market. This means that testing laboratories do not need to invest in costly specialised equipment to use our product," Dr Reddington says.

For further information: https://bioprobedx.com/bio-lp-1/

WMS MEMBER FEEDBACK

THE WATER MANAGEMENT SOCIETY

"I am retiring soon, so I regret I will not be renewing my membership. May, I take this opportunity to express my appreciation for the outstanding work the Water Management Society does in providing detailed information and support to the many issues relating to water safety and compliance.

It has been a pleasure to be a member of the Society and wish you and all your members the very best for 2022 and beyond.

Kind regards,
Michael C Holden
IEng FIET MWMSoc"

Aqua Enviro experiences of the pluses and minuses of Hybrid events- how does it all add up? – Press Release

Are hybrid events here for good?
Combining in-person and virtual participation should be the best of both worlds. Clearly, the major plus is that those with busy schedules or facing company restrictions can attend online, present and participate without the need to travel and can join in from nearly anywhere in the world. It also allows an event to host many attendees without sacrificing quality, engagement and participation. We did learn that there is nothing like seeing people live though…
Aqua Enviro were one of the first in the industry to offer hybrid events last year; it was fantastic to see people face-to face greeting each other again, we overheard one delegate asking another if they could give them a hug. Another really made the most of the hybrid format; attending online before he took the dog to the vet and then arrived in person. We found that we had lots of people participating live from Europe and further abroad but very few from Scotland (all online), reflecting the differing government attitudes to covid restrictions. Let's hope we'll have them all again this year.
One of the useful things to come out of the blend of formats is that it makes the chair's job of asking questions after a talk less seat-of-the-pants; questions from the online audience are visible soon after the speaker makes the point, which means the chair can prioritise or combine these early questions ready to ask as soon as the talk is finished. This gives time for the microphone to make its way to the live audience for the next question, a definite improvement.
For the organisers, they are running and paying for 2 event platforms, but the added level of opportunity for participation should see hybrid events continue to thrive. Aqua Enviro's next hybrid conference is the European Wastewater Management Conference & Exhibition (EWWM), 12-13th July, Birmingham, the live event will once again be streamed to a virtual audience to offer a fully inclusive experience.
Aqua Enviro are now inviting 1-minute video abstracts from potential speakers who wish to present at this flagship conference. Poster abstracts are also welcomed. For full event details visit; www.ewwmconference.com or email Frances: frances.woodhead@aquaenviro.co.uk

Aqua Enviro is a specialist environmental consultancy, conference and training provider in the water, wastewater, bioresources and biowaste sectors. Web: aquaenviro.co.uk | Phone: +44 (0)1924 242255.
Other queries?
Contact: clare.hunter@aquaenviro.co.uk
Phone: 07792 727 810

French health agency Santé Publique France announces reduced LD cases in 2020

Cases of Legionnaires' disease reported to the French health agency Santé Publique France decreased in 2020, confirming a downward trend evident over previous years. According to figures provided by the French public body, the number of legionellosis cases was lower than 2017, and 2019 but slightly higher than in 2016.
The results of environmental and microbiological epidemiological investigations carried out by the agency show that water from sanitary networks remains the primary source of contamination for cases of legionellosis.
For the agency, this highlights the importance of preventative measures, monitoring, and controlling the risk of Legionella in water networks. However, some water networks are not subject to Legionella monitoring as it is currently compulsory only for hotels and public offices. This situation should be improved by implementing the recently revised EU Drinking Water Directive (DWD), which extended the monitoring of the Legionella bacteria to every potable water system in the EU as part of the new risk assessment analysis.
Despite the positive downward trend in cases, legionella remains a matter of public concern in France.
In August, a spa near the city of Meaux was closed by the local health agency after an outbreak of Legionella that led to the hospitalisation of some clients.
A deadly case of Legionnaire's disease also occurred in the northern district of Marseille at the end of July. In June, Legionella was detected in a thermal bath in Saujon, New Aquitaine, forcing the closure of the establishment for the whole summer season.
In the same region, a high school in Jonzac was closed as Legionella bacteria colonised the showers. The 130 resident pupils were sent home until the problem was solved.
New Aquitaine's deputy director-general for education, Philippe Mittet said that Legionella is "a classic, well-known event which affects two or three high schools out of the 295 public high schools in New Aquitaine each year."
All cases occurred in summer when the rise in temperature makes water systems, and cooling towers warmer, creating an ideal environment for spreading bacterial cultures of Legionella.
The vast majority of detected cases – 1248 out of 1328, 94% of the total – were due to the species Legionella Pneumophila serogroup 1. Likewise, almost all of the strains isolated were from Legionella Pneumophila – 293 from serogroup 1 and 20 from other serogroups. Four strains belonged to the species Legionella longbeachae, which grows into the soil and is not relevant for water.

VWT UK provides boiler water treatment for innovative waste recovery facility – Case Study

At the facility, three technologies are brought together to treat household 'black sack' waste. Mechanical treatment sorts and separates recyclable items and biodegradable content from the rest of the waste. Anaerobic digestion technology is used to process the food and biodegradable material in order to produce renewable energy as well as a compost material. All remaining waste is then used to fuel an advanced thermal treatment (ATT) plant. The process creates synthesis gas (syngas) through gasification, which is then used to produce high temperature steam to generate renewable electricity in a turbine. The site is able to produce enough energy to power around 11,000 local homes. It also diverts 97% of its local area's waste from landfill, providing a more sustainable solution to waste management and reducing the costs to the local council.
High quality water for the steam generation is an important factor in the operation of the power generating assets on site. The existing water treatment solution consisted of three different chemicals and while it was working when properly dosed, the management of the chemicals, which had to be manually controlled, was complex and time consuming. The chemicals were often overdosed, requiring a blow-down – discharging water from the system and replacing it with feedwater – to correct the imbalance.
David Broster, Business Development Manager at VWT UK explained: "Through meetings with the customer, we ascertained that a robust chemical treatment programme was required to help them comply with boiler water standards and the steam turbine manufacturer's specification for steam quality. Specific requirements for the customer were control over pH and conductivity levels within the steam and condensate return, and boiler water."
"We recommended Hydrex 1815, a neutralising amine product that would allow control of the pH of the steam and condensate to support the inhibition of corrosion in the steam and condensate lines. This was complemented by the addition of our oxygen scavenger Hydrex 1316, which is ideal for high pressure boiler water applications."
The system has been set up to add the chemicals via a measured continual feed, with minor adjustments made by the team on site as and when necessary. Minimising overdosing has reduced the facility's overall chemical usage and made it more predictable, allowing a cost saving to be made. The customer has also cut the amount of additional water needed by reducing the need for blow-downs – further lowering costs – and minimised the time spent managing the process.
For more information about VWT UK visit: www.veoliawatertechnologies.co.uk.

SPATEX 2022 post-show Press Release

SPATEX 2022 had an overwhelming sense of the feel-good factor! Stands and aisles bustled with happy visitors and the sound of chatter filled the air – there was something tremendously comforting about SPATEX returning to its 'normal,' familiar formula.

It was the camaraderie of the 1,545 unique visitors and the hundred plus exhibiting companies including WMSoc, and their combined sense of joy at being able to reunite under one roof once more, that meant the 25th SPATEX 2022 was universally declared, the BEST show to date. That almost tangible, warm feeling that comes from doing good business was in abundance from the moment the show opened, right up to the minute it closed.

Aside from a vibrant exhibition hall brimming with shiny new product, the two seminar arenas also welcomed a steady flow of traffic, with delegates keen to pick up valuable information and tips. Over a third of visitors sampled the unrivalled double seminar and Workshop programme, hosted by esteemed industry associations ISPE, STA, PWTAG and more.

Thank you from the SPATEX team. You make SPATEX the industry success story it is, so a heartfelt thanks to all our fabulous visitors and exhibitors. You were brilliant! Inspired by the energy of the 2022 show, we aim to build on its 25-year foundation and move into the next exciting phase. Watch this space!

To read all the testimonials: https://www.spatex.co.uk/2022-testimonials

The 26th edition, SPATEX 2023, returns Tuesday January 31 to Thursday February 2 at the Coventry Building Society Arena, Coventry CV6 6GE. For more info, please contact: helen@spatex.co.uk or michele@spatex.co.uk Tel: +44 (0) 1264 358558

Vaisala introduces a new immersion type temperature transmitter for data centres - Press Release

To support the growing demand for uninterrupted data, Vaisala, a global leader in weather, environmental, and industrial measurements, expands its product portfolio for data centres by launching the new immersion type Vaisala TMI110 Temperature Transmitter.

Vaisala's instruments monitor the conditions and energy efficiency of data centres that maintain the digital environment. With lots of powerful hardware concentrated in one place, data centres must be kept cool and safeguarded against both external and internal environmental influences. As a result, data centres consume significant amounts of energy.

"The new Vaisala TMI110 completes Vaisala's product portfolio for data centres. It is a great addition to our measurement instrument selection for data centres as now our customers can source all of their most important sensors from one supplier – air temperature, humidity and differential pressure sensors for rooms and ducts, outdoor weather sensors, and now immersion temperature sensors for cooling systems," Vaisala's Product Manager Anu Kätkä says. "Cooling is critical to maintaining temperature and humidity at the optimal level for reliable server operations. The TMI110's accuracy is ±0.1°C, which is really good news for data centre operators as well as for the environment. Even the smallest fluctuation in cooling temperature can have a significant impact on the overall running costs and environmental impact of the energy hungry data centres."

The new immersion type Vaisala TMI110 Temperature Transmitter is supplied with a calibration certificate and it offers excellent response time. The product will be available during the first quarter of 2022. For more information: Miia Lahti, Communications Manager, Industrial Measurements, Vaisala. +358 50 555 4420, comms@vaisala.com

Building on over 85 years of experience, Vaisala provides observations for a better world, with space-proof technology even exploring Mars and beyond. We are a reliable partner for customers around the world, offering a comprehensive range of innovative observation and measurement products and services.

https://www.vaisala.com/en

Start-up AquaSwitch secures seed funding to build water price comparison website - Press Release

AquaSwitch, a new tech start-up, has secured £156,000 of seed funding at a £1m pre-money valuation as part of its plan to deliver much-needed transparency and choice to the non-household water market. The funding has been raised to build the first fully automated price comparison website that offers a fair, independent view of all business water tariffs available in the market.

AquaSwitch's co-founders, Ben Brading and Tom Melhuish, have extensive experience in disruptive tech businesses having worked at Cazoo, uSwitch and Exodus, where they played a significant role in transforming their respective industries to provide greater consumer choice and value.

The English non-household water market deregulated in 2017 with the aims of bringing greater choice, lower bills and improved service standards to its 1.2 million customers. Four years later, 85% of the market has never switched from their default water retailer.

Sarah McMath, MOSL(market operator)'s Chief Executive, reflected in a recent industry forum that if you evaluate the water market in terms of the "ability for the customer to choose their retailer and ability for them to save some cash, then the market isn't working".

On AquaSwitch's plans to revolutionise the water market, Ben comments: "The water market is difficult to navigate for business owners; there's no easy way to find out if you're paying too much for water or which retailers offer the best alternatives. Since it's not easy, most do not bother. We believe that comparing water tariffs offered by different retailers should be achievable in just a few clicks. We are delighted to have secured investment to make this a reality."

Angel Investor, Mehul Hirani, participating in the funding round added, "The business water market is worth £3bn per annum and is yet to enjoy the benefits of digital transformation that AquaSwitch will deliver."

For more information, please contact Ben Brading on 0203 086 8225 or email: ben.brading@aquaswitch.co.uk

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TECHNICAL Q&A

SENT INTO WMSoc. TECHNICAL:

Q: My customer is using rainwater systems with filtration and UV treatment on their sites for hand washing and toilet flushing, they are also using 10-litre point of use water heaters. They have been advised by one of the water treatment companies looking after their sites in England that they don't need to check the monthly temperatures of the water due to the nature of the systems on-site and that it only needs to be done once a year? The guidance states monthly but as these are different systems would you agree or disagree with the above recommendation of annual temperature checks as being sufficient or not?

A: ANSWERED BY THE WMSoc. TECHNICAL COMMITTEE:

The HSE's guidance on monitoring small systems does not specify monthly temperature checks, but it does set several preconditions for this to be appropriate; see information box 2.2 in HSG274 part 2.

Info box 2.2: Low-risk systems*

An example of a low-risk situation:

- in a small building without people especially 'at risk' from legionella bacteria;
- where daily water usage is inevitable and sufficient to turn over the entire system;
- where cold water comes directly from a wholesome mains supply (no stored water tanks);
- where hot water is fed from instantaneous heaters or low storage volume water heaters (supplying outlets at 50 °C);
- where the only outlets are toilets and hand washbasins (no showers).

In order to decide what would be an appropriate scheme of control and monitoring schedule for these systems, they need legionellosis risk assessments. We suggest you also refer to the WMSoc guidance on Harvested Rainwater Systems for other considerations.

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DO YOU HAVE A QUESTION FOR OUR TECHNICAL COMMITTEE?

Send in your question via email to: admin@wmsoc.org.uk

The Big Bang to Water Scarcity and Risk Management?

By Warren Bradshaw
MWMSoc, (IEng) MI Water, MIHEEM, Grad IOSH

In July 2021 on what is considered to be a hot summers day in Scotland, I decided to go for a paddle down my local river (the river Spey). It's the fastest flowing river in Scotland and has amazing scenery. As I set off from Boat-a-Brig under the railway bridge, I noticed how I could see the bottom and thought this a little strange from previous excursions. As I meandered down stream and started to scrape the bottom in places, then having to get out and pull/ walk my kayak down parts of the Spey, I realised what climate change meant to me.

In July 2021 the Times reported:
"A long hot summer looks set to test Scotland's water resilience to the limit as the country becomes the official driest part of the United Kingdom.

Conditions now mirror those of 2018 when a particularly dry spring was followed by a bone-dry June, prompting Scottish Water to take emergency measures to replenish areas running short on supplies."

With further reports on concerns from the Environmental Protection Agency in October 2021, looking towards the future for a potential drought situation in 2022. Luckily this was averted due to high rainfall over the coming months.

More recently, like many suffering 7 days of power outage after Storm Arwen and looking forwards to a compensation payment which still hasn't arrived; when writing this article my energy supplier promptly sent through a letter telling me my energy prices were to rise dramatically.

Scottish Water uses 442 Gigawatt hours (GWh) electricity each year– enough to power nearly 140,000 homes, to provide potable supplies and treat waste water from homes and businesses. It is simple economics that with this amount of energy being required to supply us with 1.5 billion litres of water annually and the whole country braced for rising energy bills, those costs will undoubtedly be passed onto the consumer. Water will start to become a lot more expensive.

After three years of drought, in January 2018 the South African city of Cape Town was just 90 days away from turning off the taps. Residents were warned they would have to collect rationed water from centralised water centres.

There was a campaign slogan 'if its yellow, let it mellow', which helped slash domestic usage, as did dirty shirt competitions, challenging participants to wear clothes for as long as possible between washes. While in this instance this city dodged a bullet, other major cities might not be so lucky in the future.

The UK Environment Agency has repeatedly warned that London, and the rest of south-east England, will not have enough water by 2050 unless we change our water-wasting ways.

It is estimated that 4 billion people live in areas that suffer from freshwater shortages for at least one month annually. This is predicted to rise to between 4.8 billion and 5.7 billion by 2050. Reasons include climate change, polluted water supplies and increased demand due to both population growth and changes in behaviour.

A topic of discussion about water consumption is consumers have the perception that water is all around them so do not consider waste. Over 70% of the Earth's surface is indeed covered with water. However, only around 2.5% of that is fresh water, the rest is saline. And most of the fresh water is locked up in ice caps, glaciers and permanent snow. Less than 1% of Earth's water is available for drinking.

A number of years ago in some remote parts of Scotland communities started to experience, what appeared to be these sudden issues springing up (pardon the pun) with water scarcity in surface and shallow private supplies. With several notable projects having to be implemented for schools and other local government amenities to stay operational,

where shallow wells had been supplying parts of these remote communities for years suddenly drying up due to drought.

At this time, the most viable low risk alternative to this problem was drilling a borehole; to find what was hoped to be an endless supply of water. Looking back at the resilience planning completed across the Highlands for these challenges and in preparation for the potential scarcity to affect many other supplies, a program of borehole projects were implemented. Literally sinking £25k on average into a fully functioning potable supply. Many larger local government organisations and businesses planning for water scarcity and to ensure resilience to their water requirement were doing the same thing, predominantly this demand was seen in the whisky industry and agriculture.

There were, so it was naively thought, less issues with these deep bore solutions. Although, due to modern farming methods and other industrial processes, natural underground formations have created all sorts of interesting water chemistry issues that can create remediation challenges, these deep bore solutions still appeared to be the only option.

A joke was circling at the time when these considerations were on the table about the film the Big Short in which Michael Burry (Hedge Fund Manager) played by Christian Bale announced at the end of the film to be investing in Water. Water use has grown at more than double the rate of the world's population increase over the past 100 years.

By 2025, it is estimated 1.8 billion people will live in areas prone to major water scarcity & 2/3rds of the world's population will be living in water-stressed regions.

Burry stated in an interview:
"What became clear to me is that food is the way to invest in water. That is, grow food in water-rich areas and transport it for sale in water-poor areas"

"This is the method for redistributing water that is least contentious, and ultimately it can be profitable, which will ensure that this redistribution is sustainable" – Source. NY Mag

Water scarcity is regularly reported in Waterline with industries such as whisky and agriculture heavily investing in water sustainability, with abstraction licenses becoming problematic in certain areas, securing supplies such as aquifers makes sense. The next question will be if the demand for surface water and boreholes become too heavily regulated as water scarcity becomes far reaching, what will be the next step in sustainability?

Radon and Other Water Contaminants
At one particular site in Scotland suffering water scarcity from a well; a borehole was drilled successfully yielding water (which is not always the case). After subsequent testing the water was found to be out of specification for gross alpha (origins undetermined), radon, lead, aluminium, iron and manganese. The supply failed for bacteriological contamination as well.

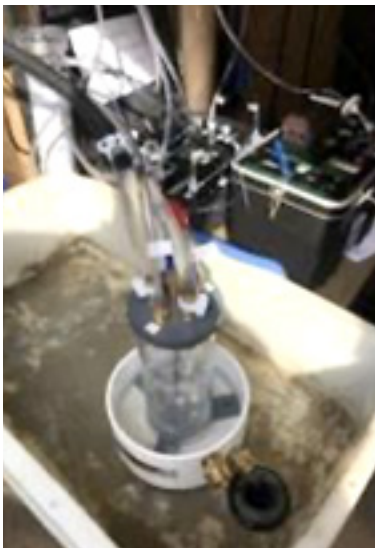
When managing private water supplies the main guidance utilised to inform the risk management process was BS 15975 and WHO guidance for managing risks surrounding water sustainability and risk management in supply.

Initially to remove the iron a Shakesby filter with iron removal media was specified. It is a propriety catalytic filter with media that accelerates the reaction between oxygen and iron. As a catalyst, it is not used up in this action and is classed as a permanent medium.

The filter automatically back washes and uses a flow rate half that of the service flow rate. All comparable iron removal filters pass wash water to drain, so using a filter which reduces the loading on the drain system can have tangible benefits especially in interesting sites where drainage is limited.

The components within the filter can induce air into the incoming water, vent off excess air and unwanted odours, such as hydrogen sulphide the rotten egg smell, and retain the iron deposits.

Having previously used other filter systems that utilised a 1/3 of the vessel filled with gravel, it was found this could affect performance and can be difficult to service, with one particular installation, that had been in place for a number of years, tested for a full suite of contaminates specially in the fine and course gravel filters. The initial results showed high radon levels, but with no evidence of daughter products notably lead 210 or polonium in the system.

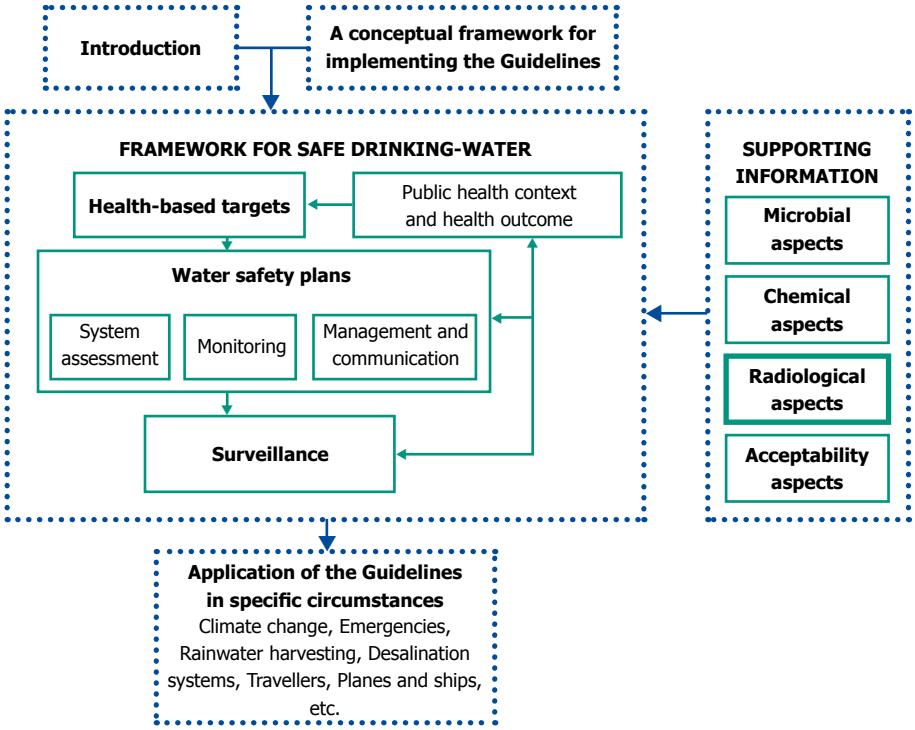


Remote Monitoring Equipment for Radon in Water

There was confidence that this filter should be used first to remove the iron. Past experimentation of remediating for radon, by first using gassing off in a tank, created a maintenance issue. Taking the iron out of solution sludged up the tank so that there was a reduction in the air compressors' ability to gas off radon in solution through the gassing off tank.

One of the areas to be aware of when filtering water with radiological hazards is their ability, if caught in a filter, to produce daughter products through secular equilibrium. This is something that had been tested for using a special courier and radiation protection expert on a number of existing supply systems on existing media that had been in place, in some instances, for a number of years and poorly maintained.

From previous testing completed in gravel type filters it was determined these had a low risk of contamination from radon. In filters such as activated carbon (bone charcoal) this could remove the radiological contaminants and if permanently exposed to the hazard could become dangerously radioactive. In the case of radon, the filter could be removed and placed to one side, waiting for the relative half life of 3.8 days to pass before normal disposal. The site team were reluctant to look at this as an option due to potential exposure to maintenance staff.



Ref: Interrelationships among the individual chapters of the Guidelines for drinking-water quality in ensuring drinking-water safety; Page 7; Management of RADIOACTIVITY in DRINKING-WATER; ISBN 978-92-4-151374-

Referring to WHO Guidance Document Guidelines for Drinking-water Quality FOURTH EDITION

Table 9.4 Treatment performance for some common redionuclides*

Element	Coagulation	Sand filtration	Activated carbon	Precipitation softening	Ion exchange	Reverse osmosis
Strontium	xx	xx	x	xxxx	xxx	xxxx
Iodine	xx	xx	xxx	x	xxx	xxxx
Caesium	xx	xx	x	xx	xxx	xxxx
Radium	xx	xxx	xx	xxxx	xxxx	xxxx
Uranium	xxxx	x	xx	xxxx	xxxx	xxxx
Plutonium	xxxx	xx	xxx	x	xxxx	xxxx
Americium	xxxx	xx	xxx	x	xxxx	xxxx
Tirtium	Not possible to remove (some removal by aeration of water, not quantified)					

*x = 0-10% removal; xx = 10-40% removal; xxx = 40-70% removal; xxxx = > 70% removal.

If lead 210 (half life 20.4 years) or polonium 210 (half life of 140 days) was discovered in any of the media that were tested; an application for a Non-nuclear RSR: environmental permit would have been required and the product of misfortune disposed of very differently.

It was determined that the iron reduction filter (Shakesby) would also remove or reduce down to a compliant level the manganese and the lead. After installation of the Shakesby, post samples showed this not to be the case and post Shakesby sampling showed high levels of lead and manganese.
After installing the gassing off tank which had adjustable external air compressors pushing air through perforated pipes into a very well sealed tank. The vents to the tank were connected onto radon removal fans (forced extraction) which vented to atmosphere.

Head of the borehole and flow through expansion vessel

Internal photograph of perforated pipe installed in gassing off tank

On a previous project it was found that the air compressors were not sealed from the internal tank room. This caused the air compressors to push radon gas back into solution and reduce the effectiveness of the treatment process. The tank was a specially sealed unit, with overflows and vents with air tight seals. Learning from previous mistakes when trying natural ventilation methods to gas-off radon to atmosphere especially when the water supply is in a high demand situation. It was decided that the lowest risk solution to remove the radon to atmosphere was a forced mechanical radon ventilation system.

WHO guidance reports successful remediation for radon of up to 98% passing air through the water. After some experimentation the systems being installed were achieving 89-93% remediation. This was due to the length of time allowed in the tank and system usage which could reduce contact time for the water in the gassing off tank.

After the radon treatment tank, a bone charcoal filter was put in place to remove the lead and the manganese. The water was then passed through a UV filter with shut off solenoid valve and UV alarm. This reduced the bacterial load down to acceptable levels. This was only completed and put in place once gaining confirmation through a lot of expensive testing that all the radon was removed. After some weeks had passed the gross alpha was no longer detected. It was assumed this was a contaminant in a reservoir of stagnant water and would not return after further testing over a number of months confirmed it was no longer a problem.

Photograph of the UV and Fine Filter after the tank

WHO guidance in general details "treatment that combines coagulation with sedimentation or filtration is effective at removing suspended radionuclides to some extent, with the effectiveness ranging from about 30% to 100%, and typically about 70% for the main naturally occurring radionuclides. Ion exchange filters, which are more commonly used for groundwater, are particularly effective for radium and uranium, removing over 70% of these radionuclides."

Working with a contractor at the time undertaking active monitoring of radon in

the water and in the air, it was very much apparent that most of the supply tanks and treatment sheds had excessive radon in air issues.

Looking at real time clever data monitoring where a new gadget called an Alpha-E was deployed, it gave real time accurate radon in air monitoring data. This meant the reliance on the use of the Public Health monitors, which have to be in place a number of months and can take four weeks to return results causing an issue with gathering data, no longer needed to be relied upon. The Public Health monitors can be unreliable if buildings are not in regular use meaning extremely high or low reading anomalies.

Alpha E Radon in Air Monitor

Blending this monitoring with the use of an Internet of Things water temperature monitoring system called "Neptune", developed by a Dundee based company called M2M Cloud, it was possible to gather real time data on the flow events caused by occupational use, temperature and real time radiological data building a picture of relationships helping us to manage the radioactive risk proactively. As radon is seasonal and has a negative coefficient, essentially the colder the water the greater potential for radon to be released.

Due to the hazards posed to the maintenance staff and our internal employees both parties had to notify (to the HSE) under the Ionising Radiation Regulations. Advice had to be sought from a Radiation Protection Advisor as per the regulations and mitigation measures put in place.

The supply was then risk assessed by Environmental Health and was given a favourable report. The newly installed supply and treatment system was one of the first to have the new risk assessment process applied at the time from the DWQR. The Drinking Water Quality Regulators Risk Assessment for Environmental Health Officers has some interesting questions which are more mechanical oriented.

There is a question surrounding the ability of an assessor to risk assess alone, a supply like the one described, when the specific questions in the risk assessment cover a number of competencies that an Environmental Health Officer may have limited knowledge of; such as areas surrounding the mechanical systems, radiological hazards and makeup of the supply itself.

Recently M2M Cloud's Neptune Water Monitoring system has won SMART Award Funding from the Scottish Government. The award is backing further development of Neptune's cutting-edge water monitoring system and device. Using M2M's experience in the field of building Artificial Intelligence and Machine Learning, applying this unique knowledge to a software package able to capture multiple risk based data and learn autonomously patterns to inform water risk assessment. It will be the first time true autonomous learning that has been applied to water risk assessment if successful.

Other Technologies

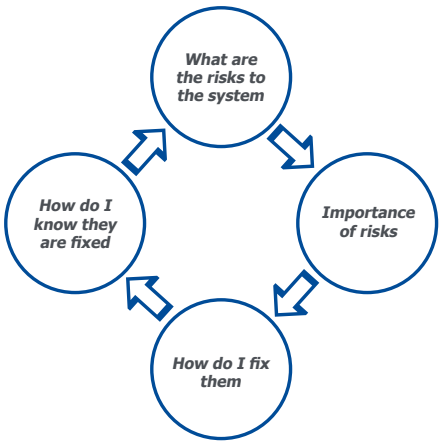
For a true risk-based picture in water systems certain parameters surrounding less variable risks have to be manually input such as system configuration or materials. The variable data such as temperature, biocide or even contaminants, for example the build-up of heavy metals or biofilm and conditions supporting different contaminants also have to be catalogued, the greater the data sets the more accurate the prediction becomes.

But therein lies the issue itself; as system risks which are not variable will be static and easily quantifiable, how do you monitor and catalogue accurately more variable risks. M2M already having complex sensors able to monitor flow and temperature are confident that these parameters will be easy to capture. How to support the risk model looking at other variables such as biofilm proliferation or other contaminants? Gathering real time data to support the multiple data dependencies to give a true risk picture is the challenge.

Northwestern University was in a number of articles (one published in a UK tabloid) about cell-free biosensors, which are powerful platforms for monitoring human and environmental health. One of their more recent developments is a system called ROSALIND, it's a molecule sensing platform with toehold-mediated strand displacement to construct hybrid RNA–DNA circuits that allow fine-tuning of reaction kinetics.

It's a low cost, easy to use field-deployable cell-free biosensing technology that can detect heavy metals, bacteria and other contaminates in water.

Should it be possible in the future to bring all these technologies together, remotely sensing different parameters, a machine could be programmed to predict and carry out live water risk assessments when plugged into any water system, answering the four important questions of water risk management:



There is a technology which is being employed more across Europe or on a smaller scale in the UK which could reduce water scarcity. The technology may not be for all situations, and like all technology has its limitations (right technology, right place, right time!). Atmospheric Water Generators have been around for a while.

Our planet's atmosphere contains 37.5 quadrillion (million-billion) gallons of water vapour. This could if condensed cover the Earth's surface with 1 inch of rain. Annually this is recycled through evaporation powered by the sun 40 times each year; a process known as the hydraulic cycle.

WatAir UK 30 litre and 10,000 litre Units

With Environmental Health (notably in Aberdeenshire and the Highlands) several years running hoarding emergency plastic bottled water for potential droughts in Scotland to help address pending water scarcity emergencies, an atmospheric water extracting (AWE) device could be deployed in certain situations to relieve this stress and provide remote communities with a viable supply.

Through some research the most common AWE devices, work simply on vapour compression refrigeration cycle. The air moisture condenses over the evaporator coil. The amount of condensate depends on psychrometric condition of incoming air. A large supplier of these units, (WatAir UK) says there is an increasing demand for their products across Europe and in the UK.

The technologies available are able to capture both gaseous water (vapour) and liquid water (droplets) from the air around us.

One company (SkySource) has developed the WEDEW (wood-to-energy deployable emergency water) system, which uses biomass to generate humid air, from which water can then be condensed.

This technology has been commercially available for a couple of decades with over sixty companies found through a google search selling the devices.

AWE's have been deployed in everything from remote holiday resorts, through to military operations or for disaster relief. The units can be quite power hungry and so a carbon offset from a renewable source might be a way of reducing this issue.

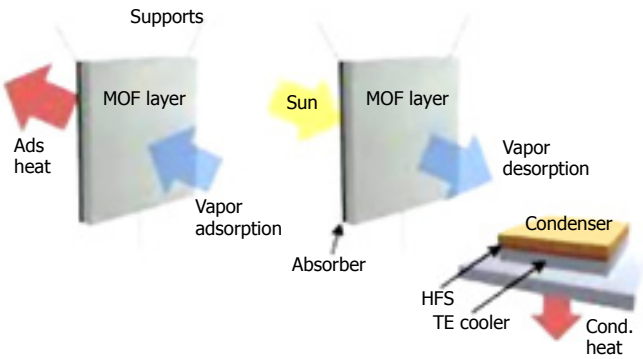
Having not carried out any water quality sampling on an AWE there is the question over what contaminants (depending on machine make-up and where you are in the world) may have to be remediated for. If for instance an AWE was located in a high radon in air environment would this affect the water quality radiologically?

Alternative approaches to water vapour harvesting are emerging such as the use of desiccants. These materials absorb the water from the air. These systems have lower energy consumption and higher water extraction efficiency. The first of these systems available reached the market place in 2017 developed by Zero Mass Water. It was an off-grid system powered by solar panels. Larger commercial systems by companies such as Drupps Concept from Sweden may produce up to 3000lts per day with a modular set up.

The next generation of desiccant technology for water harvesting purposes include composite sorbents, such as activated carbon-lithium chloride. Solar-powered Metal-Organic Framework (MOF) systems can remove water from even dry desert air, around 7–20% relative humidity.

MOFs have a large internal surface area, so they can hold large amounts of water in their pores. There is a cooperative effect when they are used to capture water. The first water molecules aggregate to form seeds onto which other water molecules then bind. 'You start out with the water uptake low and then it increases significantly before levelling off because the pores are fully packed.'

There is a third technology that collects liquid water droplets already present in the air – fog harvesters. Fabric mesh for fog water collection have been in operation for many years in locations that experience water scarcity and frequent fog, such as the Atacama and Namib deserts. Fog forms particularly well in mountainous and coastal regions. There is a focus on developing novel meshes and coatings to boost water capture efficiency. Traditional meshes only collect



about 3L of water per day per square metre of fabric.

Many of the new designs are inspired by nature such as nets that mimic spider webs. Cactus-like structures and those that mimic the shell of the Namib desert beetle are also under development.

While it is unlikely atmospheric water extraction technologies will be the holy grail for growing water issues alone, a combination of approaches to water scarcity (lowering wasted water and reducing carbon emissions) all have a place in a multipronged approach needed for forming a sustainable supply, for some globally sooner than others. A combination of renewable infrastructure offsetting energy demand intertwined with other possible benefits such as reducing humidity in buildings may give us the answer we need. It may also open up new challenges in hazard recognition and risk mitigation ensuring water quality standards using this largely untapped supply.

With more companies and organisations investing in risk based information systems, bringing together multiple systems could help drive proactive water system risk control into a new era.

Without further development and consideration of different catchment methods an uncertain future may be frightening. It could mean further marked increases in water costs with a more heavily regulated area surrounding abstraction of water resources from the precious dwindling global 1% sat on the Earth's surface.

NEW members

Since the last edition of Waterline was printed the WMSoc has approved 28 new membership applications and 1 upgrade request. We welcome members from the following sectors of the industry:
Water Hygiene – 14,
Water Treatment – 10,
Other – 3,
Local Authority – 2.

The following new members have given permission for their names to be printed:
Trevor Barnes,
Reese Brearley,
Paul Calvert,
Michael Carty,
Stephen Cheneler,
Mark Conway,
Aaron Cragg,
Sam Evans,
Stephen Flatman,
Adam Graham,
Christopher Kick,
Blair Lee,
Isaac Maginn,
Ian Noble,
David Parkes,
Rufus Redsell,
Michael Richards,
Ceri Rideout,
Owen Rowe,
Craig Russell,
Al Sayed,
Thomas Stewart,
Lee Smith,
Zak Spencer,
William Truesdale,
Elizabeth Ward.

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The Cost of Not Doing it Right: Continuous Legionella Challenges in a Healthcare Setting

Nick Barsby, National Sales Lead – Water Hygiene, T-Safe
Claire Jackson, Authorising Engineer (Water) / Senior Contracts Manager, Lakeside Water

Synopsis
Lakeside Water, the water hygiene specialists, and registered members of the Legionella Control Association (LCA) are involved in the water quality control measures confirmation assurance of a number of healthcare facilities in the Southeast of England as part of an on-going contract. The contract required annual confirmation Legionella sampling, design based on the guidance of BS7592:2008[(i)] and the clients Water Safety Plan requirements, for when control measures were being achieved. On an annual sampling visit to one of these sites, the laboratory data highlighted some concerns that led to a system wide chlorination. The first set of re-sampling, as per HSG274 Part 2[(ii)], was undertaken 2 days after the initial disinfection and was successful at delivering the desired result of systemic not detected results. The second round of confirmation sampling delivered positive results which led to further investigation revealing a catalogue of issues that once resolved left a "challenging" ward where Legionella continued to prevail. Over the next 24 months a range of remedial actions were undertaken to resolve the issue along with monthly sampling while the "challenging" area was protected by T-safe filters. The cost of not doing it right first time on this site was in excess of £300,000.

Starting at the Start
Challenges were identified on this site during routine samples taken in 2019. This was in line with the sites Water Safety Guidance plan and using a sampling plan derived from the last round of risk assessments and in conjunction with BS7592:2008[(i)]. The routine sampling identified a site wide positive Legionella issue, a significant issue for a healthcare facility due to the immunocompromised population.

There were positives in both the hot and cold-water system. These were not present on the previous year's round of sampling and there was no documented loss of control during the previous 12-month period. A systemic disinfection was undertaken in response to the site-wide positives in December 2019 for immediate risk mitigation whilst root cause analysis was undertaken. The trust had a policy of three clear / not detected results as being the required outcome to close the matter given it was a site wide problem.

The system was disinfected with 50ppm of hydrogen peroxide for a 2-hour contact time due to the size of the system. Following the systemic disinfection, and in line with HSG274 Part 2[(ii)] paragraph 2.132, sampling was undertaken 2 days post systemic disinfection to measure the impact of the process. The first set of post disinfection samples showed no positive results in either the hot or the cold-water system. One down, two to go.....

The second round of post disinfection sampling was undertaken in January 2020. The system returned negative results for all the cold system. The hot system, one month after a set of "not detected", post disinfection results, had numerous positive results which indicated some form of systemic issue remained in the hot water system.

The disinfection not resulting in the desired outcome led to a meeting with the client and their tenants' estates team. In this meeting it was discovered that 3 calorifiers were operating at between 38-42°C, this fault was not noted during the disinfection due to the requirement to work on a 'cold' system in order to prevent the chemical from being oxidised off during the disinfection process.

There was no evidence in the site log books or records of monthly monitoring of these assets by incumbent PPM contractor who was appointed to undertake this task. It was therefore unclear how long these assets had been operating in the peak zone for Legionella growth as set out by ISO11731[(iii)] for Legionella culture plates.

With an initial clear cause for Legionella growth identified, a programme of daily flushing was instigated with every asset on the hospital site included while the calorifiers were repaired.... However, upon further investigation it was identified that these calorifiers had temperature restrictions applied by the manufacturer. These were set below the levels required for full pasteurisation. To compound issues, one of the calorifiers was not achieving the temperature controls outlined in HSG 274 Part 2[(ii)], HTM04-01[(iv)] or the Water Safety Plan (WSP).

A full investigation into the calorifiers discovered that these particular units could not be pasteurised without bypassing all the temperature and pressure control systems. Furthermore, the model that was installed was an old and discontinued product that had been specified and installed by the PPM contractor when previous cylinders reached the end of their useable life.

The calorifiers clearly needed to be replaced with units correctly specified for the site and as a priority. This led to a capital expenditure that had been allocated for moving cold water storage tanks out of a 25-meter-high water tower having to be spent to replace the current calorifiers with new calorifiers that were capable of delivering thermal control, the primary control measure used by the site.

Sadly, the calorifiers were not initially installed correctly by the plumber. Some dead legs were created when non flow through expansion vessels were incorrectly installed. This was highlighted by the temperature monitoring staff as part of the ongoing daily flushing of the site. Once rectified, by the installer, a full pasteurisation of both the water storage and distribution system was undertaken.

The full system was temperature monitored, via the ongoing daily flushing of the site, for a 6-week period. The ongoing monthly sampling following new cylinder installs showed that the hot water system now had no positive Legionella results across the site, apart from one ward and this is where the fun really starts....

The Ward Where Legionella didn't die.....
With the systemic issues resolved; focus was now placed on a single ward. This was flagged as an issue as it repeatedly provided positive Legionella results in the hot water monitoring programme despite the rest of the site now delivering 4 consecutive "not detected" Legionella results in the hot and cold water systems.

The first approach was to apply an injection disinfection to distribution lines of the ward. This was achieved by applying 100ppm of hydrogen peroxide with a 2-hour contact time. The aim was to target potential biofilm that appeared to be present on the ward's water system.

The post disinfection laboratory results showed no real change in Legionella levels but we did however start to notice patterns emerging. The first, obvious and interesting

fact was that Legionella species, confirmed by MALDI-ToF[v] at a UKAS accredited[iii] laboratory, was nearly always *Legionella anisa (L. anisa)*. This pattern was compared to records of 13,500 previous laboratory results for Legionella over a 33-month period (from January 2019). The same pattern was observed.

Given that Legionella was still prominent in the system a second disinfection was undertaken a month later. This time all the strainers were removed and disinfected, independently. The system was then disinfected minus the strainers. The biocide of choice was again hydrogen peroxide with the aim of targeting all the remaining biofilm. All strainers were re-installed post disinfection.

Three days were allowed to pass, and all the systems strainers were again removed, cleaned and disinfected. This was done in case any biofilm had sheared off post disinfection that may have been trapped in the strainers. Samples were taken again after two days following completion of all disinfection works through systems and strainers from the ward distribution system. Positive results kept coming however.

This led to more investigation of the wider systems. It was noted around 15 years ago that the ward had been refurbished, the central distribution remained original copper, however all the local drop downs to this ward were installed with plastic pipework with crimped fittings. Further research identified that these components, at the time of installation, were predominantly used for under floor heating pipework; the type of piping now common on cruise ships with WRAS[vi] approval since 2016*. To compound matters, there was no insulation of the pipework post the main centralised copper distribution network. This allowed for heat transfer and was clearly a major problem.

A group discussion was held on the best way forward given the unique scenario. This group included the senior contract manager, two Authorising Engineers (AEs), the client, their tenant and associated infection control teams. It was agreed via a TEAMS meeting that a change of chemical should be implemented to see if bacteria in this specific area had built up a tolerance to hydrogen peroxide and the shock of a new chemical might help. Chlorine was to be applied to the system at 100ppm for a 1-hour contact time to see if it would impact the Legionella counts. Sadly it did not.

Given the system had undergone disinfections for three consecutive months it was decided that the system required a month of no treatment to allow it to settle down. At this time (December 2020) discussions were taking place to see if this would become a live COVID ward. This would have a direct impact on access to the area, root cause analysis and risk mitigation works. It was decided to install a permanent chlorine dioxide dosing unit to the hot and cold-water storage tanks in order to aid risk mitigation; however, these were 25 meters in the air and in a confined space. The decision was made that these should be moved, as was originally planned prior to the calorifier issues and this, compounded by the ongoing plumbing challenges, resulted in a decision being made to upgrade the associated plant and equipment.

The upgrade was completed in January 2021. This consisted of 2 new GRP tanks, 2 brand new booster pump arrangements, a continuous chlorine dioxide dosing unit was installed, and the water softener was relocated and upgraded from a simplex to a duplex unit.

Throughout this entire period every asset across the whole hospital was being flushed twice a week; with every asset on the problem ward being flushed for a minimum of 5 minutes every day. Further to this T-safe 92-day laminar flow tap filters and medical shower (POU) filters were installed to all assets within the problem ward to protect patients from water borne pathogens. Monthly sampling, both pre and post flush on all outlets was planned and executed over this time in line with the WSP. The ongoing positive results (pre-filtration) on the ward with significant bacterial counts left the infection control teams with concerns over staff and patient welfare. In order to provide assurances to infection control teams that immediate risk mitigation was effective in protecting patients, staff and visitors to the ward; when filters were installed (and each time they were replaced) pre-flush sampling was also undertaken through the filter as well as the system. Continued "not detected "results post filter provided the assurances required while ongoing works were being undertaken on root cause analysis.

When you think it can't get any worse...

To compound the challenges associated with this ward, it was converted into a COVID positive ward on New Year's Day 2021 and remained this way until April 2021. This added to the challenges in managing Legionella control – from simple access issues for flushing or monitoring temperatures, through to being able (or not) to make any physical changes to the plumbing.

When the ward became accessible, despite COVID patients still being treated on the ward, the water hygiene specialists and the AEs undertook a site visit to review the pipework and the potential for pipework re-configuration was discussed. It was noted that this "challenging" ward was the only area in the hospital with plastic pipework and the only area with ongoing bacterial concerns. During this meeting it was agreed to remove parts of the pipework and undertake swab sampling on the pipework and associated fittings to confirm whether this combination of conditions was just coincidence.

The swab results identified that the pipework was clear for Legionella. Some of the fittings however were positive for *L. anisa*.

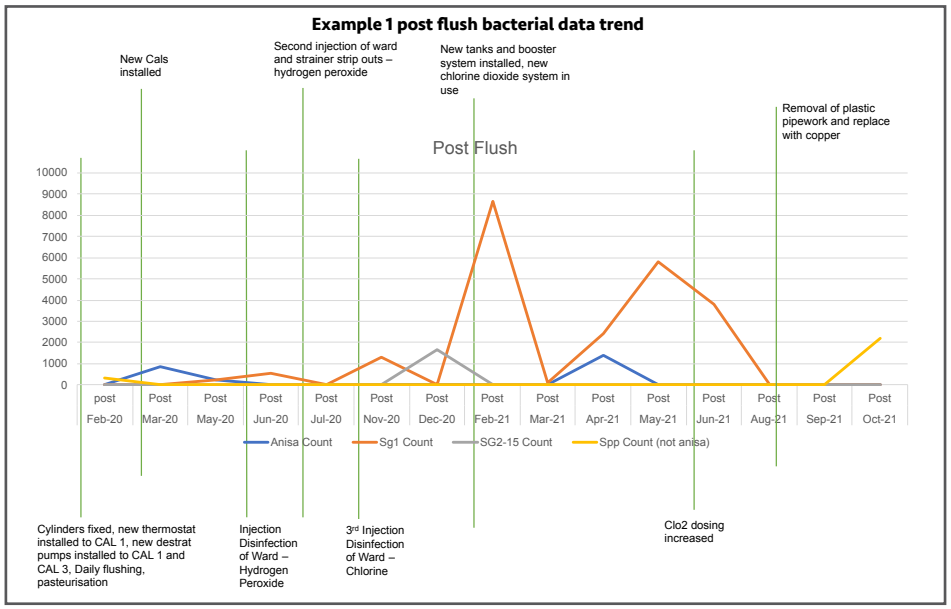
The swab data and results led to a further meeting with the trust, tenants and AEs (one from the water hygiene specialist, one from the client and one from the tenant). The group reviewed some pipework and fittings that had recently been removed from the system. At this point it was discovered that a large amount of jointing compound was on the outside and inside of the plastic pipework, concerns were also raised regarding the jointing material used. It was agreed by all parties that the plastic pipework and fittings with associated jointing compound would have to be removed to reduce the Legionella risk. Had the ward been piped correctly in the original install then the scale of the Legionella risk would have been drastically reduced if not removed entirely.

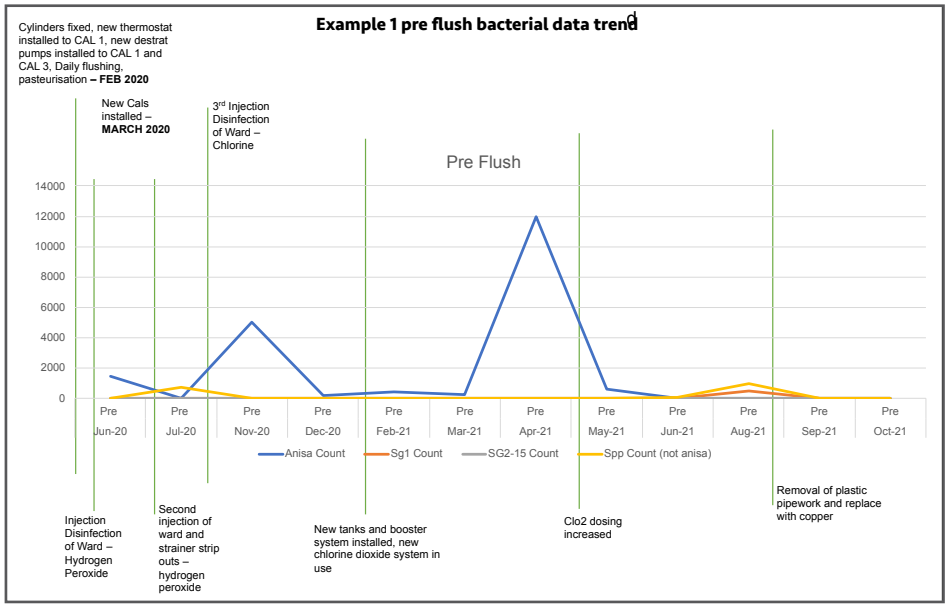
The re-plumbing of the system was due for completion by the middle of September 2021 and the early results from this suggest that the positivity rate has dropped by over 95%.

There are Lies, Damned Lies and Statistics...

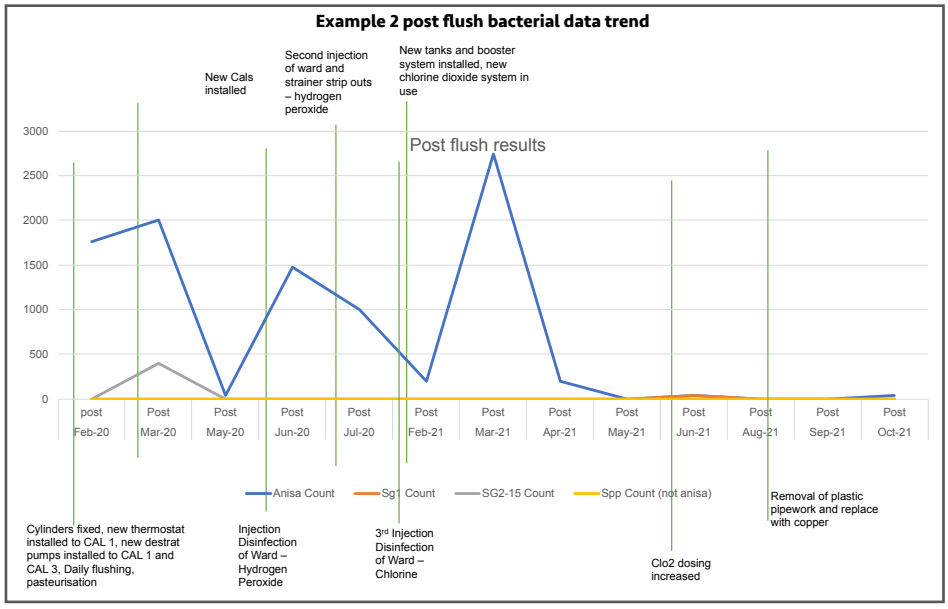
The examples below highlight the interaction of *L. anisa, L. pneumophilia* SG1 and SG2-15 with the different chemicals that have been applied to the system[vii].

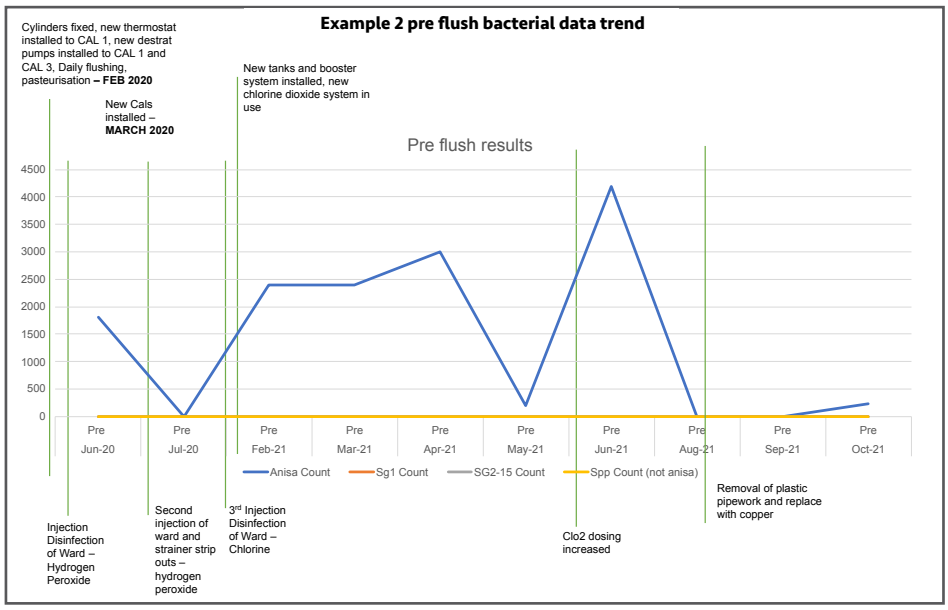
Example 1 shows how *L. anisa* appears to outcompete the other Legionella bacteria that are present in the system; some of these come to the fore as *L. anisa* counts reduce, this is most prominent in the pre-flush results.





Example 2 shows how *L. anisa* typically behaves on this site in areas where there are less competing Legionella bacteria in that part of the system. Note how even post the remedial works *L. anisa* infection appears to be coming back in certain areas of the system.





Example 3 is a prime example of how *L. pneumophilia* serogroup 1 respond to different treatments both pre and post flushing[(viii)]. Notice how in April and May 2021 the increase pre-flush starts to present itself post flush with no *L. anisa* competing with the *L. pneumophilia* SG1 strains for hold within the system. Interestingly, and curiously, *L. anisa* seems to have established itself around this asset post the re-plumbing works as demonstrated by the October 2021 result.

The data on the following graphs demonstrate how POU filters successfully protected patients once the issues were identified and the filters were deployed. Installed for over 12 months the filters offered total retention of system Legionella bacteria throughout their deployment cycles.

One sample did provide a positive result of 21 CFU/L. This is unlikely to have come through the filter due to the nature of their design and function. If a filter was to fail, it fails catastrophically, allowing all pathogens through. The likely cause of this positive result is either, retrograde contamination or cross contamination of the sample either at the point of sampling, transport or analysis.

The performance of the filter was not impacted by the various treatment processes deployed or the varied Legionella counts, that ranged from not detected up to over 40,000 CFU/L.

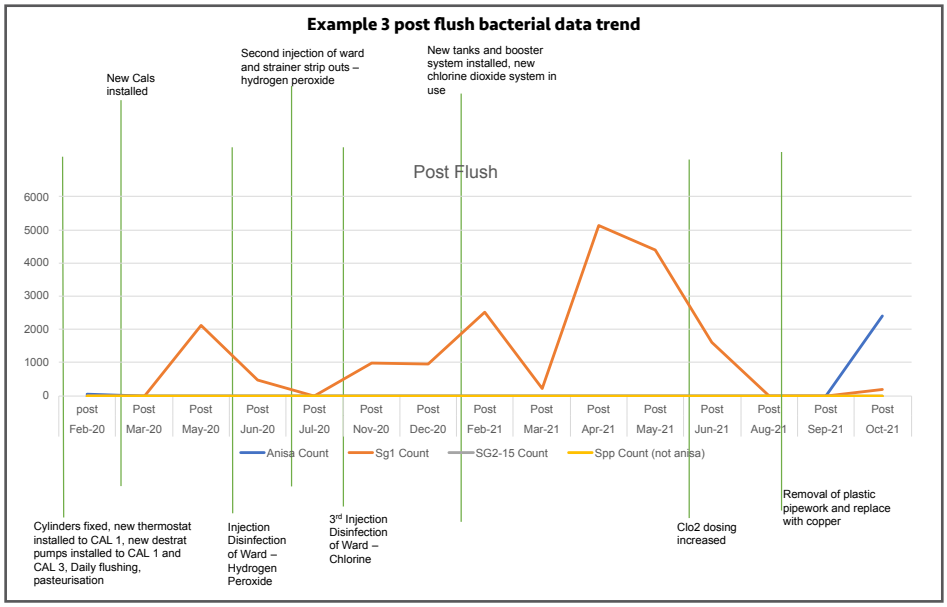
What was the cost of this to the Trust?
The title of this paper asks questions about the cost of not doing things right. The "additional" monetary cost to the Trust on this project include:

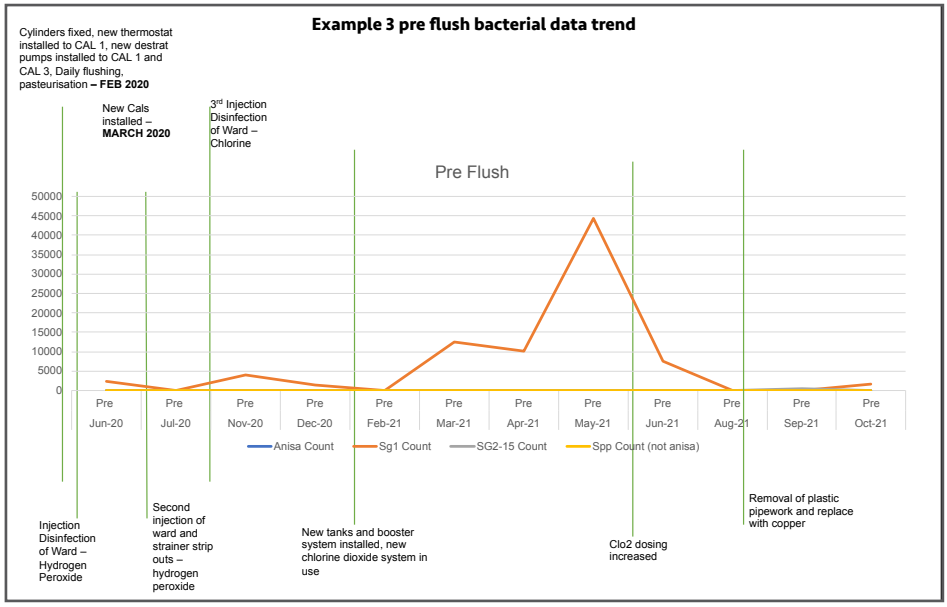
- Daily flushing works over 21 months costing around £150k
- Monthly sampling of the ward over 21 months costing around £30k
- Four systemic disinfections costing around £5k
- TMV servicing and remedial works costing over £5k
- New calorifiers costing around £30k
- New chlorine dioxide system costing around £30k
- New water tanks and booster systems costing around £40k
- POU filters for numerous cycles costing £25k
- Re-pipe of the system costing around £50k

These costs amount to around £350,000 to date and the situation continues to be monitored, adding more to the on-going cost of not doing things right first time.

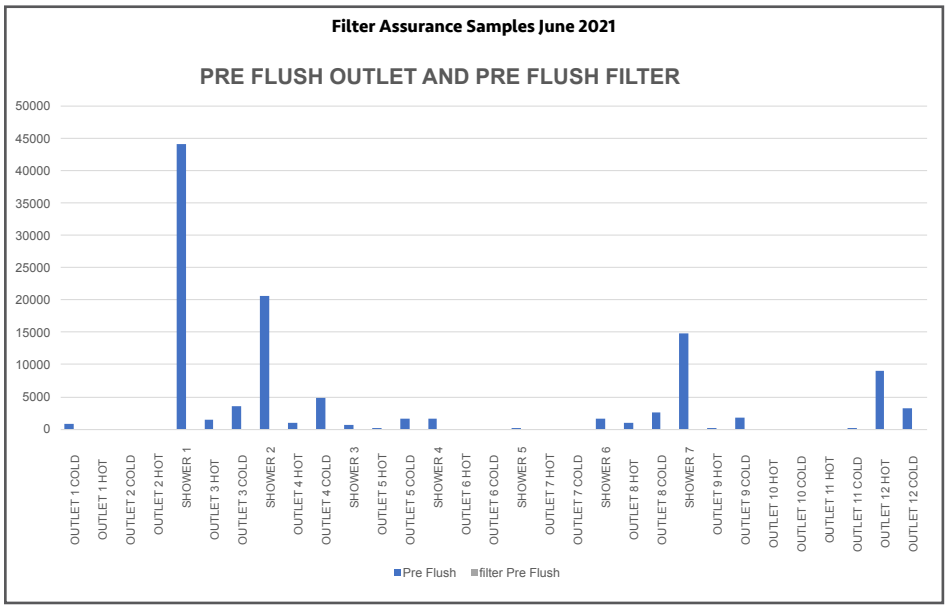
There is also an obvious a human cost involved in this, not just from the disruption to the ward and added pressures on ward staff, but also to the patients and families from decanting the ward to another hospital location, a 30 mile and 50-minute drive from the current location.

What questions has this experience raised?
There are clearly some root causes to the issues raised in this review. From specification issues around calorifiers and the use of plastic pipework to questions about the impact of sampling 48, 72, 96 or 120 hours post chlorination and the impact on results and the resistance of *L. anisa* to a range of chemical and thermal treatments[(ix)].





Other interesting patterns in the datasets raise further questions. It is clear to see from the full dataset on this site that *L. anisa* and *L. pneumophilia* can co-exist in low numbers, however, when the counts of *L. anisa* reach around 1,000 CFU/L the mixed colonies disappear, and *L. pneumophilia* is the victim.



This poses a range of microbiological questions:

- Is annual testing of sites that have no record of a loss of control sufficient given this example?
- Is "plumbers' putty" a high nutrient source for bacteria?
- Some samples have only *L. anisa* positives, does this mean that *L. pneumophilia* is not present in the pipework? Or is its presence being masked by other species on the culture plate? What is the real microbiological situation in the pipework itself?[x]
- Is the *L. pneumophilia* a concern if it's being masked by another species?
- Would *L. pneumophilia* be found by rapid tests that target specifically *L. pneumophilia* SG1 and where the culture method failed to detect?
- How big a problem is *L. anisa* for the water industry?[xi]
- How much more does the culture test support growth of one *Legionella* species over another?
- Does the incubation temperature for the culture test encourage certain species to grow over others?[xii]
- Are the counts an error by the laboratory in selecting too few colonies to confirm the type of Legionella present? Would a wider spread of colonies or more colony picks confirmed by MALDI-ToF give a wider spread of species?
- Should we consider testing Legionella at the current temperature (36°C) and also undertake a test at "system" temperature (conditions)? What impact would this make and what would it show?
- Should the AE be involved in the purchasing process to ensure correct specification of equipment - how is this managed by other water safety groups?
- Should all major plumbing works undertaken in Healthcare settings, that could have an impact on the microbiological load, be completed by LCA registered member companies?

Conclusions

The prominence of *L. anisa* in the "challenging" ward appears to have been supported by poor system conditions over an elongated period of time. There were several factors that exacerbated this issue including:

- No flow or return temperatures being taken on the calorifiers
- Incorrect specification issued to the trust for calorifiers by primary contractors
- Over reliance on contractor specification by estates teams instead of referring uncertain specifications for major plant equipment back to AEs and the WSG for approval and sign off
- No audit/checks on the original PPM tasks being completed
- Calorifiers unable to reach pasteurisation temperatures
- Budget being spent on calorifiers (originally) rather than the tank re-location to aid PPM works access
- Access & working at height issues for installing the chlorine dioxide permanent dosing plant to storage tanks
- Impact of the excessive use of "plumbers' putty" as a food source for bacteria
- Use of incorrect components in plumbing this system

What is unknown is the impact of each individual issue above only the combined effects and questions should be asked how much Legionella growth, of any species, would be encouraged by each of these issues on their own.

Further research is required regarding the ability, or not, of *L. anisa* and *L. pneumophilia* to be able to co-exist on an ISO11731 culture plate[xiii]. The preliminary data of 13,500 samples held by the water hygiene company suggests that co-existence is not possible with counts over 6,000CFU/L of *L. anisa* but this could be impacted by a range of factors including the number of colonies selected for identification via MALDI-ToF among others.

The data suggests that, given the right conditions Legionella can continue to thrive even with a range of treatments in place and the only protection to patients, staff and visitors, in this case, was POU filtration[xiv]. How many other sites have these continuous issues that are not being protected with the same level of vigour?

Another area that raised industry questions is that the re-pipe of the ward has now been completed and has been undertaken using copper crimped connections (mapress/pressfit type install). This type of pipework uses EPDM as a jointing material, however EPDM flexible hoses have not been advised in healthcare facilities since 2010 and the long term effects of the use of this install are unknown.

Ultimately, this site had a plethora of problems that all created a scenario where Legionella could not easily be controlled. The cost to put these issues right was in excess of £300k.

The main question that this article seeks to ask "Are the challenges highlighted in this document unique or are there similar challenges with other water systems across the UK?"

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References / Further Reading / Supporting Documents

1) BS7592: 2008 "Sampling for Legionella bacteria in water systems"

2) HSG274 Part 2 "Legionnaires' disease: Technical guidance Part 2: The control of Legionella bacteria in hot and cold-water systems.".

3) ISO11731:2017 "Water quality — Enumeration of Legionella"

4) HTM04-01: 2016 Part B "The control of Legionella, hygiene, "safe" hot water, cold water and drinking water systems, Operational management"

5) Gaia V. et al, (2011) "Rapid identification of *Legionella* spp. by MALDI-TOF MS based protein mass fingerprinting"

6) WRAS Materials 2021 "Guide; A guide for Manufacturers, Suppliers and Test Laboratories on the Application Requirements for WRAS Material Approval"

7) *Muder R, R. & Yu V, L.* (2002) "All *Legionella* species have pathogenic potential"

8) *Farhat M. et al* (2012) "Effects of Disinfection on Legionella spp., Eukarya, and Biofilms in a Hot Water System"

9) PD855468:2015 "Guide to the flushing and disinfection of services supplying water for domestic use within buildings and their curtilages"

10) *Girolamini L. et al* (2021) "Dynamics of Legionella Community Interactions in Response to Temperature and Disinfection Treatment: 7 Years of Investigation

11) *Fallon R.J. & Stack B.H.R.* (1990) "Legionnaires' disease due to *Legionella anisa*"

12) *Shimada S. et al,* (2021) "Characterization of the First Cultured Psychrotolerant Representative Legionella from Antarctica Reveals Its Unique Genome Structure."

13) Svarrer C.W. & Uldum S.A. (2012) "The occurrence of *Legionella* species other than *Legionella* pneumophila in clinical and environmental samples in Denmark identified by *mip* gene sequencing and matrix-assisted laser desorption ionization time-of-flight mass spectrometry"

14) ACoP L8:2013 Legionnaires' disease, The control of legionella bacteria in water systems. Approved Code of Practice and guidance on regulations

This article first appeared in the March 2022 issue of Health Estate Journal, the monthly magazine of the Institute of Healthcare Engineering and Estate Management.

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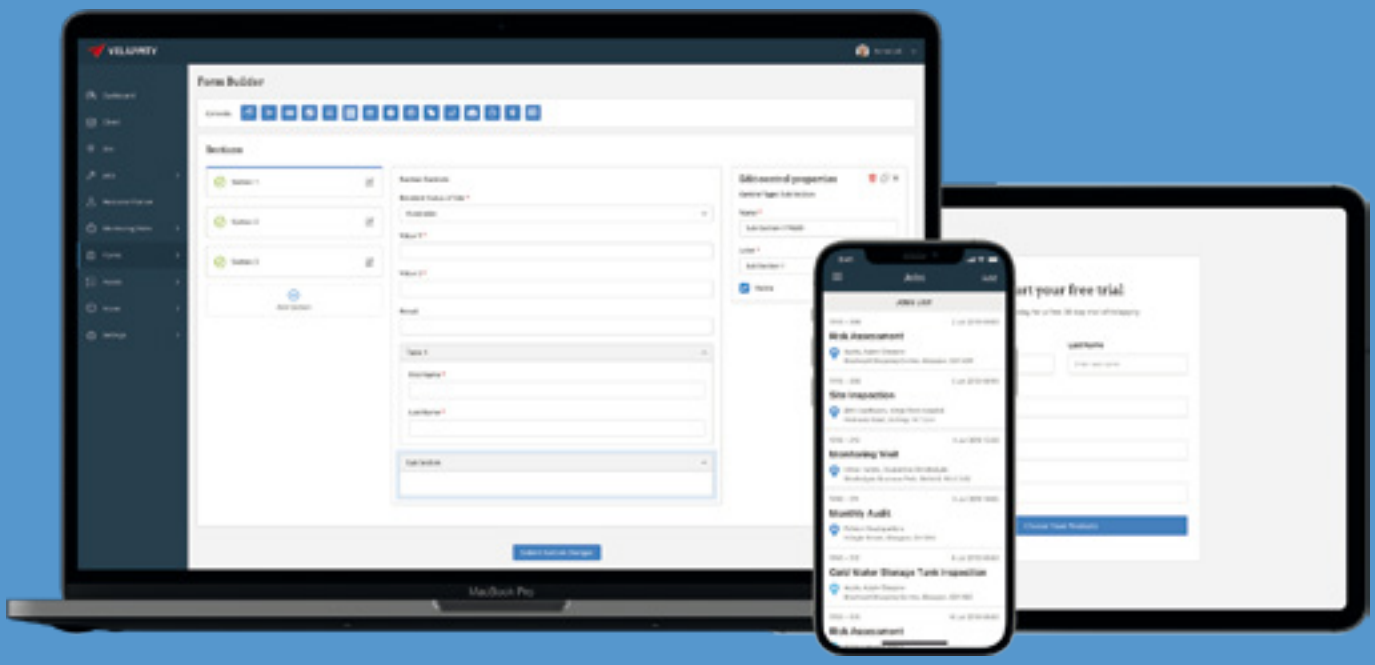

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CALL FOR ARTICLES ON PROBLEMS AND SOLUTIONS WITHIN THE WATER CYCLE

This edition of Waterline has a toolbox talk on the mechanics of the Global Water Cycle. It doesn't highlight the impact of 7.5 billion human beings on the cycle, nor the effects of climate change. Below are listed a number of topic areas which we are asking the members of WMSoc to provide articles for publication in Waterline. We are looking for explanations of the current problems, and what we are doing now, or what we could do in the future to resolve these growing issues. For some of the listed topics there are multiple issues, and some issues impact multiple sections. Concentrate on those issues where you have particular knowledge or experience. Thank you.

Receiving areas – Changing rainfall levels, locations and storm patterns. Large parts of the world will become uninhabitable. Research into cloud seeding and into ice/snow fall and accumulation. Rising sea levels due to ice loss.

Intensity – More intense rainfall, tropical type storms, loss of coastal land, loss of fertile soil, fertilisers entering rivers, breaching of river banks, flooded farmland and floodplain housing.

Humidity – Atmosphere warming and now holding more water. Water vapour is a greenhouse gas. Large increase in use of air conditioning systems. Greater volumes of warmer surface water being evaporated globally. More moisture in clouds causing heavier and more localised precipitation. More clouds blanketing the planet, increasing heat retention / global warming.

Protection, Flooding and erosion – UK most exposed European country for coastal erosion. Permanent coastal defences being built, and some river defences which are very expensive. Some land drained in the 18th Century now being left to nature, creating fresh water bogs. Some areas of coastal land being ceded to nature, creating salt marshes. Trees to be planted and ponds created on uplands to slow water, beavers introduced. Planning constraints on flood plain building. Adaptions to existing housing: no air vents, electric sockets high up on the wall, larger sewers, single direction valves from house to sewer, strong door seals, higher windows.

Clean Energy Generation – Hydropower, tidal power, wave power, off-shore wind power, thermal / hot rocks. These are all liable to damage the environment.

Domestic Usage – Drinking, cooking, hygiene and washing clothes. Drawn from reservoirs, rivers and aquifers. Unequal precipitation with a mismatch between population density and resource. Plans for a UK water grid. Reduced usage requirements for toilets and kitchen units. Plans for some more reservoirs. Target usage per population. Exhaustion of potable water aquifers and replacement with saline water in many countries with low precipitation. UK only collects/stores 1% of its rainfall.

Institutional / Commercial Usage – Hot and cold water plus air conditioning and heating. Hospitals, laboratories and dental surgeries use with specialist equipment.

Industries using excessive water – Steel, Petrochemical, Chemical, Brewing, Agriculture in hot climates, the cost of rearing beef cattle. Water and environment costs of fast fashion. Lot of activity to change processes and reduce water consumption.

Human non-essential uses – Wild water and baths swimming, water parks, water sports on reservoirs, rivers and seas. Keeping grass green!

Other human uses – Misting systems for cooling air and extending food 'best before dates'. Fountains and other water features.

Alternatives to Potable Water – Rainwater harvesting / grey water usage. Water recycling and its effects (increased energy usage due to possible filtration or increased chemical usage due to increased treatment?). Seawater evaporation and condensation plants. Desalination by RO and other means.

Water Pollution – Fertiliser / farm land run off, mine water, sewerage works overflows - all to rivers. Fuel leaks from boats. Excrement from dwellings on water. Illegal industry discharges. Prescribed drugs in sewage. Roof, road and pavement run-off containing rubber and salt (research into tyre life, use of winter salt and grit). Discharge of plastics into rivers, seas and oceans.

Trade and Domestic Effluent Treatment – Water treatment plants. New processes. Trade effluent recycling. Larger water treatment plants, enlarged storage capacity for use during storms to reduce untreated discharge.

Effects of pollution on water based creatures – Early death, infertility, lack of food sources, diseases. Sustainability, effect on carbon capture.

The list is provided as a prompt for further thought and discussion, to supply an article or comment for publication, please contact waterline@wmsoc.org.uk.

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Legionella Control within Hot and Cold Water Systems in a Time of Covid

By Nigel Tooth

March 2020, we all remember how it felt in those early days of the Covid-19 pandemic. It was our John F Kennedy moment or was maybe reminiscent of where we were when we first heard the news of John Lennon's assassination. All nonessential high street businesses were closed to slow the spread of infection, with people instructed to stay at home other than for essential purposes only. We can all recall the rush of people to shut up shop before racing back to the sanctuary of home. Cities suddenly became ghost towns. The London underground which had previously been standing room only with insufficient space to open a newspaper, in an instant the new normal was to have an entire carriage to oneself. To date passenger levels have yet to return to what was once considered every day. The streets of London became like a set for the movie *28 Days Later*.

Despite lockdown measures organisations remained bound by health and safety legislation, including the Health and Safety at Work Act 1974 and The Control of Substances Hazardous to Health 2002. The Health and Safety at Work act continued to apply. It remained necessary to have in place a suitable and sufficient risk assessment document for duty holders to identify and assess the risk of exposure to the legionella bacteria from work activities and water systems. The government offered no advice on relaxing statutory obligations and so compliance to statutory guidance contained within the ACOP L8 still needed to be maintained. Under these pieces of legislation organisations must have legionella risk assessments and must implement control measures to reduce the risk as far as is reasonably practical (HSWA, 1974; COSHH, 2002). It further remained necessary to have in place any precautionary measures to enable adequate management of risks.

The effects of the lockdown including building closures with drastically reduced occupancy, also created difficulties for external contractors when attempting to visit sites for essential maintenance purposes. Such factors dramatically reduced water turnover resulting in lapses of control measures, thus drastically increasing the risk of building water systems becoming subject to microbiological infestation, including from the legionella bacteria. Under the British Standard guidance on legionella risk assessment, (BS 8580-1:2019; 10.1), such changes warranted a review of site risk assessments. This meant that for premises taking lockdown measures, any pre lockdown risk assessment was unlikely to still be suitable for such radically altered conditions.

Responsible water hygiene providers provided practical advice bulletins based upon industry standard guidance, detailing actions intended to ensure that premises remained safe for occupants. Some water hygiene companies were granted status as essential workers to enable them to continue operating as normal in carrying out flushing of little used outlets along with validation sampling. Water hygiene providers operating in line with the government's hygiene and social distancing guidelines ensured that all operatives were equipped with suitable PPE and were carrying out risk assessments on a site-by-site basis to reduce risk to both themselves and to members of the public. Such actions were intended to ensure the safety of buildings during periods of heavily reduced occupancy to keep water services online and safe. Significantly reduced occupancy poses a particularly high risk within larger buildings with increased stored water capacities. The aim was to maintain control measures and for water system turnover to mimic normal occupancy.

For buildings where it was decided to maintain water systems, the two most effective legionella control measures for domestic water systems were by maintaining of compliant hot and cold water temperatures and by ensuring sufficient turnover throughout the system by means of a robust flushing regime (HSG274: Part 2; 2.32; 2.36; 2.78). For such control measures to be effective they must be carried out correctly by competent persons (HSG274: Part 2; 16) which could be achieved by using either water hygiene engineers or by suitably trained members of staff. A further option for temperature monitoring is by using remote technology involving a network of temperature sensors installed in key parts of the building's water system to provide real time temperature monitoring data. The advantages of such an approach would be as follows;

- Temperature monitoring compliance can be ensured without monthly visits from an engineer after the devices are initially installed

- Provision of regular reports detailing temperature compliance and where flushing should be carried out in response to non-compliant temperatures

Concept Environmental Solutions were heavily involved in carrying out regular flushing programmes, particularly within major educational establishments, with the aim of mimicking normal building water usage. Such actions were put in place to limit the negative impacts of systems being disused and to minimise the costs of recommissioning buildings upon resumption of normal operation (HSG274: Part 2; 2.50). Advice to clients included the following;

- **Routine Water Hygiene Tasks:** It is of critical importance that normal building water usage be replicated. It is therefore necessary to ensure that a robust water hygiene maintenance programme be maintained, including regular flushing of low-use outlets, temperature monitoring, thermostatic mixing valve inspections along with showerhead cleaning and descaling etc. If there are lapses in control measures, then samples should be obtained for legionella analysis by a UKAS accredited laboratory to ensure that the building water system has not become colonised with legionella (HSG274: Part 2; 2.122). Legionella samples should also be taken 10 to 14 days prior to building services resuming normal operation

- **CWS Tanks:** Cold Water Storage Tanks should be sized to ensure that water usage is sufficient that stored water is not stagnating (HSG274: Part 2; 2.58). This means that a complete turnover of water should be achieved within a 24-hour period. In the case of split section CWS Tanks it may be possible to isolate a section to reduce stored water volume, although the manufacturers should first be consulted. It may therefore be advised to reduce the stored water content within both sections by lowering ballvalves or installation of drop-arm ballvalves. If it is felt necessary to fully drain CWS Tanks, then they will need to be inspected, refilled, and disinfected with potable water samples obtained for analysis by a UKAS accredited laboratory

- **HWS Generators:** Whether smaller point of use HWS Heaters or larger HWS Calorifiers, it is important that they are not turned off as the maintained heat will inhibit the colonisation of the legionella bacteria. It is necessary to ensure HWS Generators continue to operate at compliant temperatures of 60°C on the flow and not less than 50°C on the return, along with not less than 55°C in healthcare premises. If HWS Heaters have been turned off for more than a week, then they should be disinfected prior to being taken back into service (HSG274: Part 2; 2.127)

- **Little Used Outlets:** A little used outlet is classified as an outlet used less than once per week. This includes not only taps but showers, washing machines, vending machines and bib taps as a few examples. A competent person needs to review the building water system to identify any little used outlets to ensure that each one is thoroughly flushed at least once a week. This should be achieved by reviewing the low use outlet register within the site logbook and adding new areas that have become infrequently used. This activity must be recorded and reviewed by the sites responsible or deputy responsible person on a regular basis. The idea of little used outlet

flushing is to mimic normal building water system occupancy to reduce the risk of microbiological proliferation, including from the legionella bacteria. This should always be a major factor when considering the extent and frequency of little used outlet flushing to be carried out. It is also necessary to take great care to minimise the generation of aerosol when carrying out low occupancy flushing as this is how the legionella bacteria is transmitted. To minimise risk of flooding, it is further recommended that outlets should not be left unattended during flushing procedures

For buildings where it was decided to decommission water systems, the following course of action was recommended;

- **CWS Tanks:** These should ideally be drained and allowed to dry to prevent the formation of biofilm or stagnation that would encourage the proliferation of microbiological infestation, and to minimise the risk of a possible flooding. It is however important to bear in mind the possibility of leakages that could be caused by contraction and expansion when draining and refilling sectional GRP CWS Tanks

- **HWS Generators:** Such units, whether smaller point of use HWS Heaters or larger HWS Calorifiers should wherever possible not be turned off, as hot water will inhibit the colonisation of bacteria including legionella. Continue to ensure HWS Generators are operating at compliant temperatures of 60°C on the flow and not less than 50°C on the return, along with not less than 55°C in healthcare premises

- **Hot and Cold Water Pipework:** Do not drain pipework as this can promote the growth of biofilm including pseudomonas (HSG274: Part 2; 2.52) along with creating conditions suitable for corrosion damage

- **Signage:** Ensure that clear and visible signage is placed throughout the building to state that the water system has been decommissioned and is not safe to be used

Some companies and organisations adhered to the requirements. Others, such as within catering and entertainment sectors already reeling from the financial implications of lockdown, felt unable to take further financial hits to already ailing businesses. In pure cost terms it can be argued that the cost of the pandemic has already outstripped the financial cost of the second world war. *An updated statement on Covid19 from the Legionella Control Association however noted There is potential for multiple outbreaks of Legionnaires' disease following the COVID-19 outbreak if actions taken now are not carefully considered.* Public Health England (PHE) guidance stated that there should be regular flushing of the water system at the likes of dental practices, hairdressers, gyms, and hotels, as well as office buildings, to stop bacterial growth.

At long last in May 2021, the lockdown finally appeared to be easing. At this point responsible water hygiene providers recommended that considering the clearly longer-term closure due to the COVID-19 pandemic than had been originally envisaged, that hot and cold water systems be properly recommissioned to SFG 30 standards (Guide to good practice-mothballing and recommissioning of buildings) following mothballing. This was intended to ensure the safety of system users prior to water services being returned into normal operation.

For smaller MCW only systems serving for example a couple of wash hand basins, toilet pans plus a kitchen sink as may be found within staff retail premises, it could on occasions be sufficient to carry out copious flushing of outlets followed by obtaining of samples from a representative number of hot and cold water outlet points for analysis by a UKAS accredited laboratory for Total Viable Counts, Coliforms, E.Coli and Legionella.

For larger systems involving hot and cold water storage facilities, a start-up approach as follows was recommended in accordance with the ACOP L8 and BS8558 to ensure that the systems were safe to operate;

1) Refill any CWS Tanks that have been drained during the lockdown period, check for any potential leaks that may have occurred due to contraction and expansion

2) The entire hot and cold water system should be thoroughly flushed, ensuring there is complete turnover of system water capacity (HSG274: Part 2; 2.127)

3) It is of critical importance to minimise the generation of aerosol, as this is how the legionella bacteria can be transmitted, for items such as showerheads it may be necessary to run water through plastic bags to prevent the creation of aerosols

4) Do not leave flushing of outlets unattended, the potential for basins and sinks etc to overflow and cause a flood is a real risk

5) A complete system disinfection with chlorine to be proportionally injected via the incoming mains cold water supply to a concentration of 50mg/l. Chlorine should be drawn through every outlet and water storage vessel, testing concentrations throughout the building, and ensuring a contact time of at least one hour

6) Following completion of disinfection, validation samples to be obtained for analysis by a UKAS accredited laboratory for Total Viable Counts, Coliforms, E.Coli and Legionella at representative outlet points throughout the system (HSG274: Part 2; 2.120)

7) Inspect CWS Tanks for potential leakages and for compliance with current standards and byelaws. Should they supply drinking water then a potable sample should be obtained for analysis by a UKAS accredited laboratory to ensure that they are fit for purpose

8) Ensure that any overdue water hygiene tasks, including temperature monitoring, HWS Calorifier inspections, microbiological samples, thermostatic mixing valve inspections plus showerhead and spray-tap descaling etc are completed prior to the building being reoccupied

So where do we go from here, and will there be a need to strengthen existing guidelines covering water hygiene? Below are some considerations;

- **Hospitals and Care Premises:** As a responsible water treatment company, we have noticed an increase in legionella positive results from water samples within the care sector. The likelihood must be that with so much focus being placed upon prevention of Covid, that routine water hygiene tasks such as regular flushing of little used outlets and temperature testing of hot and cold water outlets is not always being carried out as stringently as is necessary. It may therefore be prudent to adopt an automated approach to such regular tasks

- **Is this the New Normal?** Back in March 2020 the consensus seemed to be that the pandemic could potentially all be over within a few months. Yet here we are some two years later faced with a second variant, spreading like wildfire, and threatening to overwhelm the NHS. Until the entire world is vaccinated there must be the risk of more and potentially more deadly variants. Faced with such an uncertain future, how long will it take for water systems within office and retail premises to be subjected to the type of normal water consumption necessary to avoid stagnation which will encourage microbiological proliferation

- **Homeworking:** In the initial rush of people to shut up shop before racing back to the sanctuary of home, companies were desperate for employees to set up home offices and to carry on working as best as they could. Many of those employees however found that they didn't miss the daily commute, that they rather liked this facet of the new normal. Faced with such an uncertain future, will water systems within office and retail premises ever again be subjected to the type of water consumption necessary to avoid stagnation which will encourage microbiological proliferation?

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Legionella Control Association

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INDUSTRY UPDATES

Legionella Control Association

LCA are running 4 Roadshow events *(see advert on page 8)* in May 2022 showcasing the same programme and speakers at 4 UK venues. The programme includes news about recent LCA activity, common failings at LCA audits, Legionella Anisa, LCA escalation procedures, competence assessments, HSE activity update and finishes with a round table discussion on ACoP L8 and HSG274 - Is it still fit for purpose? The LCA is planning a refresh of its website this year with more interactive and media content to assist members in joining the LCA and maintaining the requirements of being a member. We will be rolling out training in competence assessment as a member benefit, beginning in 2022. The training will be in how to develop the process and procedures to assess competence for compliance with LCA Code of Conduct requirement 2.

The LCA is reviewing members that are underperforming over the long term and there are plans in place to address this issue. The LCA has received several complaints about members from end users in 2022 so far. The investigations into complaints vary in their findings but all are followed up and resolved with either the member showing that they can work within the Code of Conduct, or the member's registration being suspended/terminated. LCA membership figures remain healthy and as at 10/03/22, there are 382 LCA members, 22 applicants and 6 suspended members not listed on the website and subject to the disciplinary process.

RSPH

Webinar Title: Back to basics: Waterborne pathogens of concern in healthcare premises - their role in causing hospital acquired infections and contribution to the global increase in antimicrobial resistance

Time and Date: 1 - 2pm, 18th May 2022

The British Standards Institute has recently published *Water quality - Risk assessments for Pseudomonas aeruginosa and other waterborne pathogens.* Code of practice to support the development of holistic and effective water safety plans. *The role of Pseudomonas aeruginosa* in the acquisition of antibiotic resistance is described by the WHO as of global critical importance but is this risk being identified and taken seriously in our healthcare premises? Is enough being done to prevent waterborne hospital acquired infections? This free webinar from RSPH, chaired by Prof. Rodney Cartwright and given by Dr Susanne Surman-Lee, will answer these questions.

Link to book:
https://www.rsph.org.uk/event/back-to-basics--waterborne-pathogens-of-concern-in-healthcare-premises.html

UKAS

UKAS is the UK's national accreditation body appointed by government, with a remit to assess and accredit organisations that provide services including certification, testing, inspection and calibration. UKAS accredits organisations conducting legionella risk assessments of artificial water systems within the built environment to the international standard ISO/IEC 17020:2012. This standard sets out minimum requirements for inspection bodies and is applicable to a range of industries. To apply relevance to legionella risk assessment work, UKAS has published a supplementary document referred to as RG9 - Accreditation of Bodies Undertaking Legionella Risk Assessment Activities.

RG9 provides an understanding of the minimum requirements for competency of personnel involved in risk assessment work as well as expected mechanisms for demonstrating the consistency of risk assessment inspections through processes such as competency audits and re-inspections. Importantly, the publication deals with impartiality which is seen as a critical element of any organisation undertaking inspections which may recommend the need for remedial action. Often, legionella risk assessment inspection bodies offer additional maintenance services and microbiological sampling. Accredited inspection bodies undertaking legionella risk assessment work are expected to demonstrate how they ring-fence inspection work and avoid using them as a tool to drive other incomes streams.

An updated edition of RG9 is shortly to be published and will have minor clarifications over the current edition, as well as introducing a requirement for inspection body accreditation schedules to specify where the accredited inspection body undertakes work in health and social care settings. This new requirement aims to allow the identification of expected additional competence expectations for operators conducting legionella risk assessments in such vulnerable population settings. Whether legionella risk assessment organisations are accredited or not, RG9 (free to download from *https://www.ukas.com/resources/publications/inspection-body-accreditation/*) is an essential reference for all organisations conducting legionella risk assessment work.

A discussion with... Nick Barsby LCA chair

Today we are talking with Nick Barsby who is the current chair of the Legionella Control Association (LCA). We started our conversation by asking Nick to **describe his career journey so far.**

After qualifying with a degree in Marketing Psychology from De Montfort University in 2004. Nick worked at a number of laboratories including Severn Trent, Exova, ALcontrol, ALS and ADEY working on amongst other things MALDI-ToF. Nick is currently working at T-Safe where he has been for the past 18 months. Nick joined the LCA Management Committee in 2016 as an independent committee member, taking on the role of marketing & publicity officer in 2017, before becoming chair in October 2021.

Nick has enjoyed the steep learning curve in the various environments and feels that he "has always been chatty and friendly and this has been useful in his various roles". He noted that the "labs were looking for people to help the very technical lab people" to talk to customers. He notes that he picked up the information fairly quickly and noted that "none of the labs are rocket science. A Legionella test is a scientific thing to do, but a consistent method is used with a standard process which makes it accessible to the less technical amongst us".

Next we moved on to **what or who had had the biggest impact on Nick's career?**
It was Severn Trent who started Nick on the water path and he "learnt from Dave Simons who was the Sales Manager and later went to work at Welsh Water" in addition to Roger Gaunt, Business Development Director and Mike Cohen, Technical Director who "was involved in waste acceptance criteria analysis and is still in the industry working as a technical consultant". Nicks notes that he learnt a lot from Dave, Roger and Mike who "took the whole team of newcomers under their wing and who they mentored into the industry". He notes that they "could see that he wanted to learn and was eager to learn" and they were only too happy to help.

Other people who have had an influence on Nick are Alison Hughes at Exova who helped to steer and put focus behind him, and Chris and Morten at ALS were great. Finally in his new role at T-Safe Nick has been helped by his boss Stephen McCreanor but also by the technical guy Joachim who "has helped to explain something very technical and make it understandable". We all need some of those people in our working life!

Discussing **what advice Nick would give his younger self** he felt that he wouldn't change anything. He believes strongly in his mantra "good, better, best, never let it rest until your good is better and your better is best!" and noted that "there will always be someone who is better than you, but there is no excuse for someone working harder than you". This is a mantra he follows to this day believing that hard work will always help to get the right results.

Next we moved onto the **main focus of the LCA at the current time?**
Nick explained that it is an exciting time at the LCA. There have been many "developments within the last few years, the engagement of a manager with Matt Morse. The Association has become more vocal with the COVID pandemic, providing guidance and support to give our members the confidence to act when there wasn't a lot of guidance coming from the government". They have also "reinvigorated all of the standards for service delivery, which was no mean feat". This has been a big step change for the LCA and Nick promises us that "there will be more guidance and instruction for use videos in the pipeline". The team are also planning a roadshow of one day events for LCA members going around the country, and notes that "for the first time in 7 years we are moving our events out of the Midlands. We have exciting messages to bring to our members".

Other areas of Nick's work are on Legionella anisa, data for which has been passed to HSE and papers are being written, some of which you can find in this edition of Waterline. Nick explains that "The Legionella anisa discussion emanated from a conversation with a member which has led to more questions, data and an understanding of a new area and that is what science is about. It's about finding new things and improving our understanding. Trying to understand where things go wrong and where things could be better and delivering guidance to help members deliver a better and more compliant service and help prevent people catching Legionnaires' disease".

Nick notes that "things are changing significantly, perhaps for the first time in 40 years with regards Legionella". He is excited about the good things coming out of the LCA and feels that "members should be proud of what the LCA is doing and has done and also what they as members have done". He notes that "some of the things coming in the future will make the members busier, but also more effective and prouder as well".

This all sounds great, so we asked **why is supporting your members important?**
Nick explains that "the LCA wouldn't exist without its members. They are the lifeblood of the Association" and he wouldn't be sitting here today as the chairman without the members. He notes that "everything the LCA do is to support members and help them give a better service" to their customers. "It's not a pay your subs and get your badge organisation, we set standards and expect high standards from our members and want our members to be proud of the badge". As documented in Waterline before, it is a badge that is highly sought after as people have falsified membership in the past proving it is something that people want. Nick is passionate that "as the committee representing members, we need to remember we are there to support the members and should provide things to help deliver a better service or understand things better".

Next we moved onto Nick's views on **degree versus vocational training?**
We note that Nick in fact has a degree in something which is not water-related, but also has vocational training from various jobs. Nick believes that "a degree shows you can stick to something for 3 years, but you are not necessarily the smartest person in the room. It really is about attitude and application". He notes that "a degree might help with certain learning skills but it isn't critical that you need a degree". He is sure that there are certain jobs where a degree might help, for example being a doctor, but notes that "he hasn't been held back by the lack of degree in a specific subject". An inquisitive mind and desire to learn is perhaps more important than the original subject matter of a degree.

From the LCA point of view they demand that people complete relevant training, and that this, along with competence assessments, is maintained. However, there is no requirement for degree, over on the job and classroom training and in fact maintaining knowledge is just as important as initial qualifications.

Our next question was whether Nick preferred to read **hard copy or digital documents?**
Nick explained that he was a "pen and paper man, a self-confessed dinosaur". He noted that he has 15 issues of Waterline in his office that he flicks though when he has 5 minutes spare. He did note that he "has been writing a paper recently and has been searching online for information and reading papers online but that he prefers a physical paper where he can highlight information". He does however accept that he will need to change in the future.

We discussed that other people are finding digital methods easier to search and Nick agrees noting that he "has L8 on his desk but often searches on the electronic copy" for speed. The world has changed from searching in reference books and Nick was in that transition phase from university where email

was becoming more widespread. There may be life in the old dinosaur yet!

We then moved onto what **improvements the LCA would like to see in the industry?** Nick explains that "what we have done recently is release new service standards to raise member standards. The team is now working on revising the training and knowledge matrix, and when this is released it will help members to align better to the guidance". He feels that the "LCA is there to continually raise standards. We are not trying to make it impossible for members (or applicants) to comply, we are trying to improve the standards for the end customer, who may be a hospital or a school".

Personally, Nick feels that "if people read all of the standards and guidance documents and understood them a bit more, it would be helpful". He notes that "often the assessors see references to old standards and that raises the question of is 'that a typo?', or 'do they even know that a new version of the standard is available?'. As an industry we don't always keep up to date with what is changing and understand the ramifications of that.

Looking in from the outside, perhaps the LCA could improve in this area providing help to their members to understand what has changed with new standards". Nick notes that the "BS 8580-2 doesn't talk about Legionella but does talk about other waterborne pathogens" and asks "should something be put out there for the members?". This is something that the WMSoc try to do with new standards and Nick notes that "the limitations of this is that if something is missed in the synopsis then everyone will miss that update". It is indeed a difficult balancing act, but Nick feels that "as an industry we need to get better at keeping up to speed with the latest regulations and guidance" and that the "LCA could be better at supporting our members in understanding when updated guidance is published and what that means for them." "Understanding not just what has changed but also why that has changed is important".

We can see that the LCA is doing great work and continuing to make improvements to the industry. Many thanks to Nick and the LCA for taking the time to talk to us this month. We hope you enjoyed the conversation.

Quick fire round

Beer or Wine?
Beer

Pizza or Curry?
Both, depending on the weather!

Cheese or Dessert?
Dessert, there are just too many to choose a favourite

What's your favourite vehicle?
Starbug from Red Dwarf

What three things would you take if deserted on a tropical island?
A boat, map and compass. Nick is too chatty to stay on his own on the desert island for long, he doesn't think he would last a week before needing to return to civilisation!

Committee roundup – Spring 2022

Here is a quick roundup of work being undertaken by the various sub-committees of volunteers.

Events
I'm delighted to announce that the first live WMSoc Event of 2022 will take place on the 21st June at Drayton Manor. The programme we are planning is varied and informative and we can't wait to see you there.

The first webinar of the year "What's New in British Water Quality Standards" delivered by Susanne Lee was a real hit. If you weren't able to attend to see this live you can find it, along with the full webinar series, in the members area of the website. Our next webinar is on the 28th April 2022 entitled "compliance is not the goal of risk management" delivered by Richard Bentham. This will be another really interesting and informative hour so if you're not already, make sure you are signed up to join us for it!

We are also hosting our first WMSoc golf networking event, an excellent opportunity to meet like minded people on the beautiful greens of the Belfry followed by a three course dinner and prize giving ceremony. Spaces are limited so make sure you grab yours before it's too late!

Membership
So far the membership team have been working hard to improve what the WMSoc offers for our members. 38 new members have joined so far this year with plenty of members looking to upgrade by using the CPD chart. The continuous professional development is not only for individuals but companies. The CPD logo can be used to promote events hosted by service providers. With the aim to improve knowledge and skills throughout within the industry.

Some members have requested a WMSoc logo instead of letters. Although this was suggested to council the idea was rejected.

The membership form has been updated and we are actively engaging with our members by listening to your views. We are increasing the diversity within the industry by reaching to areas apart from water hygiene and treatment industries.

Technical
Work in the technical committee continues apace with new document publications and discussions with stakeholders to assist our members ongoing. We are very lucky to have such a collection of experience and expertise at our disposal.

We have published 2 more Toolbox Talks on Water Softeners and Writing of Method Statements. A guidance document on Rainwater Harvesting has also been published.

We are looking at updating member guidance on "other risk systems" and we also plan to publish member guidance on scald risk assessment. We are also planning to look into legionella risks from low carbon technologies such as heat pumps. We feel we need to support the introduction of technologies that have a positive impact on the environment as long as any new potential risks are understood and managed.

The excellent Oxidising Biocides document is being updated to better define what is drinking water and what can be dosed and the guidelines that underpin this.

To all members - don't forget that we are here to serve you and support sharing of knowledge and best practice in our industry. We are not an ivory tower or old boy network so your engagement and contributions are positively encouraged!

Training
The Training and Accreditation Committee (TAC) are preparing the budget for the coming year and will be looking towards acquiring additional highly skilled and independent tutors in order to increase their current training offerings. If you feel you have the correct qualities and can demonstrate independence, then please forward your CV to **training@wmsoc.org.uk** for consideration.

The WMSoc Qualification Pathways, leading to WMSoc Cert designation, are now being implemented and the on-line courses have had excellent feedback. The introduction of the new pathways has required certain common sections of existing courses to be prepared for, in advance of attending courses in person. These are on-line and are communicated to the delegate prior to attendance – failure to complete the courses will potentially compromise the final exam results and certificates cannot be awarded until the on-line sections have been passed.
We are looking forward to our first cohort of WMSoc Cert examinees, please get in touch to be one of the first to receive this new award at **training@wmsoc.org.uk**.

Waterline
Welcome to your spring 2022 edition of Waterline. Your committee members put a lot of effort into the creation, variation and quality of each edition. We hold monthly meetings to ensure continuity from one edition to the next, often working on two editions at the same time, closing one off and starting on the next - meeting fixed production deadlines. We were heartened to receive a number of very positive responses to the winter edition, evidence that our committee efforts are being noted.

In the winter edition we asked for articles that cover some aspect of water not usually referred to in Waterline. This edition contains a Toolbox Talk on the Global Water Cycle, and is followed by a short article on how humanity is misusing it at its peril. This lists the topics we would most like to see as journal articles, with the emphasis on how we can stop or slow these negative and damaging trends right through to the overcoming of them. Research, pilot studies, trials etc.

Please let us know if you have an interest, knowledge or involvement in one or more of these topic areas, by contacting WMSoc via e-mail: **waterline@wmsoc.org.uk**.

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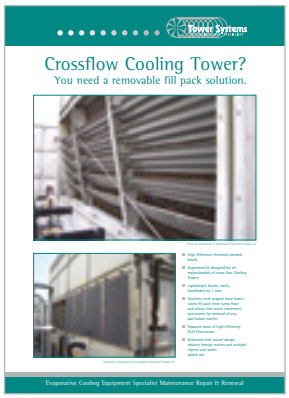
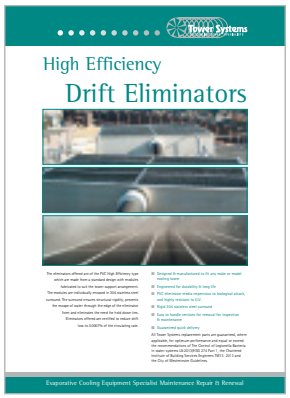


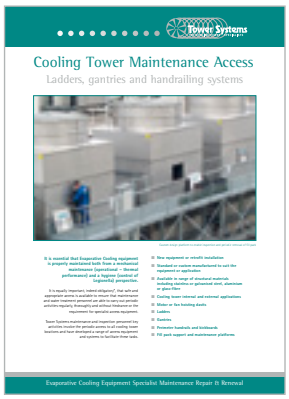
High Efficiency Drift Eliminators



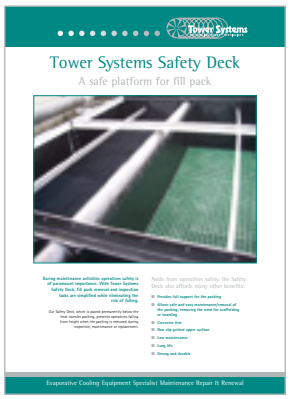
Routine Maintenance Visits

Replacement Parts

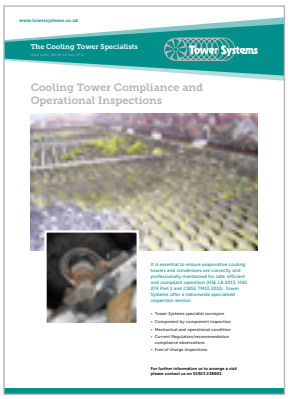
Maintenance Access



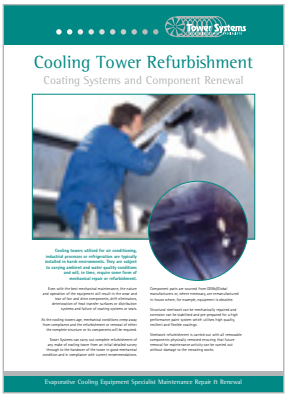
Safety Deck



Condition Surveys



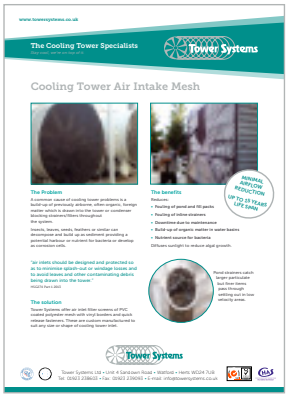
Refurbishment



Leak Repairs

Top Air Inlet Shields

Cooling Tower Air Intake Mesh



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THE WATER MANAGEMENT SOCIETY

Training Programme 2022

WHERE INDICATED ● COURSE WILL USE THE WMSOC PRACTICAL TRAINING AREA

PRACTICAL TRAINING AREA

SPRING & SUMMER PROGRAMME 2022:

Tuesday 5th April	Evaporative Cooling Water Chemistry - Foundation
Wednesday 6th April	Steam Boiler Water Chemistry - Foundation
Wednesday 20th April	Practical Legionella Risk Assessment Hot & Cold Water Systems - Advanced * ●
Thursday 21st April	Cleaning & Disinfection of Evaporative Cooling Systems ●
Tuesday 26th April	HTM 04-01 Water Hygiene Training: Managing & Controlling Risk of Waterborne Pathogens in Healthcare Water Systems ●
Wednesday 27th April	Temperature Monitoring, Sampling & Inspection of Hot & Cold Water Systems For Technicians ●
Wednesday 4th May	Cleaning & Disinfection of Hot & Cold Water Systems ●
Tuesday 10th May	Legionella Risk Assessment of Hot & Cold Water Systems - Foundation
Wednesday 11th May	Legionella Control & Management for Dutyholders and Responsible Persons - Hot & Cold Water Systems
Tuesday 17th May	Management and Control of Closed Systems ●
Tuesday 24th May	Spa and Swimming Pool Chemical Control and Management
Wednesday 25th May	Practical Legionella Risk Assessment Hot & Cold Water Systems - Advanced * ●
Tuesday 7th June	Temperature Monitoring, Sampling & Inspection of Hot & Cold Water Systems For Technicians ●
Wednesday 8th June	Cleaning & Disinfection of Hot & Cold Water Systems ●
Tuesday 14th June	Water Treatment Chemistry Foundation
Wednesday 15th June	Legionella Risk Assessment of Evaporative Cooling Systems
Tueday 28th June	Legionella Control & Management for Dutyholders & Responsible Persons - Evaporative Cooling Systems
Wednesday 29th June	Legionella Risk Assessment of Hot & Cold Water Systems - Foundation
Tuesday 5th July	HTM 04-01 Water Hygiene Training: Managing & Controlling Risk of Waterborne Pathogens in Healthcare Water Systems ●
Wednesday 13th July	Practical Legionella Risk Assessment Hot & Cold Water Systems - Advanced * ●
Wednesday 20th July	Temperature Monitoring, Sampling & Inspection of Hot & Cold Water Systems For Technicians ●
Tuesday 9th August	Cleaning & Disinfection of Hot & Cold Water Systems ●
Wednesday 10th August	Legionella Risk Assessment of Hot & Cold Water Systems - Foundation
Thursday 11th August	Management and Control of Closed Systems ●

AUTUMN PROGRAMME 2022:

Wednesday 7th September	Practical Legionella Risk Assessment Hot & Cold Water Systems - Advanced * ●
Thursday 8th September	Cleaning & Disinfection of Hot & Cold Water Systems ●
Tuesday 13th September	Legionella Control & Management for Dutyholders and Responsible Persons - Hot & Cold Water Systems
Wednesday 14th September	Legionella Risk Assessment of Hot & Cold Water Systems - Foundation
Tuesday 27th September	Water Treatment Chemistry Foundation
Wednesday 28th September	Evaporative Cooling Water Chemistry - Foundation
Tuesday 4th October	Practical Legionella Risk Assessment Hot & Cold Water Systems - Advanced * ●
Wednesday 5th October	Legionella Risk Assessment of Evaporative Cooling Systems
Tuesday 11th October	Temperature Monitoring, Sampling & Inspection of Hot & Cold Water Systems For Technicians ●
Wednesday 12th October	Cleaning & Disinfection of Evaporative Cooling Systems ●
Tuesday 18th October	Legionella Risk Assessment of Hot & Cold Water Systems - Foundation
Wednesday 19th October	Evaporative Cooling Water Chemistry - Advanced *
Tuesday 1st November	Cleaning & Disinfection of Hot & Cold Water Systems ●
Wednesday 2nd November	HTM 04-01 Water Hygiene Training: Managing & Controlling Risk of Waterborne Pathogens in Healthcare Water Systems ●
Tuesday 8th November	Practical Legionella Risk Assessment Hot & Cold Water Systems - Advanced * ●
Wednesday 9th November	Management and Control of Closed Systems ●
Tuesday 15th November	Steam Boiler Water Chemistry - Advanced *
Wednesday 16th November	Spa and Swimming Pool Chemical Control and Management
Tuesday 22nd November	Legionella Control & Management for Dutyholders and Responsible Persons - Hot & Cold Water Systems
Wednesday 23rd November	Legionella Risk Assessment of Hot & Cold Water Systems - Foundation
Tuesday 29th November	Legionella Control & Management for Dutyholders & Responsible Persons - Evaporative Cooling Systems
Wednesday 30th November	Qualification Wrap Up & Exam Session
Tuesday 6th December	Cleaning & Disinfection of Hot & Cold Water Systems ●
Wednesday 7th December	Practical Legionella Risk Assessment Hot & Cold Water Systems - Advanced * ●
Thursday 8th December	Temperature Monitoring, Sampling & Inspection of Hot & Cold Water Systems For Technicians ●

** Delegates attending an advanced course should first attend the corresponding foundation course or have equivalent knowledge.*

It is generally agreed that training should be refreshed on a regular basis; WMSoc recommends that training is refreshed every 3 years. The WMSoc has replaced its refresher courses with revamped training modules using the Practical Training Area (PTA); this gives attendees the opportunity to prove an ability to follow instructions and demonstrate their ability to work safely under test conditions. Anyone who attended training more than 3 years ago would benefit from attending a course currently shown on the programme to refresh their training.

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Call: 01827 289 558 or email: training@wmsoc.org.uk

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