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## Back to Basics

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Focusing on:

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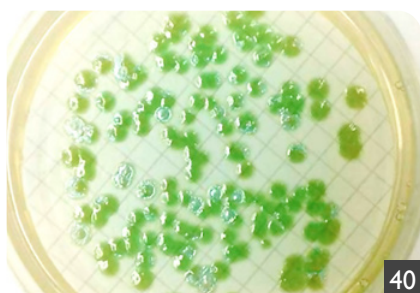
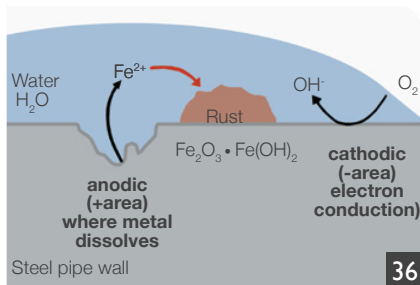
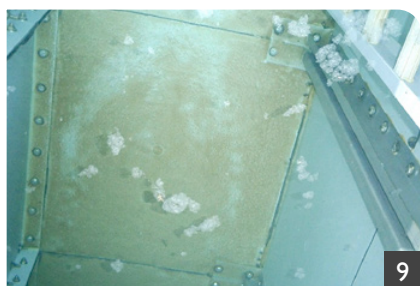
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**waterline Editor:**  
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**Guest Editor:**  
Matt Morse



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# PipeLine

Ian Penney, Chairman WMSoc

Hello all,

It's nice that spring is well and truly on the way with lighter and hopefully warmer days ahead. As thoughts turn to summer and our long-awaited holidays, perhaps you should take a look at our new photo competition on the 'best of the worst' photos of showers or other water items. Unfortunately, these opportunities for 'worst' photos sometimes happen at holiday accommodations. Hopefully we'll all be OK but if not, send us a photo.

Membership applications are on the rise this year with a bumper crop already approved. We hope you are all enjoying the benefits of being a member, which include this magazine and documents released by the technical committee including guidance on *Scald Risk Assessment*, and *Remote Monitoring* and a *Water Features Toolbox Talk* already released this year.

With regards to Waterline, and an eye to the future with respect to sustainability, we are asking members if they want to continue to receive the magazine in its printed format, or if you would prefer an electronic version? Answers on a postcard please...

The events committee have been working hard this year and we hope you managed to join our webinar on *Scald Risk Assessment* on the 27<sup>th</sup> March, if not you can find the slides in the members portal online. Our next webinar on *Rainwater Harvesting* is on the 18<sup>th</sup> May, so it's not too late to sign-up and join us.

We are also holding a face-to-face WMS Conference at Drayton Manor on the 11<sup>th</sup> July, and our second annual WMS Golf Day on the 29<sup>th</sup> June at Walmley Golf Course, Sutton Coldfield. Details for both of these events can be found on our website.

Training is continuing at our new headquarters, and we are keen to see more of you completing our qualification pathways this year. A way to prove your knowledge and be externally recognised with names of those successful published online for 3 years.

If there is something you would like to see that we aren't doing, please get in touch. We are, after all, here to serve you!

Best regards  
Ian Penney  
Chairman

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# Letter to the Editor

Hello Ian,  
As the Chair of LMAG may I offer a belated congratulations on being appointed as Chair of the Society. I have no doubt you will be kept busy and may your tenure be rewarding.

On reading the Autumn edition of Waterline I was quite pleased to read of your acknowledgment of the Legionella Management Advisory Group in your Pipeline address, thank you! Being recognised from afar is encouraging to say the least.

I was recently contacted by the admin team offering to include LMAG updates in the industry updates section of Waterline. Where we can it would be an amazing platform to give an Australian perspective on Legionella management. In addition to that Carolyn Summers has gracefully agreed to be our point of contact with the Society.

Our group has much work to do in many aspects of water hygiene and water risk management practices and guidance due to the fragmented approach across the country. To quote an old saying, from the LMAG perspective, you eat an elephant one small piece at a time.

If you don't mind I would like to occasionally correspond to keep you informed of what we are working towards and any events we may be involved with.

have a great week Ian.

Regards,  
Kelvin Slade CF  
Member Master Plumbers Assoc Qld  
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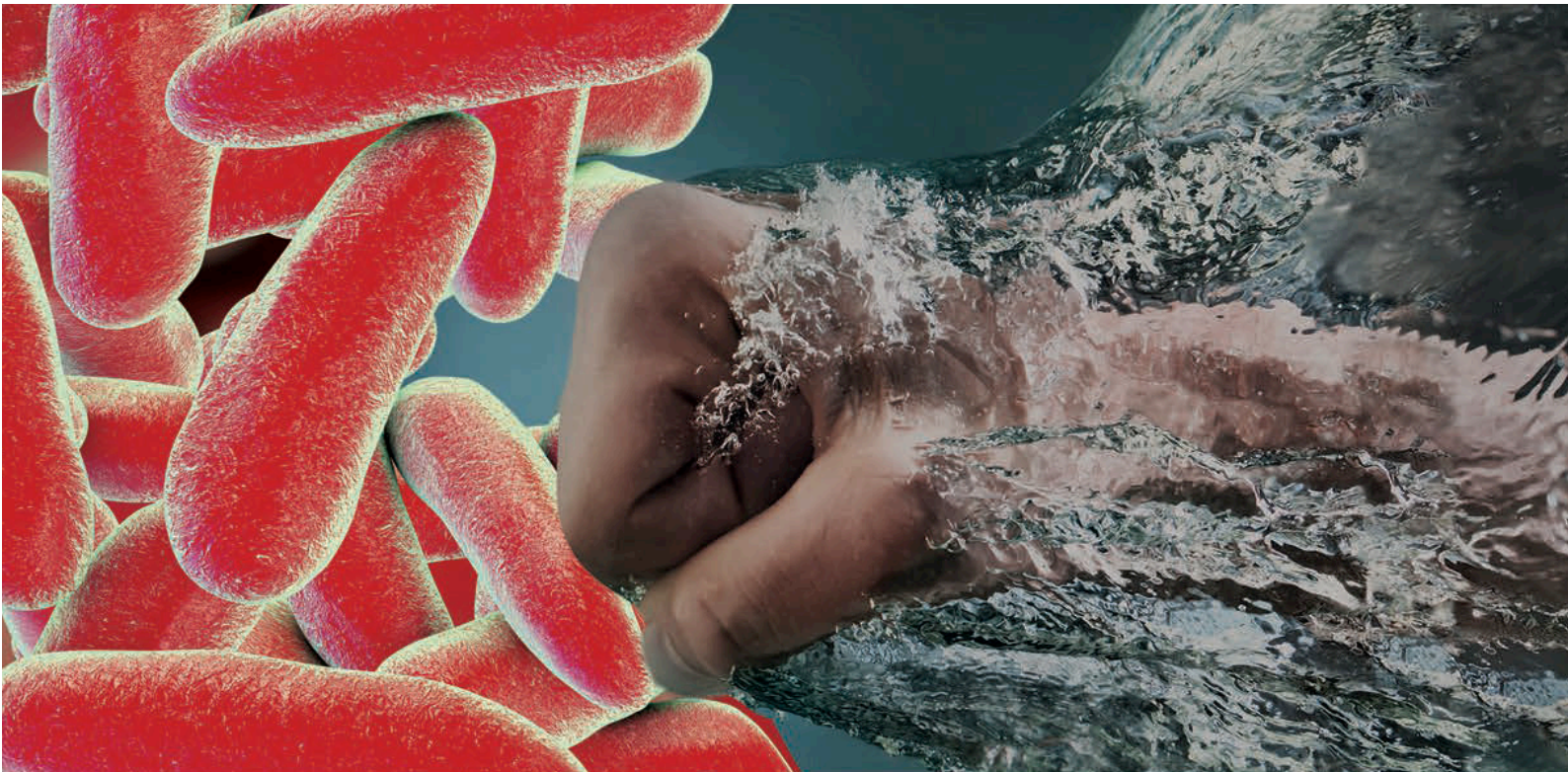
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# Back to Basics

Matt Morse, Principal Consultant, Dragonfly Water Consultancy

In my day to day work I see a lot of audits, water treatment programmes, legionella risk assessments and written schemes of control. Many of these that I see suffer from a common problem – they start in the middle instead of at the beginning. They don't go back to basics. Back to basics was the name of a conference the Society ran some years ago and it's a great way to get to the root cause of problems.

It's often said that failure to plan is planning to fail. The extent of the 'plan' within a lot of work I see is referring to guidance, referring to the manual. There is a reluctance or ignorance in some cases to step back, view what needs to be done and design a plan without the training wheels of guidance.

I'm going to ramble on a bit about the basics of our industry. Some of it might seem like we've lost our way, or that water treatment was done better in earlier years. That certainly is the case in some places, but I do tend to see the worst, or at least remember the worst of what I see. There is plenty of good, and even best practice out there so please don't think this is a picture of where we are. This is where we want to avoid being! Don't lose sight of the underpinning basics.

## Competence

The HSE interventions programmes over the last decade have thrown up a lot of scary, and to some extent, embarrassing figures for our industry. For example, a third of cooling tower sites inspected were in material breach of the law. When the figures are examined, there are failures at multiple levels that a competent person would not, should not, have let pass. The thread of a lack of competence, runs through the R1118 report.

Despite a lot of work by the LCA over the last twenty years and other organisations such as UKAS, competence is still not as well understood as it should be. There is a legal requirement to provide information, instruction, and training to staff in the workplace so they can complete their work safely. This must be sufficient to ensure they are competent. So, what does that mean and how is it best done?

That their employees were competent is one of the most difficult things for an employer to prove in court. This becomes very difficult when looked at after the fact, after the breach, after the case, after the outbreak, after the death.

What are the basics of competence? Breaking this down, the employer needs to know what their staff need to know to do the job properly, make sure they know it, check they are competent in it and document the whole process.

For field based tasks that involve a method statement, this should detail the elements of that task. Take those elements and work out what underpinning knowledge is required. Possibly use the LCA knowledge and skills matrix to help identify what

is needed. See if the operative already has that knowledge, if not train them. Record that training. Observe them doing the task, do they do it well, are they competent? Create a record of that check, maybe use the method statement itself as the basis for checking off each element of the task.

I often see a record of training without the check that the operative was competent. We've all seen people with a PhD that you wouldn't let open a can of beans that was already open – training is not enough. There must be evidence of competence.

What about the competence of others? BS8580-1:2019 talks about assessing the competence of those involved in legionella control on the site you're risk assessing. That process is sometimes poorly understood. Are there training records tick, all good. Wrong! Back to basics; what are they supposed to be doing, are they doing it, are they doing it well? – then the conclusion is they are probably competent. If there is a training certificate for the site operative but all the results are out of spec and not reported to the defects log or the wrong conclusions drawn about the data – they clearly are not competent! Risk assessors have to make an assessment, a judgement, about this aspect of risk.

## Legionella Basics

Legionella control seems to be an established 'industry' these days and I often see quoted 'XYZ must be done because the guidance says it should'. Doing what guidance says has become the goal of compliance, but this is fundamentally flawed. The aim of the game is compliance with the Law. HSG274, and to some extent ACoP L8, are not compliance documents. They're not specifications or sets of rules. There are areas where it would be impossible to 'comply' with some of the sections.

In most situations it's often useful to take a problem back to root cause to find out where the problem started. That applies to legionella control, water treatment and pretty much anything else. With persistent positive legionella samples in water systems that won't go away, the normal response is 'we've done everything in the guidance!'

Legionella grows in water systems because of several well-known factors. If those factors are there and legionella is present, legionella will grow. If legionella is there, those factors are, or have been, there.

The 'requirement' for cold water to run below 20 degrees within two minutes and hot water to above 50 degrees within one minute is often quoted. Take that back to basics in ACoP L8 paragraph 59a it says to avoid temperatures where legionella can grow, 20-45 degrees. How many water systems avoid those temperatures in all parts, at all times? None! It is a question of degree, judgement, assessment - risk assessment. If the pipework runs through the boiler room on the way to the outlet

and one minute and fifty seconds worth of flow is at 37 degrees for twenty-three hours a day, but the outlet reaches less than 20 degrees in under two minutes, is that OK?

The question of what to do with remote monitoring data is a topical one. The Society is developing guidance into what the data actually means in terms of risk and it's a very difficult question to answer. The clear cut 'compliance' goalposts in the guidance mean that most systems don't comply when you look hard enough or frequently enough.

Legionella control is summed up quite well in paragraph 59 of ACoP L8. Paraphrasing a little:

- Avoid temperatures where legionella can grow
- Avoid stagnation
- Avoid materials that provide nutrients
- Control release of water spray
- Keep the system, and the water in it, clean
- Use water treatment techniques
- Maintain the system

There are not many systems out there, if any, that can comply with all of those all of the time in all areas. No spa pool, cooling tower, post-TMV pipework, or shower is going to 'comply' with 59a. In reality we use a combination of paragraph 59b, 59e and, for some systems, 59f. Those systems can be and normally are all operated at a low level of residual risk. This can be demonstrated with low general bacteria and negative legionella analysis results.

In the dim and distant past, I had the interesting and fairly unusual experience of a client with deep pockets and little appetite for risk for certain parts of their business. The Chairman had a grace and favour apartment within the office building and no expense was spared on keeping his water system safe. When the monthly legionella samples started to test positive the guidance was followed but the positives persisted. After multiple ineffective system clean and disinfections, we became desperate and started to replace parts of the system to try and eliminate the source of the issue. We replaced the shower head and hose, still positive. We replaced the water tank, still positive. We replaced the calorifier, still positive. We replaced all the accessible pipework, still positive. Then, with not much else left to try, we dug the inaccessible pipework out of the wall that had been there since construction in the 1960's. Within this section of corroded, galvanised steel was fibrous jointing compound – probably hemp, that tested positive on surface swabs for legionella. Once removed the positive samples went away and did not return. The moral of this particular tale is that the first principles of control in ACoP L8 paragraph 59 are important and if there is a problem with no clear cause, one of these is going to be the culprit – you just haven't found it yet. We had corrosion and organic material in the





system that was sheltering and supporting legionella growth.

Often but not exclusively in legionella control, there is a general reluctance to go off the beaten track, and to make evidence based decisions where the guidance does not fit the situation well. In my experience designers of water systems tend to rely on design guides rather than take a step back and do a basic sense check on what they've designed. The result is often oversized or over specified water services and problems later in managing water quality.

The question of when a building should have its first legionella risk assessment is often asked and the answer is simple – before it's been built. I've had the chance a few times to see designs on the drawing board and had the opportunity to make suggestions before something was built. On one occasion we had a meeting with the architects, and they unveiled their plans for a development of six buildings. At the centre of the development was the central water tank with six balanced compartments. Or should I say, what they intended to be six balanced compartments. My feedback was that there was no advantage to six compartments and the disadvantage was the much higher chance of stagnation in five of the six. The architect took that all on board and the design was to be updated accordingly. Six months later we arrived on site to find a six compartment tank with five of them heavily stagnant. It turned out nobody would take responsibility to sign off on the change to the design and we embarked on six years of legionella problems instead.

**Risk Assessment Basics**

Risk assessment basics tend to only really be thought of in the more advanced risk assessments! For systems where there is not much guidance out there, the only way to go is from first principles. From the basics. The more run of the mill hot and cold water systems or even healthcare or cooling systems seem to be assessed against the guidance, rather than against the risk. Legionella risk assessment these days seems to be a commodity to buy from the lowest bidder. Many that I see don't even quantify the risk they're supposed to be assessing.

The basics of legionella risk assessment have to be: contamination, amplification, transmission, exposure and susceptibility. CATES is the five letter TLA. Many risk assessments get these wrong.

One 'premium' risk assessment company with all the right accreditation and

membership regularly states that cooling towers are a low risk of contamination as they are fed by mains water. That really shows the risk assessors lack of understanding of how cooling towers work.

Ignoring the building and water system history is another cookie cutter risk assessment failing. In a risk assessment from a hospital where there had already been one fatality from legionnaires' disease and literally thousands of positive legionella results in the record, the risk assessment report stated that the chances of contamination were low. At this stage the reality was that the chance of legionella being in the system was 100% but there was a template to follow...

Amplification is another area where risk assessors can sometimes go astray. Just because a water system is able to meet the criteria in the guidance for 'control' does not mean that it won't grow legionella.

In the not quite so distant past, I looked after a project where we kept getting persistent positive results despite the buildings 'compliance' with the guidance. Cold came through at the same temperature as the tank within the permitted two minutes. The hot came through within one minute. Everything was clean, everything moved at least once a week, what could possibly be wrong? We sampled back sequentially through pipework and determined that the colonisation was mainly in the riser areas rather than at the main plant. We then installed sensors and data loggers throughout the building to try and see what was causing the issue. The results were a surprise – it turned out the majority of the water in the building resided at legionella growth temperature for at least 22 of every 24 hours. This was enough to allow legionella to grow if it got into the system. Pipes were very well insulated and separated hot from cold as far as possible, but we still had an issue. The building was built to the building regulations Part L of the time and was therefore extremely well insulated and relatively airtight. There

was nowhere for the heat from hot water or heating to go except into the cold water. The solution we came up with in the end was to ventilate the riser spaces and allow trapped heat to escape. This meant the cold water was able to maintain temperatures of less than twenty degrees in the riser spaces.

Table 2.1 of HSG274 part 2 now advises observing the thermometer during temperature monitoring for cold water temperatures that are slow to fall or hot water that is slow to rise. The key here is intelligent analysis of what that means. What do you expect, what is it doing, is it different?

Transmission risk – can the system make aerosol? If so, how much and how likely is this? Most water systems where the water is not fully contained all the time, can create aerosol.

Closed heating and cooling systems are often dismissed as being such a low risk, its virtually a no risk system. Exposure from these is likely to be rare in normal operation but what about when being maintained? Bleed air from a closed system and an aerosol is normally produced. Many recently installed heating system technologies such as heat pumps now run with flow and return temperatures that might not kill legionella. Safe systems of work for maintenance activity are essential.

Exposure and susceptibility are an interesting subject. Who is going to be exposed to the hazard? An outbreak a few years ago in a hospital originated from TMVs feeding TMTs in a toilet on the ground floor of the administration block. Susceptibility was thought to be a normal cross section of the public in the scheme of control as after all, this was a water system in an admin block. These toilets also happened to be on the route from reception to oncology outpatients. Can anybody see a potential problem with that?

C A T E S	<b>Contamination</b> – can legionella, other bacteria and nutrients enter the system?
	<b>Amplification</b> – are conditions present that will allow growth of legionella?
	<b>Transmission</b> – can the system create an aerosol that can escape?
	<b>Exposure</b> – can people encounter that aerosol, duration, volume?
	<b>Susceptibility</b> – are there susceptible people present?

The fundamental basics of legionella risk assessment are not that complex but seem to be beyond some template type risk assessment systems. The risk assessor needs to be capable of making judgement – making an assessment. There is an argument that there is too much guidance out there and it stops assessors having to think for themselves and make that judgement. There is also a culture of not wanting to make a decision and be responsible for it – ‘do this because the guidance says you must’. That misses the meaning of the word guidance!

**Water Treatment Basics**

Water treatment was a thing long before legionella became a popular US export. From the very first steam boilers that went bang, engineers were looking for ways to limit corrosion, scale and fouling. There are three topics that come up again and again in all water treatment and they are the fundamental basics.

Add biofouling or microbiological activity to the mix and you’ve got the four pillars of water treatment. Control scale, corrosion, fouling deposition and microbiological activity and you have control of water quality and a healthy system.

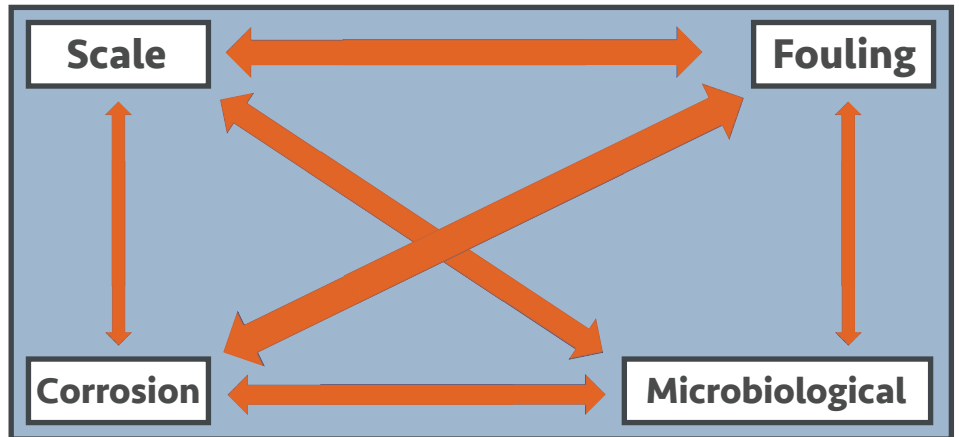
One thing that is often misunderstood is the interaction between these four areas and the law of unintended consequences. Push too hard in one corner and there will be problems at the others.

I’ve seen many galvanised steel cooling towers prematurely destroyed by the use of fully softened water makeup intended to control scale. Good intentions, blindly following health and safety guidance on avoiding scale, and lack of understanding of the process of white rust can lead to problems that are relatively easily avoided.

Microbiological control using a halogen like bromine or chlorine is established and well understood. The corrosive effect of using too much oxidising biocide is also reasonably well understood – pushing too hard on microbiological control with an oxidiser will lead to corrosion problems.

The use of a non-oxidising biocide alongside bromine or chlorine seems to be fashionable. These are sometimes claimed to be there to act as a biodispersant by the water treatment company. While some non-oxidisers do have an impact on biofilm, they are not generally classed as a biodispersant in the classic sense. The back to basics question to ask is this; is the other stuff going in with the oxidiser readily oxidisable? If it is, then in simple terms there is likely to be an issue when the oxidiser and oxidisable bits interact. Don’t forget, the one or two parts per million bromine reserve in the system is likely to a whole number in parts per thousand or even parts per hundred in the brominator. The system water containing the non-oxidising biocide will go through that brominator.

Sometimes the dose of a non-oxidising biocide is limited either by environmental limitations, operational constraints, or the human factor and the result is a dose below the level that will achieve an effective kill. Something is better than nothing though? Where do these non-oxidising biocides come from? Many are organic chemicals that when they degrade can provide nutrient for bacteria within the system. In closed systems it seems very



common to dose a non-oxidiser without consideration to the conditions within the system. If the system water quality is alkaline some non-oxidising biocides will struggle to do much except feed the microbiological problem.

The key to successful management of water quality in any water system is balance. In swimming pools, we often still use water balance as a critical control to prevent corrosion of metals and erosion of grouting, but it seems to have fallen from favour in other water systems. Keeping the basics under control will lead to success. The four pillars of water treatment above can be applied to any water system to a greater or lesser extent. There might not be much in the way of microbiology growing in a steam boiler, but we still need to manage corrosion, scale and fouling.

**Root Cause Analysis**

As part of the recommendations following a case of legionnaires’ disease some time ago, the responsible person was advised to be trained in root cause analysis. They had enormous trouble finding a course that fit the bill because nobody seemed to offer it back then. The basic principles of this subject can be very useful when problems are encountered in legionella control.

The first part of this is accepting that there is an issue that requires solving. Falling back on faulty data or mindlessly defending the status quo, does not move the situation onward. ‘Positive legionella results are normal for that type of cooling system’, was one I heard a little while ago. Once they’d had their head removed from the sand they recognised the problem and we managed to get to the bottom of the issue.

Once a problem has been recognised,

it must be diagnosed. What is the underlying cause? Understand and define the extent of the problem. For legionella, microbiology and water treatment problems there will be many assumptions. It’s very difficult to obtain all the data needed to understand everything. The principle is to determine what the problem is, why it has happened, and most importantly what needs to be done to prevent it happening again.

There could be a physical cause – something failed or broken in the water system, pump airlocked, tanks imbalanced, calorifier heating coil blocked, etc.

There could be a human cause – an action taken or not taken leading to the issue, cooling tower water treatment removed from a tender specification, a plumber leaving a hot water return valve closed after working on the system, not cleaning the packing in a cooling tower, etc. All of these have led to outbreaks in the past.

There may be a deeper organisational cause – a system, process or policy that has led to the problem. Nobody nominated as responsible person for legionella, nobody assigned to switch duty/standby pumps on the cooling system, etc.

Root cause analysis should look at each of these types of problem roots. When the underlying root cause has been found, it can be addressed. If the analysis does not get to the root cause, the problem is likely to reoccur because the cause has not been resolved.

**Example 1; a positive legionella in a water system. Problem – there is legionella in the water system. Action – clean and disinfect system. Does this deal with the root cause?**



White rust and corrosion on a three-month old galvanised evaporative condenser coil.



**Example 2; hot water is reported as running cool. Problem – water is not hot enough at taps. Action – flush hot water till it runs hot. Does this deal with the root cause?**

There are several ways of getting at root cause. The two examples above are flawed because they address symptoms rather than causes. The statement of the problem misses the underlying reasons. One way to get at root cause is to keep asking why, like a toddler, until you get to the root of the problem, or get put on the naughty step. Known as the five whys because five questions are normally enough. Applied to the first problem example 1.

**Q1. There is legionella in the water? Why?**

**Q2. Conditions in the system for legionella to grow and legionella has entered the system. Why? What are those conditions?**

**Q3. One compartment of the tank is stagnant and residing at 30°C. Why?**

**Q4. The tank is imbalanced and is gaining heat. Why?**

**Q5. The tank room is unventilated and at the top of the building and water resides for long enough to get warm.**

The root cause at question 5 gives the answer. Don't lose sight of the symptom – clean and disinfect that water system because there is clearly an immediate issue that needs to be dealt with. Make sure there is a recommendation to rebalance the tank, maybe reduce storage capacity, ventilate the tank room – address the underlying root cause.

Another way to try to find root cause of an issue is an Ishikawa cause and effect analysis. This looks at all the possible causes that might lead to the observed effect. This can be useful where there are multiple possible causes contributing to the observed effect. Named after Professor Kaoru Ishikawa but also sometimes known as a fishbone diagram after the shape it can make on paper.

The effect – i.e. the observed problem sits at the head of the fish. Each rib coming off the spine is a different possible cause or contributory factor. Some of the ribs might have contributory ribs of their

own. The contributory factors are often classified into those related to people, equipment, methods and materials.

**For our example 2 the analysis might look something like this:**

We can unpick each strand of the problem and its possible contributory factors. For each of the branches there could be:

- People factors (did somebody leave a valve closed they shouldn't have, has somebody turned off the calorifier?)
- Equipment factors (has the calorifier heat source or recirc pump failed?)
- Method factors
- Materials factors (was this system designed with long runs of noncirculating hot water?)

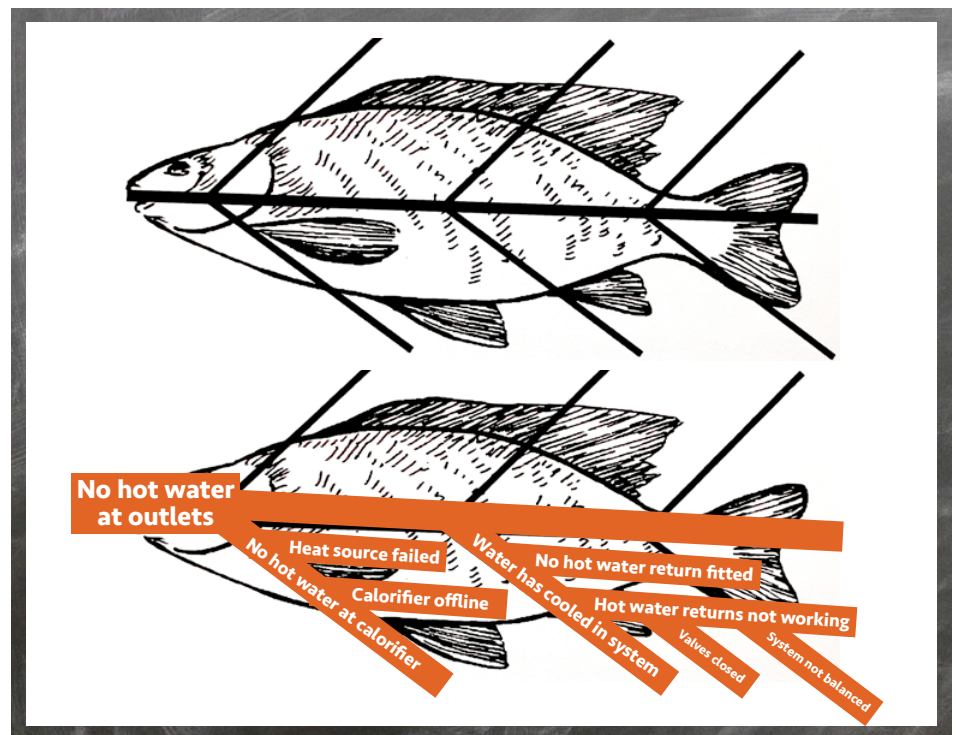
For this real example the issue was an unbalanced hot water system. Lockshield valves were closed in some areas and changes in the system layout meant that

areas of the system had lost balance, were not circulating and hot water in the pipework was cooling down over time. Flushing for five minutes brought hot water through but did not solve the underlying stagnation and legionella growth issue. As a result of the root cause analysis, the action taken was to rebalance the hot water system. This meant that all the circulating parts circulated as they were supposed to and water at outlets was hot within seconds.

#### Summary

All of the above is an attempt to describe the underlying basics. The first principles of control, principles of identifying and quantifying risk, basic fundamentals of water treatment and the root causes of problems.

Using downstream guidance, without heeding the basics sometimes leads us astray. Where the guidance comes to an end, all we have are first principles and we must think for ourselves.



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**Q1: How can you record and document evidence of an individual's competence?**

**Q2: When should a new building have its first legionella risk assessment?**

**Q3: What sources of contamination should be considered when risk assessing a cooling tower system?**

**Q4: What should be done with positive legionella results in water systems?**

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The answers will be published in the Summer 2023 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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# Remote Monitoring of Hot & Cold Water Systems Is the goal Compliance or Risk Management?

## Moving forwards while going back to basics

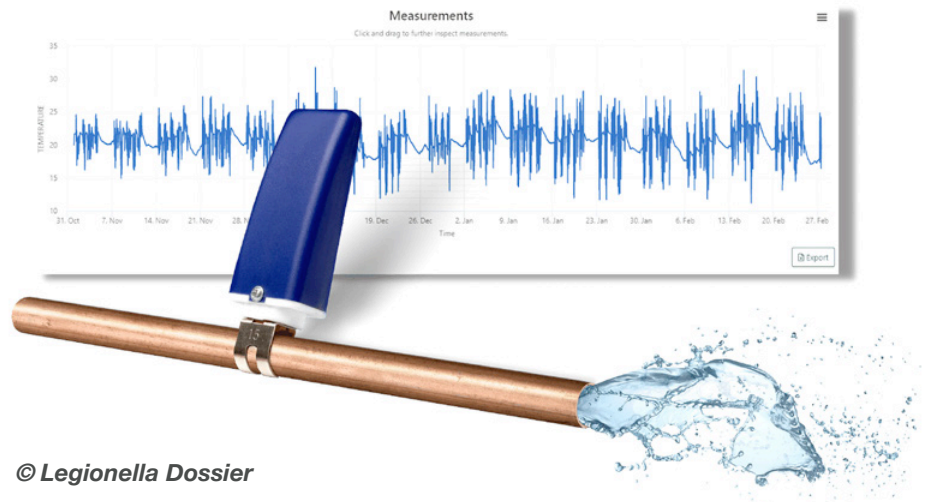
Nick Barsby, Business Development Manager, Legionella Dossier

The traditional approach to temperature monitoring is flawed. For over 20 years we, as an industry, have been sending people around the United Kingdom to take a temperature from a water system once a week, month or quarter. This will give us twelve, three or one data point a quarter, based on your records and frequency. Weekly, monthly or quarterly temperature monitoring can be a useful tool in identifying potential growth conditions for Legionella bacteria but it is not without its flaws. As an industry we then make decisions on the effectiveness of a control scheme based, in part, on these readings. In going back to basics should we not look for a better, more data driven approach?

Before we start our review, we need to understand the difference between compliance and risk management. Compliance refers to ensuring that the system meets the legal requirements and guidelines for Legionella control. Complying with the guidance in Approved Code of Practice (ACoP), Health and Safety Guidance HSG274 Parts 1, 2 & 3 etc. This may not always be possible when we look at paragraph 59 of the ACoP as we see a range of controls that allow for compliance. Risk management refers to identifying and managing potential risks to human health, this leans more to COSHH. Can we identify all risks and manage the potential impact on our stakeholders and mitigate the risk to a minimum or as low as reasonably practicable level?

One of the main issues with relying solely on manual temperature monitoring is that it only provides a limited amount of data, it's a single point of failure. Taking temperature readings once a week, month or quarter may not provide enough data points to accurately assess the effectiveness of a control scheme. Additionally, the guidance on what constitutes a "compliant" temperature range for Legionella growth is somewhat vague and doesn't specify a timeframe.

Furthermore, manual monitoring is open to human manipulation. It relies on a human and humans are flawed machines and all operate slightly differently. From using uncalibrated equipment, failing to take any readings at all to manufacturing data or poor sampling techniques there are numerous ways that the manual approach can lead to poor data, most of



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which comes from human error. These flaws do not exist in remote methods; although they do have their own challenges.

Remote monitoring can help ensure compliance by providing accurate and up-to-date data on the water system, which can be used to demonstrate that the control measures are effective and in line with regulatory requirements. For example, regular temperature monitoring of the hot and cold water systems can help demonstrate that the water is being maintained at the appropriate temperatures to control the growth of Legionella bacteria.

In going back to basics we have to go back to the ACoP as a starting point. The guidance for a compliant temperature comes from Paragraph 13(a) in ACoP, which states that "*Certain conditions increase the risk from legionella if the water temperature in all or some parts of the system may be between 20–45 °C, which is suitable for growth*". There is no tolerance or timeframe on how long the temperature should not be in this region. Is one second too much? One minute? One hour? One day? One week? In a world where compliance is the goal this allows for zero failures. Yet in a risk management world we have to consider the risk posed by one second of failed temperature over an hour that equates to 1 in 3,600 readings, in a day that becomes 1 in 86,400, in a week that's 1 in 604,800. Most remote monitoring offers a range of read points, from every

minute to once every fifteen minutes - over a day. This equates to between 96 and 1140 data points per sensor per day or 672 to 10,080 weekly or around 3,000 to 44,000 per month.

Presently we are in a position where we take one reading a month and make significant system based decisions on a single point of data when its reasonably practicable to acquire anywhere between 3,000 and 44,000 readings a month. In a compliant world, one reading makes compliance easier. But does this mitigate the risk appropriately?

Paragraph 59 (a) in ACoP talks about avoiding these temperature ranges but no timeframe. As we flow through the document Paragraph 62 highlights how the Written Scheme of Control can suggest physical control such as temperature. The challenge is how much risk is posed by a one off temperature failing? A genuine, single point in time that the system is under immense strain or a freak event in supply causes the system to fail to achieve the targets. If this was in a manual read this would lead to significant investigation at significant cost. Yet for those who apply remote monitoring techniques we can highlight that the event was a sporadic occurrence. We can use the data to investigate the root cause and not have to spend further resources on this.

Remote monitoring also enables trend analysis - if our one off occurrence is found to occur at the same time every day, week, month, quarter or year we



can investigate further. It highlights a pattern and raises the root cause investigation process. If we look at the example of a school; the monthly monitoring would often take place outside of school hours - when the system is under less strain. This may give the end user confidence that the system is under control and has a low risk; yet throughout the school day the temperatures are consistently failing to achieve the targets in the hot water system, often sitting in a non-compliant zone for up-to twelve hours. Unless a sample was taken to check for Legionella growth or further temperature records are taken by the end user then these matters can go undetected for long periods of time. If we are going back to basics this must be considered a significant weakness.

The ability to trend data enables a pattern to be built up to manage the risk. If the above scenario occurs every Tuesday we can look at what could be a factor in this - do we have increased demand? More system users? Is it the day the showers are used more (or less)? The remote sensor data will give us previously unknown intelligence on the water systems. A single data point in the week simply cannot tell us this. It may tell us the system is compliant, providing a false sense of security and allowing a risk to propagate while the system is being considered "compliant" from a monthly temperature check viewpoint.

This prompted me to look further into HSG274 Part 2 to verify that thought process, Paragraph 13 talks about the growth conditions and highlights the same temperature range with the addition of stagnation, recirculating loops and nutrients, all things we know and work to. It's a common concern from many people that we speak to that challenges are seen in subordinate and tertiary loops. Sites that have historic plumbing issues; don't have regular flow and return checks undertaken or sporadic readings. The use of remote sensors here will enable Service Providers to build up a true picture of these loops; have we covered all systems? Are we truly circulating the water? Have we created any dead-legs? Do any poor loops create an area of poor flow and stagnation? Again, single point data reads could find these point; if access is available. Yet it will only be a single point in time. Installing modern remote sensors allows you to profile the temperature records of these circulating loops over an extended period and understand what, if any, issues are present and the scale of the challenges faced.

Paragraph 2.6 of HSG274 Part 2

highlights this again with temperature being maintained at below 20°C within two minutes for the cold and the hot water should be stored at 60°C while reaching sentinels at 50°C (55°C in healthcare) within one minute - again - no stipulated allowance of deviation. This again begs the question, how much risk is caused by a short, unsustainable period of temperature failure?

As we progress through HSG274 Part 2 we come to supply temperature comments in section 2.56; here we acknowledge that the supply temperature can vary significantly across the year and different supplies, with an acceptance that the supply can be over 20°C at some periods of peak summer. The guidance states that the risk assessment should be reviewed if the supply is over 20°C yet offers little guidance as to what next steps we should consider. There is anecdotal evidence that a significant change in temperature (2°C+) from the mains supply can allow for the proliferation of Legionella and other waterborne pathogens. This notion is further supported by the 2021 culture and confirmation of Legionella bacteria in an Antarctic lake. This study confirmed the bacteria to grow at a temperature range between 4°C to 25°C.

Continuing through HSG274 Part 2 we come to 2.65; focussing on identifying the appropriate points to take temperature reads from. This is crucial. Sentinel outlets are a must; either remotely or manually. Circulating loops must be considered. Considering access to these can often be a challenge, the use of remote sensors here is a great advantage. The next paragraph in the HSG274 confirms that sampling every asset is often impractical and some form of rationale should be applied to choosing your temperature monitoring points. This is extended further in 2.67; where high risk assets in healthcare are highlighted as critical monitoring points.

Thermostatic Mixing Valves (TMVs) are covered in greater details in Paragraph 2.74. Here the importance of increased temperature monitoring is key. A weekly or monthly check may not highlight a fault for an extended period of time, especially if the fault is not reported to the estates team. Given TMVs should be installed to eliminate the scald risk its vital that any temperature deviation is flagged and acted upon with haste. This is an area where compliance and risk management go hand in hand. If we start to see trends of temperature deviation or non-compliance we can immediately react and manage the potential scald risk. It is becoming more and more common for remote sensors to have three sensor points; allowing the

hot, cold and mix feeds to be measured, allowing us to trend the supply and outlet from any TMV.

Table 2.1 in HSG274 Part 2 sets out guidance on monitoring frequencies, including the caveat of "or as indicated by your risk assessment", which seems to find its way into far too many risk assessments too. Here we are talking about a compliance point - a yardstick to measure, have we done the thing to check the bad thing isn't happening now. For me it's a bit like saying it's been a very sunny day, when in fact, it's rained all day apart from the 5 minutes I was outside. That doesn't make it a lovely sunny day, it gives me a flawed perception of reality; and that's the risk that manual temperature monitoring exacerbates; it's a window into the system when we can have 24/7 access and truly understand the trends and patterns.

Lower hot water temperatures are discussed further in the biocidal protection section. There is guidance on lowering the hot water temperature with biocides as a primary control. Caution is advised and suggestions of verifying the effectiveness of the biocides on the system is given before Paragraph 2.88 highlights that a reduction in calorifier temperature isn't acceptable in healthcare settings. Again, a never event so to speak.

Throughout all of our chemical control guidance temperature can play a key role in the effectiveness of some of the chemistry and may have an impact on the efficacy of our chemicals. So it again begs the question, why don't we monitor consistently though the system? It would enable the chemicals to be dosed more effectively and potentially efficiently; it would certainly help reduce the instances of under-dosing which can allow the bacteria to build up a tolerance to our chemical of choice. In going back to basics, do we need to consider what we can do to improve future outcomes?

As we move through HSG274 Part 2 we enter the Microbiological monitoring section; with guidance that testing should be considered when control is lost or suspected to have been lost. How do we know if control has been lost when we only have one data point every month? The monthly result may be compliant, but the risk levels are higher but undetected.

Our spot check could be the sunny window on a rainy day - how do we avoid this scenario? We can do one of two things - either take more manual temperature reads or install data loggers and remote monitors. Both have pro's and con's - we could end up with a daily



sunny window check and still miss the significant issues; yet the cost would be similar to remote monitoring; which could give us a 24/7/365 view of the system; thus highlighting all losses of control and being a truly risk mitigating approach instead of a compliance approach.

Throughout the monitoring section of HSG274 Part 2 we are constantly looking to trigger a sample via a temperature not being achieved. Be that from the supply, such as a borehole or mains, or calorifiers. If these are single point in time reads then we won't be certain that our original temperature read was a peak or not - this could lead to additional cost and a waste of money for the end user. While the sample result is always useful to give confidence control has been maintained, it could have attracted attention away from other areas where our temperature result was the sunshine moment in a rainy day scenario.

Thermal disinfectants are a great way to achieve pasteurisation of the hot water system, as highlighted in Paragraph 2.133; but we need to be sure that our temperatures are being achieved across the system. Using manual temperature checks to do this can be both time consuming and hazardous. Time consuming in covering the site and taking a read on each floor from the sentinel outlets at each location and taking individual temperatures for at least five minutes per asset and risky as the chances of scald injuries from such high temperatures is increased. If we were to use remote monitoring instead we would reduce the risk of scalds as temperatures are taken remotely and increase the efficiency of confirming the temperature was reached by reading numerous outlets simultaneously.

Moving through HSG274 Part 2 we come to special considerations for healthcare and care homes; with a focus on increased susceptibility of the population in these settings. Here it is pivotal that principal controls such as temperature are achieved and stagnation avoided. The increased temperature of 55°C is highlighted here for hot water outlets; but the risk comes here from under-use and failing to consistently achieve these temperatures. With a high risk population controls need to be even tighter and confidence that these can be achieved is critical to any good control scheme; so is a weekly or monthly check sufficient in these settings; I would argue no.

HSG274 Part 2 closes with numerous appendices including Risk Assessment, Control Schemes and Outbreak

responses. The risk assessment highlights the importance of companies to undertake a risk assessment and keep it as a live document. By using live data from the assets in situ we can create a genuine live risk assessment. Regular monitoring of the water system can provide a more comprehensive picture of the microbial population and water quality parameters. This data can be used to identify potential risks and make adjustments to the control program as needed. The risk assessment should be reviewed on a regular basis, such as every six months or annually, to ensure that it remains relevant and up to date. The review should take into account any changes to the water system or processes, as well as any new guidance or regulations that may impact Legionella control.

A written scheme of control should be in place, outlining the steps that will be taken to manage the risks identified in the risk assessment. The written scheme of control should be reviewed regularly and updated as needed to ensure that it remains effective. Records need to be kept and maintained for five years. If these are paper based records then we know these can be misplaced and a challenge to maintain. When this is done digitally, such as remote monitoring, this can be captured with software, stored on servers and be exported as required. It also enables trending of data over a longer period of time.


The importance of data is emphasised further in the outbreak part in Appendix 2.3. At this point evidence will be key to demonstrate what actions have been undertaken. If you are under pressure to produce evidence of tasks and compliance then I would strongly suggest that digitised data records are much easier to find and export than going through reams of paper on a shelf; some of it stained, half completed and the ink faded.

In conclusion, while compliance is an important goal, risk management should be the primary focus of Legionella control programs. By identifying and managing

potential risks, water systems can be maintained in a safe and healthy condition, protecting the health of building occupants and reducing the risk of Legionnaires' disease. Remote monitoring can be a valuable tool for risk management. By providing real-time data on the water system, remote monitoring can help identify potential risks, such as fluctuations in temperature or water flow, that may indicate a problem with the system. This can help identify issues early, before they become a serious problem and pose a risk to human health. These issues can easily be missed by manual monitoring and a "man in a van" with a single data point.

Remote monitoring systems and sensors can provide a more accurate and comprehensive view of our water systems, allowing for more proactive risk management and Legionella control. It can provide trend analysis and be set to trigger alarms as deviation occurs - all removing the potential for human error in the reporting of issues. We still need our humans to fix the issues, where a clear task is completed a yes/no result can be attained. To close, in going back to basics we have the opportunity to re-define the deliverables on Legionella control, from a compliance, tick box exercise to a genuine risk management and mitigation exercise that delivers safer water systems to the end user market.





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# Waterscan

## NEWS FROM THE WHOLE FIELD OF WATER AND ITS EFFECTIVE MANAGEMENT

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### Chicken producer makes River Wye phosphate pledge

Chicken producer Avara has pledged that its supply chain will not contribute to excess phosphate in the River Wye by 2025.

Two million chickens are processed at its factory in Hereford every week and it is the county's largest employer. The US-owned firm say 160,000 tonnes of manure is produced annually by their 120 supply farms in the catchment area. It is aiming to increase the amount of chicken muck sent out of the area and processed by digesters. Up to 600 tonnes will be processed per week, the firm says in a new action plan.

A study in 2020 by Natural Resources Wales found more than half the River Wye failed to meet pollution targets and in September it admitted for the first time that the manure is causing harm to waterways - and pollution was being caused by the "spreading of manure from intensive poultry units". Campaigners from River Action have previously called on the company and second supplier, Noble Foods, to take action to protect the river, which flows through Wales, Herefordshire and Gloucestershire.

The River Wye Preservation Trust and Angling groups have also been calling for action, as well as 75,000 people who signed a petition.

In its action plan, Avara said it had successfully reduced the amount of phosphate in its feed by 27% since 2016, without compromising the nutritional value or bird welfare. "Over the next two years, we will take further action such that our supply chain no longer contributes to excess phosphate in the River Wye," it said.

### Climate change is dimming Earth

As well as heating the planet, climate change could also be dimming the planet's "shine", according to scientists at Big Bear Solar Observatory in New Jersey.

By measuring the sunlight reflected from Earth to the dark part of the moon at night, scientists measured what they call "earthshine" or albedo - basically Earth's reflectiveness. The studies suggested that the amount of low cloud cover over the eastern Pacific Ocean is reducing due to warming ocean temperatures. Since these clouds act like a mirror, reflecting light from the Sun back into space, without them that reflected light diminishes. So, according to these scientists, we might actually be taking the shine off our little blue dot.

### Oyster farmer joins legal bid over sewage spills

An eighth generation oyster farmer has joined a legal bid to toughen government policy on water companies discharging sewage into the sea. Family business Richard Haward Oysters, based on Mersea Island, Essex, has operated for 253 years. Operations manager Tom Haward said the "industry could be destroyed if water companies aren't held to account".

Anglian Water said it was investing more than £200m to reduce spillages across the East of England.

Untreated sewage is discharged into coastal waters by storm overflows, which are designed to prevent sewers becoming overloaded in an emergency. However, their use has increased in recent years as climate change has led to more rainfall and water infrastructure has not kept pace with population growth, the Department for Environment, Food and Rural Affairs (Defra) said.

The government has given water firms until 2050 to invest in and improve sewers to prevent them from overflowing into English waterways and coastlines. A claim for a judicial review has been made by Mr Haward, the Marine Conservation Society, activist Hugo Tagholm and the Good Law Project.

The group hopes to compel the government to impose tighter deadlines on water companies to significantly reduce the use of storm overflows and expand protection for coastal waters.

### Enraged seal attacks tourists swimming at South African beach

Shocking video has emerged on social media of a baby seal viciously attacking a child and a woman at a popular South African beach. Footage shows the enraged animal charging at a child playing in the shallows at the beach in Cape Town and biting him as a man shouted 'get out of the water'.

Onlookers screamed before two men came to the rescue, causing the animal to flee. But a woman can then be heard crying out as the creature went on to attack her in the sea. She attempted to push it off but failed, which prompted a group of witnesses to help. A man eventually grabbed the animal by its flippers and tossed it back into the water as the woman was carried to safety.

There have been reports of similar incidents at other beaches in the region in recent months. South Africa's sandy beaches attract large crowds during the holiday season, from November to March.

### Middle-aged women warned over dangers of cold water swimming

Middle aged women have been warned by doctors that cold water swimming can lead to a dangerous lung condition. A regular open water swimmer in her 50s who is a triathlete in rude health suddenly developed fluid in her lungs which spread to her heart during a night swim in a quarry. The unnamed patient was rescued and spent a night in hospital after hyperventilating and coughing up blood. She has now fully recovered and is back in full training. Medics say she suffered from a condition called swimming-induced pulmonary oedema (SIPE), which is also regularly seen in scuba divers. Experts writing in the journal *BMJ Case Reports* said swimmers should be told more about the risks of SIPE, which leads to fluid accumulation in the lungs resulting in difficulty breathing, low levels of oxygen in the body and a cough. Among the factors that increase the risks from SIPE are being older, female, having high blood pressure, long distance swimming, cold temperatures and pre-existing heart disease.

The woman was struggling to breathe and coughing up blood after taking part in an open water swimming event at night in water temperatures of around 17°C while wearing a wetsuit. Her symptoms started after swimming 300 metres and were a more severe manifestation of the breathing difficulties which forced her to withdraw from a swimming race a fortnight beforehand. "She had coincidentally had her Pfizer Covid-19 booster vaccination six hours before the swim," the doctors write in the study. There is no suggestion the job played a role in the incident.

On arrival at hospital she was found to have a racing heart beat and a chest X-ray revealed pulmonary oedema. Further scans showed fluid had also infiltrated her heart muscle in what is known as a myocardial oedema which caused strain but no structural damage.

Doctors advise that to avoid a recurrence of SIPE people should consider swimming at a slower pace, not wear a tight-fitting wetsuit, not swim alone and swim in warmer temperatures while also avoid anti-inflammatory tablets such as ibuprofen. Those experiencing symptoms for the first time should stop swimming and get out of the water straight away, sit upright and call for medical assistance if required.



### El Niño and La Niña; how do they change the global weather?

Scientists are warning that 2023 could be warmer than 2022, as a climate phenomenon called La Niña - which has been suppressing global temperatures - comes to an end.

La Niña is part of a climate phenomenon called the El Niño Southern Oscillation (ENSO) system. The ENSO has two opposite states - El Niño and La Niña - both of which significantly alter weather patterns across the globe.

For the last three years, the world has been in successive La Niña periods, which have lowered temperatures and brought heavy rains to Canada and Australia.

Winds blowing along the Equator above the Pacific Ocean - from South America in the east towards Asia in the west - were stronger than normal. These "trade winds" piled warm water off the coast of Asia, raising the sea surface level. In the east, near the Americas, cold water flowed upwards to the surface.

During El Niño the opposite happens - weaker trade winds mean the warm water spreads out back towards the Americas, and less cold water rises towards the surface. Not every El Niño or La Niña event is the same, but scientists have observed some typical effects:

Global temperatures increase by about 0.2C during an El Niño episode, and fall about 0.2C during La Niña. El Niño means warmer water spreads further, and stays closer to the surface. This releases more heat into the atmosphere, creating wetter and warmer air. The hottest year on record, 2016, was an El Niño year. Between 2020 and 2022, the northern Hemisphere had three La Niña episodes in a row.

Prof Adam Scaife from the Met Office said: "Global average temperature over the last three years has been at near record levels, but it would have been even higher without the cooling effects of a prolonged La Niña."

A 0.2C temperature rise would add about 20% to the existing global temperature rise from climate change. The Met Office expects La Niña to end later this year, "raising the prospect of even higher global temperatures".

### Bird flu spreads to mammals

Bird flu has been creeping up on us since the outbreak started in October 2021. First there were the headlines about poultry being culled, then the shortage of Christmas turkeys and the barren supermarket shelves where eggs were once stacked high. Now bird flu has spilled to mammals in the UK, with otters and foxes testing positive for the virus.

With COVID now in its fourth year, people are naturally alert to the possibility of another pandemic sweeping through the population. However, bird flu isn't about to become the next Omicron, but the possibility of the virus mutating means scientists are keeping a watchful eye. The Animal and Plant Health Agency (APHA) confirmed five foxes and four otters have tested positive for avian flu in England, Scotland and Wales since 2021.

The UK isn't alone in seeing the virus crop up in mammals. Around the world it's been found in domestic cats, grizzly bears, dolphins, leopards and more, according to the United Nations Food and Agriculture Organisation. In October last year, mink started dying at a farm in Spain. Testing revealed they had H5N1 avian flu.

The spread at the mink farm set alarm bells ringing. In most cases where mammals become ill - including the otters and foxes in the UK - it's likely because they ate infected dead wild birds or their droppings. But at the mink farm, the virus appeared to spread between the animals, from pen to pen. Genetic sequencing showed the mink were infected with a new variant of H5N1 which includes a genetic change that means animal-flu viruses are better able to reproduce in mammals, according to a report by Nature.

A UKHSA risk assessment from January concluded the apparent transmission between mink was of "significant concern" but said there was no "clear evidence" this had happened in any other species of mammal.

When it comes to the strain found in mammals in the UK, there's "currently no reason to suspect that the jump is due to a change in the virus's genetic make-up", according to Dr Alastair Ward, associate professor of biodiversity and ecosystem management at the University of Leeds. He said foxes and otters are known to scavenge, and it's likely the bird carcasses would have had high viral loads.

### Cruise ship passenger survives 20 hours overboard

James Grimes from Alabama said that he went into survival mode after he plunged from the Carnival Valor ship and into the shark-infested waters of the Gulf of Mexico on the night of November 23.

"My worst fear is drowning, and that's something I didn't want to face," he said, adding that he knew he just had to "swim and survive."

"I was swimming in one direction, and I looked around, and I seen it out of the corner of my eye," Grimes said. "It came up on me really quick, and I went under. It wasn't a shark, I don't believe. It had more like a flat mouth and came up and bumped one of my legs, and I kicked it with the other leg. It scared me, not knowing what it was. All I could see was a fin."

At one point, Grimes said a stick came floating by that looked like bamboo. He said: "So I started eating on it and it actually, I won't say it tasted good, but it gave some type of flavour in my mouth other than salt water." He said he tried not to lose hope as the hours wore on. "I wanted to see my family, and I was dead set on making it out of there. I was never accepting that this is it, this is going to be the end of my life. I'm 28 years old. I'm too young. This is not going to be it."

Grimes, who was on a five-day cruise for Thanksgiving with 18 family members, was reported missing by his sister about 12 hours after he left the ship's bar to use the bathroom and failed to return. After a huge search, he was eventually spotted by a cargo ship and plucked from the ocean by the Coast Guard about 20 miles south of Louisiana's Southwest Pass.

His rescuers believe he was moments away from perishing in the water given the hypothermia, shock and dehydration he was suffering from. Grimes doesn't recall how he fell overboard, insisting the last thing he remembers was winning an air-guitar contest in one of the ship's lounges. He denied being drunk but couldn't recall how many drinks he had in the lead-up.

The US Coast Guard said in a statement: "Cruise ships have safety barriers in all public areas that are regulated by US Coast Guard standards that prevent a guest from falling off. Guests should never ever climb up on the rails. The only way to go overboard is to purposefully climb up and over the safety barriers."

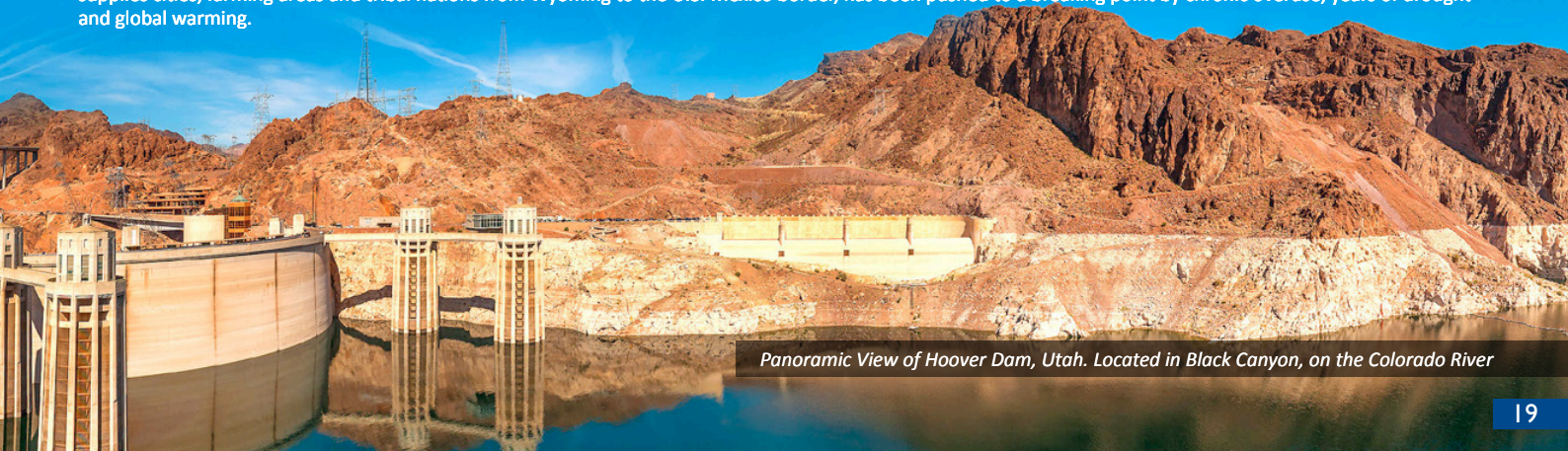
### States miss deadline to address Colorado River water crisis

The seven states that depend on the Colorado River have failed to meet a deadline for agreeing on a water-use reduction plan, raising the likelihood of more friction as the West grapples with how to manage the shrinking river.

In a bid to influence federal officials after contentious negotiations reached an impasse, six of the seven states submitted a last-minute proposal outlining possible cuts to help prevent reservoirs from falling to dangerously low levels, presenting a unified front while leaving out California, which uses the single largest share of the river.

Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming called their plan a "consensus-based modelling alternative" that could serve as a framework for negotiating a solution. The U.S. Bureau of Reclamation had set an end-of-January deadline for the seven states to reach a consensus. But California officials opposed making evaporation and other water losses in the river's Lower Basin part of the calculation, as the change would translate to bigger supply cuts for the state. Federal officials told the region's water managers at a mid-December conference that they would weigh immediate options to protect water levels in depleted reservoirs this year, and that the region must be prepared for the river to permanently yield less water because of climate change.

Lake Mead and Lake Powell, the country's two largest reservoirs, are now about three-quarters empty in spite of recent heavy rains and snowfall. The river, which supplies cities, farming areas and tribal nations from Wyoming to the U.S.-Mexico border, has been pushed to a breaking point by chronic overuse, years of drought and global warming.



Panoramic View of Hoover Dam, Utah. Located in Black Canyon, on the Colorado River

### Saltburn loses blue flag beach award

Simon Clarke, the Conservative MP for Middlesbrough South and East Cleveland, said the award for the last four years had been a "source of pride".

The Local Democracy Reporting Service revealed how a drop in water quality from 'excellent' to 'good', based on tests by the Environment Agency, meant Saltburn was ineligible for a Blue Flag certification this year.

It was one of 80 English beaches to receive the award last year, which covers the period between May and September, and the only one between Whitby, North Yorkshire, and Roker, Sunderland. Mr Clarke said: "While the Environment Agency still rates the quality of bathing water at Saltburn as 'good', it is disappointing that this most recent analysis has not found it met the requirement to be considered excellent. Regrettably, this means Saltburn has not met the criteria for a Blue Flag award this year, an award which has been a source of pride for the past four years."

"I will be speaking with colleagues at Redcar and Cleveland Council, Northumbrian Water and all relevant agencies in the coming days and weeks to see what action can be taken to improve the quality of bathing water in Saltburn so that it returns to the standard of 'excellent' as soon as possible."

*Editor: Saltburn memories – my wife was born there and on our first new year as a couple she persuaded me to take part in the new years' charity swim. Stripping to my budgie smugglers in the local pub and running across the ice covered beach I leapt into the sea. The tide was out and you were supposed to go out as far as shoulder high seas. That was a long way from the shore but I made it and got back to the pub where my by then scarlet coloured and hypothermic body was in need of several 'hot toddies' and hogging the fire. I do not recommend this activity to others!*

### Christchurch beach hut owners face soaring ground rent fees as BCP Council sets out plans for seafront services

Beach hut owners have hit out at proposed price hikes which will see rental fees for some in Christchurch nearly double over the next five years. BCP Council is proposing various changes to its management of more than 3,700 huts across the region, the most controversial being a big jump in ground rent charges. In 2022/23 alone, hut fees in some areas, including Friars Cliff, could soar by 26%. Subsequent years up to 2028 will see increases of between 5% and 21%.

In a report to the cabinet, officers said the move to take advantage of a "strong demand" for beach huts in the local area would enable £4.4m of investment in the huts and seafront facilities, but owners slammed the rent rise as "unfair and inequitable".

A joint statement by the chairs of Friars Cliff, Mudeford, Bournemouth and Poole beach hut associations claimed the "captive market" of owners was being used as a cash cow to plug a budget black hole and fund "non-essential" services. "The £4.4m is not to improve investment in beach huts, but to mainly subsidise services on the whole of the seafront," they said. "To call the new pricing structure 'fair' is a travesty." Rental fees for huts vary considerably across the three towns, and the council says the move would bring about more "consistency". It also said that analysis of beach hut tenants in the BCP area revealed the majority are affluent.

Hut associations have been invited to share a "list of maintenance items" which will be considered as part of the new management plans. The changes would also see lease transfer fees go up substantially, affecting those who wish to pass their huts on to family or friends. Current restrictions on sub-letting would also be scrapped and long leases of up to 50 years would be offered across the region.

### New gadget could reduce shark bycatch by 90%

Marine scientists have designed a piece of technology that could drastically reduce shark bycatch by emitting short electrical pulses as a deterrent. The small battery-powered device, known as SharkGuard, reduced the numbers of blue sharks accidentally caught by commercial fishing gear in a French longline tuna fishery in the Mediterranean by 91% and stingrays by 71%, according to a study in the peer-reviewed journal *Current Biology*.

Clipped on to the line next to a baited hook, SharkGuard emits a short pulse every two seconds. When that pulse temporarily overstimulates the electrical sensors around a shark's nose and mouth – called the ampullae of Lorenzini – the shark swims away.

Dr Phil Doherty, lecturer in marine conservation science at the University of Exeter and lead author of the study, said that although SharkGuard is doing what it has been designed to do, further sea trials are required to assess its effectiveness in other fisheries.

Every year an estimated 100 million sharks, skates and rays are killed by fishing and bycatch. Since 1970, the global abundance of oceanic sharks and rays has declined by 71% due to fishing practices. Pete Kibel, co-founder and director of FishTek, the marine engineering company that designed SharkGuard, hopes the device will be commercially available by 2024. "The clever bit is miniaturising the whole thing to create something that is operationally viable for fishermen," he said.

### Hungry hippo swallows toddler - then spits him out alive

A two-year-old boy, who was named as Paul Iga, was playing near his home about 800 yards from the shores of Lake Edward in west Uganda.

The hippo grabbed the child in its huge jaws and was in the process of swallowing him when a local man saw what happened and started frantically pelting the animal with stones.

The startled hippo regurgitated the child and lumbered off back towards the lake. "This is the first such kind of incident where a hippo strayed out of Lake Edward and attacked a young child," Ugandan Police said in a statement.

The hippo had "grabbed... the boy from the head and swallowed half of his body," the police said. "It took the bravery of one Chrispas Bagonza, who was nearby, to save the victim after he stoned the hippo and scared it, causing it to release the victim from its mouth."

The little boy was rushed to a nearby clinic for medical treatment to injuries he sustained in the attack. He was then transferred to a hospital in the nearby town of Bwera. He was given a vaccine for rabies as a precaution and then discharged and released back to his parents.

Hippos are estimated to kill at least 500 people a year in Africa, chomping down on their victims with tusks that can be more than a foot long. The power of their bite is three times greater than that of a lion and 10 times that of a human. Despite their great bulk, the animals can run for short bursts at around 20mph.

### Groundwater reserves drying-up across Europe

Europe is on the verge of a catastrophic drought as groundwater reserves dry up, scientists have warned. Hotter summers due to global warming has meant there has been a huge drop in surface water levels since 2018, which have not recovered due to heatwaves across Europe in recent years.

Scientists warn Europe is on the edge of a water disaster, and it is already affecting wildlife, habitats and agriculture. Dr Torsten Mayer-Gür, a professor at Graz University of Technology, Austria, and the author of the research, said: 'A few years ago, I would never have imagined that water would be a problem here in Europe.'

The effects of this prolonged drought were evident in Europe during the summer of 2022. Dry riverbeds and the slow disappearance of stagnant waters severely impacted both nature and people. Numerous aquatic species lost their habitats or were killed as their water disappeared, while dry soil caused many problems for agriculture and flash flooding.

The drought also caused massive forest and grass fires across Europe, including in the UK. The energy shortage in Europe also worsened, as without sufficient amounts of cooling water, nuclear power plants in countries such as France struggled to generate enough electricity. Hydroelectric power plants also struggled to fulfil their function due to the lack of water.

The new data was gathered using satellite gravimetry, a specialised method of measuring the world's groundwater resources and documenting their changes. The team used twin satellites called Tom and Jerry that orbit the Earth in a polar orbit at an altitude of just under 490 kilometres. They provide readings of the total mass, from which the mass changes in the rivers and lakes are then subtracted, the soil moisture, snow and ice are also subtracted and finally only the groundwater remains. To work out separate masses for each body of water, other partners in the EU G3P project, or Global Gravity-based Groundwater project, provided support.



Drought conditions at Ardingly Reservoir in West Sussex, summer 2022





### Water pipe robots could stop billions of litres leaking

Around three billion litres of water are lost through leaks across hundreds of thousands of miles of water pipe in England and Wales daily, says water industry economic regulator Ofwat.

Engineers have now developed miniature robots to patrol the pipe network, check for faults and prevent leaks. They say maintaining the network will be "impossible" without robotics. Water industry body Water UK said that companies were already "investing billions" in leakage.

The industry has committed to a government target of halving the amount of water lost by 2050. Water UK accepted that progress needed to "accelerate". "We're adopting the latest technology, including special in-pipe cameras; satellite imaging; thermal drone technology, high-tech probes, and artificial intelligence," it said.

Some companies already use tethered robots to investigate pipes that are inaccessible. But most of the network is currently inaccessible without digging. This is where much smaller, artificially intelligent machines come in.

A new generation of underground robotic pipe patrollers is being tested at the Integrated Civil and Infrastructure Research Centre (ICAIR) at the University of Sheffield. Pipebots are miniature, mobile robots with cameras for eyes and all-terrain legs. They are being developed in collaboration with the water industry to patrol pipes and find cracks and weaknesses before they develop into leaks.

### UAE appoints Oil Company CEO as president of climate change conference, COP28

Sultan Ahmed al-Jaber, the chief executive of Adnoc, will preside over the conference in November while retaining his role at the oil company. Climate campaigners and some politicians have called for Jaber to give up his oil role while hosting the summit, to avoid any conflict of interest.

At least a dozen employees from the United Arab Emirates' state-owned oil company appear to have taken up roles within the office of the UAE's climate change special envoy.

This revelation adds to growing concerns over the potential for blurred lines between the team hosting this year's crucial summit and the oil-rich country's influential fossil fuel industry. The officials were apparently working in the UAE's oil and gas industry immediately before joining the Cop28 team, according to an analysis of LinkedIn accounts by the independent investigative group Centre for Climate Reporting (CCR).

"If we don't make some dramatic changes, Cop28 is going to be the lost climate summit," said the US congressman Jared Huffman, who in a letter last week called on the special presidential envoy for climate, John Kerry, to push the UAE to remove Jaber from his post as Cop28 president. "To somehow pretend that all of these fossil fuel personnel and all of these connections are not a massive threat to the entire conference goes beyond naive."

Sami Joost, a spokesperson for the UAE climate change special envoy, said: "The individuals who are being hired have come from a variety of backgrounds and sectors ... Once in post, these individuals are entirely focused on the job of delivering Cop28 and have no obligations to their former employers."

Former UK prime-minister Tony Blair praised Jaber's appointment. Blair has previously worked on behalf of the UAE, and a number of staff at his government advisory non-profit, the Tony Blair Institute for Global Change, are based in the country.

### Britain planned to blow holes in the Rock of Gibraltar in 1942 to build submarine base

British military chiefs planned to build submarine shelters inside the Rock of Gibraltar to protect them from attack during World War 2, according to documents uncovered by a local historian. Plans showing two possible sites for bombproof underground berths and documents showing a positive response from the British Admiralty proved true a decades-old rumour that was largely dismissed as a flight of fancy more befitting of a Hollywood action movie.

According to the documents, revealed by the Gibraltar Chronicle, detailed secret plans were drawn up in 1942 to construct subterranean submarine pens allowing submarines to refuel and rearm in safety.

The Nazis had already shown the advantages of protecting submarines from aerial attack with the construction of U-boat pens or bunkers soon after the start of the Second World War at German ports and in locations across occupied Europe.

The technical drawings uncovered reveal how berths, which would house between four and six submarines, blasted into the Rock would have been protected by reinforced concrete and breakwaters aimed at foiling any attempted attack.

The plans for the Gibraltar submarine pens were eventually discarded owing to the success of Operation Torch, the Allied operation to seize control of North Africa in November 1942, which reduced the risk of bombing raids on British vessels moored at Gibraltar.

The focus shifted to using all available resources to support as many vessels as possible in Gibraltar harbour.



Rock of Gibraltar

### Shellfish deaths possibly caused by new disease – report

A disease or parasite new to UK waters may have caused the deaths of thousands of shellfish along the North East and North Yorkshire coast, a report has said.

A panel of 12 experts found it was "about as likely as not" a new pathogen caused the die-off in late 2021. They said it was "very unlikely" regular dredging of the River Tees caused it, while capital dredging was "exceptionally unlikely". They also ruled out the chemical pyridine as "very unlikely". And an algal bloom was "unlikely" to be the cause, however, current data, they said, "cannot be definitive".

The government previously blamed harmful algae, while fishers commissioned a report which suggested it was due to pyridine, an industrial chemical.

That previous academic research, backed by the fishing industry, had suggested the deaths could have been caused by the chemical, possibly from dredging in the mouth of the River Tees to maintain channels for port traffic.

The mass die-off of marine life on 40 miles (70km) of coastline from Hartlepool to Whitby saw crustaceans washed ashore between October and December 2021, with dying creatures "twitching" and displaying lethargic behaviour.

Although there was no direct evidence of a disease or parasite, the new report added that theory would explain this movement in the shellfish. But it said it was possible a combination of factors - rather than one considered by the panel - could have led to the "unusual" deaths.

### The true identity of decaying hull in Plymouth is revealed

The ship's correct identity was discovered in a letter in an archive. A team of marine archaeologists has discovered the true identity of a large wooden ship's hull buried in Hooe Lake on the outskirts of Plymouth.

The remains of the ship lie buried next to a stone pier on the north side of the lake. The hull has now been identified by The Ships Project as John Sims, a West-country schooner. Until the recent discovery, it was believed to be a Dutch barge called the Two Brothers.

The Ships Project is a voluntary, non-profit organization that conducts research and exploration of maritime historical sites and events both on land and underwater. Hooe Lake is known as the "Ship Graveyard" due to the 36 known ship hulls buried there.

The Ships Project said it was thought Hooe Lake was a place where boats had been abandoned for centuries. The lake is shallow and tidal so boats can be abandoned at high tide but still accessible when the tide recedes.

While writing archaeological surveys, the team discovered a letter between local historians John Cotton and Martin Langley while searching John Cotton's archives. The letter, preserved in the John Cotton Naval Archives, identifies this ship as the schooner John Sims.

Marine archaeologist Mallory Haas said the area had been a ship-launching site since Roman times. When an archaeological survey of the hull was conducted, the team found that it was not built like a barge, but more like a West-country ship or schooner.



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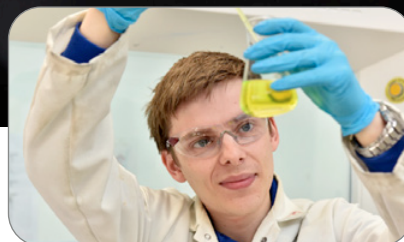
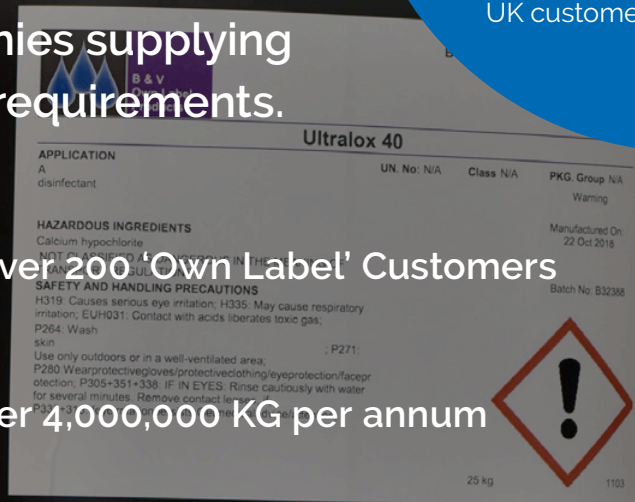
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### Prime Hydration craze

Long queues, grappling shoppers and even headfirst dives into shelves. That's what Prime Hydration - a drink promoted by YouTubers KSI and Logan Paul - has sparked in shops around the UK. It's become an online sensation since being launched, with its limited UK availability causing a craze. KSI denies that limiting the drink was a deliberate marketing ploy but the result of keeping it in short supply has been.... predictable.

With restocks selling out as fast as they arrive, it's also spawned a black market with people selling bottles for huge prices online.

For expert dietician and sports nutritionist Dr Linia Patel, the drinks contain the ingredients you'd expect. It's got coconut water, which provides sugar but not as much as "traditional sports drinks".

Prime also contains electrolytes - minerals that can be lost from the body through sweating. "If you're exercising super hard, then absolutely [there's a place for it]. But I'd say

for the majority of us, we don't need a special drink like this one," says Dr Patel. "I definitely don't think that this drink is better than others," Dr Patel says.

The latest Prime product is an energy drink containing caffeine - which the company says is not recommended for under-18s - and which Linia says should be avoided by younger people. "The majority of us don't need a special drink to hydrate us, just get a good bottle of water," she adds.



### Water bills to increase by most in almost 20 years from April

The annual bill for an average household in England and Wales will hit £448, industry body Water UK has said. The 7.5% increase means customers will pay on average £31 more than last year.

Consumer groups said the rise would squeeze struggling households when one in five are already finding it difficult to pay. But Water UK says the rise for most customers will be below inflation which, as a measure of the rate of overall price rises in the UK, was 10.5% in December.

Water UK also argued that the bills remained lower in real terms than they were a decade ago. It added that the increase reflected higher energy costs, with water firms using about 2% of the UK's electricity.

Water UK said that firms had already been investing in infrastructure, and would invest a further £70bn to "eliminate harm" from storm overflows and increase water supplies by building new reservoirs and national water transfer schemes.

It said that since the water industry was privatised, more than £190bn had been invested in improving services. It added that water companies "are acutely aware of the impact of price rises on lower income and vulnerable customers. Companies have recently increased the level of support they offer by more than £200m, which will help hundreds of thousands more households. More than one million households already get help with water bills, and that will increase to 1.2 million."

### Dismantling Derbyshire weir sees fish breed

The project, on the River Ecclesbourne, near Duffield in Derbyshire, saw the weir removed. Experts said it had blocked salmon from swimming upstream where they lay their eggs in shallow water. The weir removal is one of 16 barriers taken apart in the last year. The project was completed in October, but experts indicated there was already evidence of success.

Removing the weir has helped fish breed more successfully, environmental groups said.

Dr Tim Jacklin, Conservation Officer at the Wild Trout Trust said: "We were delighted when someone brought to our attention in early January that they had found a salmon upstream. It was a fish that had died. It was probably killed by an otter, but it was an adult salmon that probably weighed around 10 to 12 pounds [4-5kg] in weight when fully intact. And it looked like spawning had completed, so that's great news that the fishway worked so quickly."

He added that the project is "a really good story for conservation and nature restoration."

Simon Ward, fisheries technical specialist at the Environment Agency, said: "All of a sudden people are really engaging with the river, which is great."

### Beavers helping to defend Ukraine

Beavers have unwittingly bolstered Ukraine's defences against a possible new Russian invasion from Belarus. A Ukrainian military spokesman credited the dam-building creatures for miles of thick mud, waterlogged fields and burst river banks in the northwest of the country, which have created a significant obstacle for any new front in Moscow's invasion.

Kyiv officials have warned of a new looming Russian offensive, with Belarus to the north named as one possible staging post for the assault. However, Serhiy Khomynskyi, a spokesman for the Volyn territorial defence brigade, said that the beavers had become their newest, and most unlikely, allies against any such action by making the ground marshy and impassable. "When they build their dams, normally people destroy them, but they didn't this year because of the war, so now there is water everywhere," he said.

The swampy conditions created by the beavers' dams give the Ukrainian forces an advantage and time to prepare for a potential new offensive, the Volyn brigade believe.

### The Wash: £2bn tidal barrage plan including road and port unveiled

Developers said the 11-mile barrage, between Gibraltar Point and Hunstanton, could generate tidal energy and protect homes and businesses from flooding. The project would also include a dual carriageway, container port and could create 1,200 jobs.

Conservationists have raised concerns about its potential impact on a sensitive habitat for wildlife. Under the proposals, the company, Centre Port, said it wanted to build a "hydro-electric dam" and about 15 tidal turbines under the water to produce enough energy to power 600,000 homes. The company said it planned to create the "world's first tidal energy-powered deep sea container terminal", which would have the capacity to handle up to four million containers annually.

The project would act as a flood defence scheme for communities in Norfolk, the Fens and parts of Lincolnshire, protecting against land-side flooding and tidal surges, the company said. It has won a six-figure investment from energy firm Centrica.

### Dolphins have to 'shout' to hear each other over ocean noise pollution

Dolphins in noisy environments struggle to communicate and cooperate on tasks, researchers from the University of Bristol, UK, have found. This could have wide ranging implications for marine life.

Sound travels far further underwater than light, and up to three times faster in water than in air, making it an essential form of communication for dolphins and other marine mammals. They rely on vocalisation to find prey and mates, to navigate, and to work together.

In recent decades, human-made underwater noise pollution has dramatically increased. Shipping, drilling for projects like offshore wind farms, fishing vessels, military sonar and tourism are all culprits. The European Commission found that underwater background noise levels have doubled every decade in the last 60 years, mainly because of shipping.

Having previously demonstrated that dolphins can use whistles to coordinate their behaviour, researchers studied the impact of noise pollution on the mammals' ability to work together. The study, published last week in the journal 'Current Biology', equipped two bottlenose dolphins with sound and movement recorders and placed them in a controlled lagoon.

Using an underwater speaker, the researchers exposed the dolphins to increasing levels of noise, including broadband filtered noise and that of a pressure washer. As noise levels rose, both dolphins compensated by increasing the volume and length of their calls. They were also more likely to change their body positioning to face each other and to move closer together. Despite these adjustments, the dolphins' success rate in the cooperative task dropped from 85 per cent during ambient noise control trials to 62.5 per cent during the highest noise exposure treatment.

### Single-use plastic cutlery and plates to be banned in England

A ban on some single-use plastics will come into force in England from October, the government has announced. To tackle the growing plastic problem, takeaways, restaurants and cafes must stop using single-use plastic cutlery, plates and bowls.

Green groups welcomed the move, but said it could go further to address packaging being sent to landfill. The British Takeaway Campaign said that businesses need more support to implement it. Fish and chips restaurants and other takeaways will become more expensive as small companies will be forced to pass on higher costs of packaging to consumers, suggests Andrew Crook, who runs a fish and chip shop in Lancashire and is deputy chair of the British Takeaway Campaign. "We believe in doing our bit for the environment but many small businesses are only just hanging on," Mr Crook said. Plastic-free packaging is more common in takeaways now, he added, but can cost 12p per item more.

England uses about 2.7 billion items of single-use cutlery, mostly plastic, a year, and 721 million single-use plates, according to estimates by the Department for Environment and Rural Affairs.







### Trapped seal in Essex devours £3,000 worth of fish, but dies during rescue

A seal had a whale of a time after finding himself trapped in a fishing lake and treating it as if "in a branch of Waitrose". After taking up residence, the seal lived its best life, eating as much fish as possible, much to the dismay of local anglers. It evaded numerous attempts at capture and clearly had no incentive to leave after munching a total of some £4,000 worth of fish. The seal, known as Nelson, was first spotted at Rochford Reservoir in Essex in December 2022. Since Nelson's arrival, large amounts of carp, catfish, and bream vanished, causing the closure of the popular fishing lake. The seal has now died during a failed rescue attempt. Wildlife groups say they were forced to use tranquilliser guns to sedate the mammal as it had evaded previous rescue efforts and injured itself in recent days.

The British Divers Marine Life Rescue (BDMLR), which carried out the rescue attempt, said the seal had been suffering from multiple injuries before it decided to anaesthetise him. According to the wildlife charity he had an open wound on his rear flipper and an eye injury, having lived in the angling lake for more than six weeks. The charity had hoped to treat the animal before returning it to the sea "where it belonged".

A specialist vet successfully darted the seal but the team were unable to capture the animal "due to unforeseeable complications". BDMLR believe it then died underwater while tranquillised.

### Canada's Hudson Bay polar bear population plummets

Canada's Western Hudson Bay polar bear population has fallen 27% in just five years, according to a government report released before Christmas, suggesting climate change is impacting the animals.

Every autumn, the bears living along the western edge of the Bay pass through the sub-Arctic tourist town of Churchill, Manitoba, as they return to the sea ice. This has made the population not only the best studied group in the world, but also the most famous, with the local bear-viewing economy valued at C\$7.2 million (\$5.30 million) annually. "In some ways, it's totally shocking," said John Whiteman, chief research scientist at conservation non-profit Polar Bears International. "What's really sobering is that these kinds of declines are the kind that unless sea ice loss is halted, are predicted to eventually cause ... extinction."

Polar bears depend on the sea ice to hunt, staking out over seal breathing holes. But the Arctic is now warming about four times faster than the rest of the world. Around Hudson Bay, seasonal sea ice is melting out earlier in the spring, and forming later in the fall, forcing bears to go for longer without food.

Scientists cautioned a direct link between the population decline and sea ice loss in Hudson Bay wasn't yet clear, as four of the past five years have seen moderately good ice conditions. Instead, they said, climate-caused changes in the local seal population might be driving bear numbers down.

### Yorkshire Water reveals that wet wipes are most common cause of blockages

Wet wipes were linked to 11,946 of the 25,976 blockages (46 per cent) the water firm had to clear from its sewer network last year, making up a proportion similar to 2021. The company warns that many wet wipes contain plastic and, unlike toilet paper, do not break down in sewers, so they can become snagged and stick together to block sewage flowing through the pipes.

Wet wipe blockages can prevent toilets working, leading to sewage flooding properties, gardens or roads and even cause the pollution of local streams and rivers, the company said.

Other regular culprits for blocking sewers include silt run-off from roads, construction debris, "foreign objects" ranging from tennis balls to bank cards and dolls, unflushables such as sanitary products flushed down toilets, fats and oils poured down drains, and tree roots.

Mark Hammond, head of customer field services at Yorkshire Water, said: "Every day our teams deal with blockages caused by wet wipes, unflushables and foreign objects in the sewer. This costs millions of pounds to resolve, money which could be better spent on investment in the wider network."

"We're urging people to really consider what they flush down the toilet and pour down the drains so we can reduce the number of blockages we deal with in the area. Only the three 3Ps - pee, poo and paper - should be flushed down the toilet," he said.



### 2022 was Britain's hottest ever year

The record-breaking heat in the UK in 2022 was made 160 times more likely by the climate crisis, indicating the dominant influence of human-caused global heating on Britain.

Last year has been confirmed as the UK's hottest on record, with the average annual temperature passing the 10C mark for the first time. Scientists at the Met Office calculated that such heat is now expected every three to four years. Without the greenhouse gases emitted by humanity, such a warm year would be expected only once every five centuries. The 10.03C recorded in 2022 beat the previous record of 9.88C set in 2014, and is 0.89C above the average of the last three decades. All the UK nations set new record annual temperatures.

Scientists were shocked in July when the daily temperature record passed 40C for the first time, obliterating the previous high of 38.7C. The hot summer led to thousands of early deaths. A cold spell in December made little difference to the overall average annual temperature.

The scientists estimated the influence of global heating on the UK's record hot year by comparing the results of climate models reflecting today's high levels of carbon dioxide with models representing the pre-industrial period, when CO2 levels were much lower.

Dr Mark McCarthy, at the Met Office, said: "The UK surpassing an annual average temperature of 10C is a notable moment in our climatological history [and] comes as no surprise. Since 1884, all 10 years recording the highest annual temperature have occurred from 2003. It is clear from the observational record that human-induced global warming is already impacting the UK's climate. Nine of the 10 coldest years on record occurred more than a century ago, the Met Office data showed."

Prof Richard Allan, at the University of Reading, said: "Higher temperatures in the UK are contributing to more severe heatwaves, droughts and wildfires but also more intense rainfall events and flooding. These impacts will become progressively worse until global temperatures are stabilised by cutting global carbon emissions to net zero."



Southend-on-Sea, July 2022, UK heatwave 2022

### Exxon made 'breathtakingly' accurate climate predictions in 1970s and 80s

The oil giant Exxon privately "predicted global warming correctly and skilfully" only to then spend decades publicly rubbish such science in order to protect its core business, new research has concluded.

A trove of internal documents and research papers has previously established that Exxon knew of the dangers of global heating from at least the 1970s, with other oil industry bodies knowing of the risk even earlier, from around the 1950s. They forcefully and successfully mobilised against the science to stymie any action to reduce fossil fuel use.

A new study, however, has made clear that Exxon's scientists were uncannily accurate in their projections from the 1970s onwards, predicting an upward curve of global temperatures and carbon dioxide emissions that is close to matching what actually occurred as the world heated up at a pace not seen in millions of years.

Exxon scientists predicted there would be global heating of about 0.2C a decade due to the emissions of planet-heating gases from the burning of oil, coal and other fossil fuels. The new analysis, published in Science, finds that Exxon's science was highly adept and the "projections were also consistent with, and at least as skilful as, those of independent academic and government models".

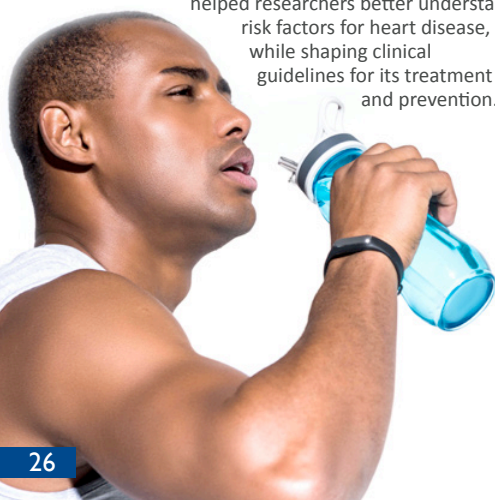
"This really does sum up what Exxon knew, years before many of us were born," said Geoffrey Supran, who led the analysis conducted by researchers from Harvard University and the Potsdam Institute for Climate Impact Research. "We now have the smoking gun showing that they accurately predicted warming years before they started attacking the science. These graphs confirm the complicity of what Exxon knew and how they misled."

### Spielberg: I regret impact of Jaws on sharks

Director Steven Spielberg has said he "truly regrets" the decimation of the shark population following the success of the Oscar-winning film *Jaws*. He told BBC Radio 4's *Desert Island Discs* he fears sharks are "mad" at him for "the feeding frenzy of crazy sword fishermen that happened after 1975". The film has been blamed for misrepresenting great whites and leading to trophy hunting in the US. Asked how he felt about the sea around his desert island being inhabited by sharks, Spielberg told the programme: "That's one of the things I still fear." Clarifying it was not a fear of being eaten, the director said the impact to the shark population is something "I truly and to this day regret". The 1975 film *Jaws* tells the story of a great white shark that attacks a US seaside town, which influenced a rise in sports fishing across America. Research has suggested the number of large sharks fell along the eastern seaboard of North America in the years following its release.

### Drink more water 'for a longer life without disease'

Adults who stay well-hydrated appear to be healthier, develop fewer chronic conditions, such as heart and lung disease, and live longer than those who may not get sufficient fluids, according to a National Institutes of Health study published in *eBioMedicine*. Using health data gathered from 11,255 adults over a 30-year period, researchers analysed links between serum sodium levels – which go up when fluid intake goes down – and various indicators of health. They found that adults with serum sodium levels at the higher end of a normal range were more likely to develop chronic conditions and show signs of advanced biological aging than those with serum sodium levels in the medium ranges. Adults with higher levels were also more likely to die at a younger age. "The results suggest that proper hydration may slow down aging and prolong a disease-free life," said Natalia Dmitrieva, Ph.D., a study author and researcher in the Laboratory of Cardiovascular Regenerative Medicine at the National Heart, Lung, and Blood Institute (NHLBI), part of NIH. The study is published as: *Dmitrieva NI, Gagarin A, Liu D, et al. Middle-age high normal serum sodium as a risk factor for accelerated biological aging, chronic diseases, and premature mortality. eBioMedicine. 2023. doi: 10.1016/j.ebiom.2022.104404.* The study expands on research the scientists published in March 2022, which found links between higher ranges of normal serum sodium levels and increased risks for heart failure. Both findings came from the Atherosclerosis Risk in Communities (ARIC) study, which includes sub-studies involving thousands of black and white adults from throughout the United States. The first ARIC sub-study started in 1987 and has helped researchers better understand risk factors for heart disease, while shaping clinical guidelines for its treatment and prevention.



### Navy save buried Antarctic postal workers

Royal Navy sailors came to the aid of four women who have taken up jobs at an isolated Antarctic scientific base after heavy snowfall buried some of the buildings, in early December 2022. Clare Ballantyne, Mairi Hilton, Natalie Corbett and Lucy Bruzzone beat a record number of applicants to become the team responsible for managing historic site Port Lockroy on Goudier Island – home to the world's most remote post office. The team, who share the island with a colony of gentoo penguins, were setting up the base, assisted by three other staff who are leaving shortly, ahead of the austral summer. Some of the buildings were buried while the roof of Bransfield Hut – home to the site's museum, gift shop and post office – was damaged after heavy spring snowfall of between two and four metres deep. A team of sailors and Royal Marines from Royal Navy ship HMS Protector shifted several tonnes of snow and carried out temporary repairs. Warrant Officer First Class Lee 'Rattler' Morgan said: 'It is good for the ship's company to step ashore and help out. The sailors were all smiles and happy to get cracking on with such a worthwhile task. I was taken aback by the sheer amount of snow and how the buildings had all but disappeared. When I left here at the beginning of the year, the penguins were lying on bare ground of rocks and mess – at least the snow's got rid of the smell.'



### Thor the walrus heads north after overnight stay in Blyth

A roving walrus who delighted crowds in Scarborough on New Year's Eve continued to head north, and has now made his way back to sea from his next resting point of Blyth on the Northumberland coast. That is the last sighting, to date, of the creature, in UK waters. Thor, who showed up in Blyth on Monday, 2<sup>nd</sup> January, slipped back into the water shortly before 7am on Tuesday, according to the British Divers Marine Life Rescue (BDLMR), which monitored the animal overnight. A large crowd quickly gathered in Blyth after the walrus was seen resting on a wooden pontoon at the yacht club, where he parked himself for the afternoon and spent the night. The juvenile male is thought to be the same walrus spotted about 100 miles south, resting on a slipway in Scarborough harbour on the evening of 30 December. He re-entered the water just under 24 hours later. Scarborough's New Year's Eve fireworks display was cancelled to avoid distressing the walrus, though he had already left the harbour before midnight. Thor, the first walrus recorded in Yorkshire, is thought to have been spotted much further south earlier in December swimming near the Hampshire coast. It is hoped he will continue to head north to his natural habitat in the Arctic. *STOP PRESS: Sightings of Thor were reported on Friday, 24<sup>th</sup> February, in Breiðdalsvík, Iceland, about 850 miles (1,360km) from Blyth. British Divers Marine Life Rescue said it could confirm from markings – pale patches on the animal's foreflippers, seen in photographs of him in Scarborough – that it was Thor.*

### Gigantic sunfish washes up on Norfolk beach

A gigantic sunfish has washed up on a beach in Norfolk, becoming the most recent of several arrivals in a phenomenon which experts have attributed to the warming up of the seas. The rare fish, which is more commonly found in tropical waters, was spotted by a wildlife photographer on New Year's Day. The baby sunfish, which measured about 1.5m from the top to bottom fin, washed up on North Beach in Great Yarmouth. The imposing specimen can, as an adult, grow up to 4m tall and is the largest bony fish in the world. Dr Ben Garrod, from the University of East Anglia, said it was the fourth sunfish which had washed up on Norfolk's beaches in the last 12 months. "We don't know why they died and this is an ongoing research project, but it's incredibly important as we know so little about them." "I know they have washed up on the Norfolk coast - maybe once every 10 years - but to have four in the last 12 months is really interesting. We don't have the evidence to say it's related to climate change but no one's denying the oceans are changing."



### Winchcombe meteorite bolsters Earth water theory

A meteorite that crashed on the Gloucestershire town of Winchcombe in 2021 contained water that was a near-perfect match for that on Earth. This bolsters the idea rocks from space brought key chemical components, including water, to the planet early in its history, billions of years ago. The meteorite is regarded as the most important recovered in the UK. Scientists publishing their first detailed analysis say it has yielded fascinating insights. More than 500g (1lb) of blackened debris was picked up from people's gardens and driveways and local fields, after a giant fireball lit up the night sky. Water accounted for up to 11% of the meteorite's weight - and it contained a very similar ratio of different types of hydrogen atoms to the water on Earth. Some scientists say the young Earth was so hot it would have driven off much of its volatile content, including water. For the Earth to have so much today - 70% of its surface is covered by ocean - suggests there must have been a later addition. Some say this could have come from a bombardment of icy comets - but their chemistry is not a great match. Carbonaceous chondrites, however - meteorites such as the Winchcombe one - most certainly are. The crumbly remains were carefully catalogued at London's Natural History Museum (NHM) and then loaned to teams across Europe to investigate.



## The Microbe of the Year 2023 – One of life's friends - Press Release

The Microbe of the Year highlights the significant role of microorganisms in ecology, health, nutrition, and the economy. The Association for General and Applied Microbiology (VAAM) in Germany has been nominating them for ten years to draw attention to the diversity of the microbiological world. *Bacillus subtilis*, a microbial all-rounder has been chosen. If you take a toilet break at a freeway service station, you benefit from the healthy effect of *Bacillus subtilis*. These harmless bacteria form permanent forms (spores) that can easily be added to the flush water, where they germinate quickly under good conditions and multiply rapidly. Thus, they displace other, usually slower-growing microorganisms and ensure hygienic conditions. Enzymes from *Bacillus subtilis* are used in laundry washing: Amylases, proteases, lipases from *Bacillus* strains break down the most important dirt, namely starch, proteins and fats - and do so at low temperatures, which saves energy during washing. The microbe plays a role in nutrition: Many people in Asia ferment soybeans with the help of *Bacillus subtilis* to produce traditional foods that are rich in minerals and vitamins and have a health-promoting effect. *Bacillus subtilis* is also used as a probiotic - a microorganism providing health benefits. Sporulation contributes to this use: Spores from selected strains survive heat treatment and the acidic environment in the stomach and small intestine. In the body, they inhibit pathogens, strengthen the intestinal barrier and the immune system.

It efficiently converts organic substrates into biotechnological products and is used for numerous production processes. For example, *Bacillus subtilis* produces vitamin B2 (riboflavin), as well as pantothenic acid (vitamin B5) and polyglutamic acid - as thickener, humectant or cryoprotectant in the food and cosmetics industries. *Bacillus subtilis* can also reduce the use of antibiotics in livestock farming. The bacteria also strengthen plant growth, protect them from pathogens and help absorb nutrients from the soil. In addition, *Bacillus subtilis* forms complex and robust biofilms - assemblies of cells, sugars and proteins that allow them to attach to surfaces. An interesting use of *Bacillus subtilis* biofilms is their potential application in Alzheimer's disease: In animal models, the biofilms protect nerve cells.

*Bacillus subtilis* also helps in the construction industry. In the aging process of concrete, small cracks appear; microbes can close these cracks: they form carbonate (CO<sub>3</sub><sup>2-</sup>) ions in the concrete - a real feat in this highly alkaline, oxygen-poor and hot environment (temperatures of 60°C arise during curing). Spores of *Bacillus subtilis* are used for self-healing of concrete: Water penetrating through cracks causes the spores to grow out, which then form carbonate, closing the cracks. *Vereinigung für Allgemeine und Angewandte Mikrobiologie – press release 12/2023*

## Australia shark attack in Perth's Swan River

A 16-year-old killed by a shark while swimming in a Western Australia (WA) river has been identified as a schoolgirl, Stella Berry. She was pronounced dead after being pulled from the Swan River in Perth on the 4<sup>th</sup> February. She was riding jet skis with friends when she jumped into the water to swim with dolphins and was attacked, police say. Authorities are investigating what type of shark was involved, but the WA Fisheries Minister has said it was "likely" a bull shark. The government will consider what could be done to prevent any similar incidents, Don Punch said. "Shark barriers is something we're always open to talking to local government about." Fisheries experts say it is unusual to find sharks in that part of the Swan River, and the attack is the first fatal one along the river in 100 years.

## Regatta drone crash could have been fatal

A 28kg drone crashed into a boat at the Henley Royal Regatta, narrowly missing its occupants, before sinking in the River Thames, a report found. The aircraft had been supplying footage of the annual rowing events when its battery ran out on 29 June 2022.

Six people had been on board the boat but no-one was injured. An Air Accidents Investigation Branch (AAIB) report said someone could have been killed. It said the licensed operator could not remember checking the battery before the flight and the warning indicator had been set to a lower level than recommended by the manufacturer.

The AAIB said research showed "fatal injuries would have occurred if the 28kg aircraft falling at 30 metres per second had struck a person on the boat".

A private boat, the Celtic Queen, had been travelling on the uncontrolled side of the river, away from the racing, when a battery warning activated on the drone's controller. The pilot tried to fly it back to the pontoon but it became unresponsive and crashed into the 20m-long (66ft) boat. It dented the boat's cabin and bent a handrail before falling in the water.



## Giant iceberg breaks away in front of UK station in Antarctica

A big iceberg roughly the size of Greater London has broken away from the Antarctic, close to Britain's Halley research station. Sensors on the surface of the Brunt Ice Shelf confirmed the split on 22<sup>nd</sup> January. The iceberg is between 150 and 200 metres in thickness.

21 staff are at Halley, maintaining the base and operating its scientific instruments. They are not in any danger and will continue their work until they're due to be picked up early February.

The British Antarctic Survey (BAS) has been operating the station in a reduced role in anticipation of the calving. Halley is positioned a good 20km from the line of rupture. BAS has an array of GPS devices in the area that relay information about ice movements back to the agency's HQ in Cambridge.

The calving of bergs at the forward edge of an ice shelf is a very natural behaviour. The shelf likes to maintain an equilibrium and the ejection of bergs is one way it balances the accumulation of snowfall and the input of more ice from the feeding glaciers on land. Unlike on the Antarctic Peninsula on the other side of the Weddell Sea, scientists have not detected climate changes in the Brunt region that would significantly alter the natural process.

## Great Britain's windfarm electricity at record high in 2022

Windfarms produced a record amount of Great Britain's electricity last year, although gas-fired generation also increased, National Grid has said. Figures from the company's electricity system operator (ESO) showed that wind-powered electricity accounted for 26.8% of generation in 2022, up from 21.9% the year before.

In late January last year, wind-powered electricity gained its highest ever share of the energy mix, accounting for 64% of generation. ESO said that a new record for wind generation was set on 30 December, when 20.91 gigawatts (GW) were produced by turbines.

Renewable energy and nuclear power sources combined to generate 48.5% of Great Britain's electricity, compared with 40% from gas and coal fossil fuels. The ESO said it was the second greenest year on record, behind only 2020.

However, gas-fired power stations, at 38.5%, reached a three-year high as the single largest source of generation during a year in which wholesale gas prices soared as Russia's invasion of Ukraine upended international commodity markets.

The ESO said: "The use of coal in our day-to-day energy mix has continued to decline, with coal responsible for only 1.5% of generation in 2022, illustrating the significant reduction that has taken place over the last 10 years, when coal represented 43% of electricity produced in 2012."

Biomass accounted for 5.2% of generation.



Off-shore wind turbines, Liverpool Bay

### Women save trapped dolphin

Amy Walker, Carrie Warrior and Sarah Gale had been out on the beach for their Christmas walk on December 29 when they spotted a fox and hovering seagulls. After spotting the distressed animal - which they originally believed to be a shark - they sprang in to action.

Ms Walker, 42, threw her coat to Ms Gale and dashed into the water, with Ms Warrior quickly following. They spent 20 minutes in the ice-cold water trying to free the distressed dolphin trapped in a rock gully.

Ms Walker, a TV producer, said: 'It was pretty tough going because the sea was rough and we couldn't get a sure footing on the seabed because of the rocks. The tide was coming in so we were getting knocked over and having to pick each other up, as well as trying not to stress the dolphin even more. I was telling her she would be ok. We were at the tail end because we weren't sure if she would bite us - she was really heavy.'

Ms Warrior said: 'It took more than twenty minutes of both of us manoeuvring the dolphin before we were able to turn it and finally release it.'

Ms Walker added: 'Seeing her swim off into the distance was a really beautiful moment. We hope she'll be okay.'

### Polar Preet 'breaks world record' for longest and unassisted polar expedition

British Army officer Captain Preet Chandi has 'broken the world record' for the longest, solo, unsupported and unassisted polar expedition by any person in history, according to her team. Polar Preet, as she is known, had passed the previous female record which was 1,368 km skied by Anja Blacha from Germany in 2019. She then went on to break the male record, which was 1,459 km by Henry Worsley in 2015.

Despite breaking the records, she did not complete her aim of becoming the first woman to cross Antarctica solo and unsupported. This was not her first Antarctic mission; in January last year she became the first woman of colour to reach the South Pole unsupported, which she completed in 40 days, just short of the female world record. Polar Preet has had to endure temperatures of -50°C and wind speeds up to 60mph as well as hauling a sledge, weighing around 120kg, loaded with her kit.

In her last update, she said: "I have been given my pickup point which is about 30 nautical miles away from me. I'm pretty gutted that I don't have the time to complete the crossing. I know that I have done a huge journey, it's just difficult while I'm on the ice and I know it's not that far away."

### Rewilding beavers bid for freedom

Two beavers are on the run after escaping from an enclosure on a rewilding project. The Eurasian beavers, Woody and Twiggy, were introduced to Mapperton Estate in west Dorset last year under licence from Natural England. The estate said recent storms had damaged fencing around their enclosure and the creatures had disappeared. Estate staff, with the help of Dorset Wildlife Trust, are working to find and trap the pair so they can be returned.

About 450 acres (182 hectares) of unproductive farmland at Mapperton Estate, near Beaminster, are being rewilded to create space for wildlife and to trap carbon.

The project was prompted by waning agricultural revenues, repair bills and the pandemic, which prompted owners, Luke and Julie Montagu, Viscount and Viscountess Hinchinbrooke, to seek new income streams.

The beavers were relocated from Scotland to Dorset where they have been living in an eight-acre (three-hectare) enclosure. A post on the Mapperton Facebook page said the beavers were "currently enjoying an extended excursion along the banks of the Mangerton River."

## event report e

### The Scottish Legionella Focus Group (SLFG) – Legionella Learning Thursday 23rd February 2023 - Glasgow Hilton Hotel

The latest Scottish Legionella Focus Group (SLFG) live event was held at the Glasgow Hilton Hotel on the 23rd Feb 2023. Over 60 Delegates attended the event to hear the presentations from our impressive line-up of industry experts. The event was kindly sponsored by T-safe.

Jemma Tennant SLFG Chair started the seminar by welcoming everyone to the event and introducing the first speaker - Mr Ian Kershaw, Immediate Past Chair of the WMSoc and Legionella Team Leader Hartlepool Borough Council. Ian gave an insightful presentation on the Water Management Society. Ian presented the features and benefits of the Society, an overview of the Council and the committee members, and how joining the WMSoc can be a valuable source of knowledge and learning for its members. He discussed the application process that is required to become a member, and the selection process involved. Finally, he presented some of the recent publications that the WMSoc have released, including the most recent one on remote monitoring.

The next speaker to present to the group was Duncan Smith, Principal Examiner Legionella, HSE. Duncan gave an interesting and insightful update on the HSE within the Legionella division. He covered plans for updating HSG274, topics of focus for the HSE over the next year, interventions, current enforcements and on-going research projects. Duncan then invited the members to a question and answer session. Some excellent questions were asked including the HSE view on ground source heat pumps, managing large housing estates, and how often a risk assessment should be reviewed. This gave the audience a lot of food for thought!

Next up we had our sponsors T-safe, Derek Pearce and Mark Rushton, deliver a presentation on point of use filters. An

interesting presentation covering a product overview, what a point of use filter is, and the mechanisms behind them. They covered what considerations need to be taken into account when deciding when to install one and the maintenance and monitoring required once they have been installed. They discussed the validation process involved before the product can be used, a very robust procedure which gave the audience confidence in the product. They presented an excellent case study – a large University housing association with a history of Legionella positives that could not be plumbed out of the system due to the age of the building and location of the pipework. An excellent presentation from our sponsors.

Last but certainly not least was Tom Makin, CEO and Chief Consultant of Envirocloud and co-author of the HTM04-01 and BS7592. Part of the WMSoc Scald Risk Assessment guidance team, Tom discussed this topic, and expertly presented engaging the audience at every step. Scalding is a 'never event' and as such, a scald risk assessment is required wherever there is potential for scalding. Tom discussed TMVs, the mechanisms behind them and the potential risks that they can cause, both by failed temperature control and potential bacteria growth. He discussed the legal requirements of carrying out a scald risk assessment, when, who and where they should be carried out. Where and why a TMV should be installed, the risks associated with them and what maintenance is required. Tom also discussed useful alternatives to TMVs to help reduce this risk.

Tom's presentation was very interesting and a lot of information was presented for the delegates to consider as they left the event.

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# Women in Water

by Dr Pamela Simpson

## Gender comparison worldwide

Anyone working in the water industry will be aware that this is a male orientated sector. Whilst some job roles may be predominantly female, overall the numbers of males far outweigh the females and this is echoed in the number of female members and students we see at the Water Management Society.

The World Economic Forum's (WEF) *Global Gender Gap Report 2022*<sup>1</sup> benchmarks the current state and evolution of gender parity across economic participation, educational attainment, health and survival and political empowerment. The 2022 report shows that whilst the global gender gap overall has been closed by 68.1%, at the current rate of progress, it will take 132 years to reach full parity for the sexes.

And when it comes to achieving workplace equality, the *Global Gender Gap Report* shows it will take another 151 years. Men still hold a clear advantage in being promoted to leadership roles. Meanwhile, female founders are starting their own businesses at a faster rate than men.

The report cites that gender gaps in the workforce are driven and affected by many factors and globally social expectations, employer policies, the legal environment and the availability of care continue to play an important role in the choice of education and careers. We see women as the primary caregivers within families and this group was adversely affected by the 2008 Global Financial Crisis.

Although no country has yet achieved full gender parity, the top 10 economies have closed at least 80% of their gender gaps, with Iceland (90.8%) leading the global ranking. Europe overall has the second highest level of gender parity in part due to Iceland, Finland and Norway who hold the topmost ranks in the world with the United Kingdom coming in 22, out of the 146 countries ranked, with a score of 78%<sup>1</sup>.

## Water Industry figures

According to the Gender Gap Report gender parity in the workforce is currently standing at 62.9%, but with women filling only 36.9% of leadership roles overall. However, when drilling down to leadership roles in our industry we see that only 20% in the Energy sector, 19% in Manufacturing and 16% in Infrastructure are filled by females.

A poll by the Scottish and Northern Ireland Plumbing Employers' Federation (SNIPEF)<sup>2</sup> of 674 people showed that 39% of respondents believed that 'sexist and outdated stereotypes were the main barrier to women entering the UK plumbing industry'. Fiona Hodgson, chief executive of SNIPEF, said: "It is unbelievable

## Global Gender Gap Index 2022 Global Gender Gap



68.1%



CLOSING

Since the last edition, the time to close the global gender gap was reduced by only 4 years. It will still take 132 years to reach gender parity.

Source: Global Gender Gap Report 2022

that in 2023 outdated and sexist stereotypes continue to be made about what women can and cannot do, often reinforced by misguided career advice that the trades are men-only professions."

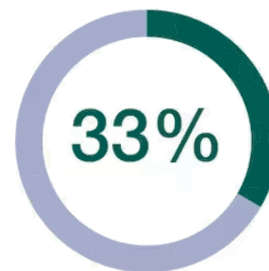
The goal of the Water Management Society is to reach all employees within the water industry, and whilst the current membership of females is only approximately 10% of total membership, we are working towards enabling more diversity within the Society's membership and representation on Council. It is hoped that by encouraging women into these roles, it will encourage young people to make the water industry their preferred career choice.

The graph on the left currently shows that the figure stands at 30% representation within Council which is roughly in line with the percentage of women in leadership roles, globally<sup>1</sup>.

## Global Gender Gap Report 2022 Women in leadership

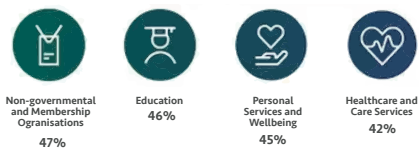


In 2022, the global share of women in senior leadership across public and private sectors is

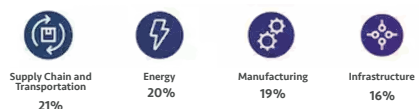


In the private sector alone, women represent 31% of leaders globally.

The industries with the highest percentage of female leadership are:

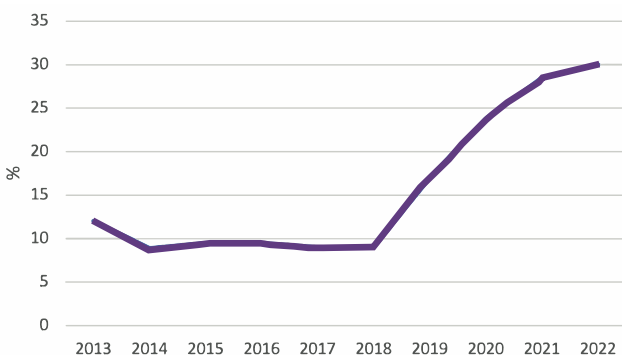


The industries with the lowest percentage of female leadership are:



Source: Global Gender Gap Report 2022, World Economic Forum

## % WMSoc Female Council members





The Society is striving to improve on these statistics, to focus on gender equity and to be a role model for its membership. The difference between equality and equity is small but important. **International Women's Day's** hashtag is **#EmbraceEquity** and they state that "Equity isn't just a nice-to-have, it's a must-have. A focus on gender equity needs to be part of every society's DNA and it's critical to understand the difference between equity and equality."<sup>3</sup>

- **Equality means each individual or group of people is given the same resources or opportunities.**
- **Equity recognizes that each person has different circumstances, and allocates the exact resources and opportunities needed to reach an equal outcome.**

This can also be applied to qualifications when entering the water management industry and vocational training apprenticeships may be the most appropriate way for some individuals to learn. However according to the SNIPEF poll only 2% of plumbing apprentices are currently female<sup>2</sup>, although this figure is rising year on year.

To celebrate International Women's Day, we have included six short biographies from women who have chosen the Industrial Water Treatment Industry as their career path.

#### Here's what they have to say:



**Elizabeth Day**  
Director, Chesterfield WT Consultants Ltd

Having graduated in, and taught, science I was looking for a change and a challenge in my late 20s. An opportunity arose to join a company undertaking pre-commission cleaning, about which I knew nothing but was excited at the prospect of a variable job which included learning a new subject, visiting different sites and working in a commercial world. Initially I trained as a service chemist whilst also learning how water systems worked and the challenges of flushing to remove debris from pipework. With time I was promoted and started to be involved in the management side of business which was stimulating and interesting.

I thoroughly enjoy meeting a large variety of interesting people including developers, people from the construction industry, maintenance teams, water treatment engineers and scientists. Working in the water treatment industry has satisfied my love of variety, I have a practical and problem-solving job and no 2 days are the same. The opportunity to visit different sites and places means that I don't have to be behind a desk all day every day.

It takes a bit of courage to change careers but I would strongly recommend and support anyone wanting to move into water treatment.



**Laura Moran**  
Microbiology Laboratory Manager, Feedwater

At the age of 17 I applied for the apprenticeship role at Feedwater Ltd, this sounded interesting and different to what I was currently doing, at the time I was working in a florist. I liked the sound of helping to test water for different types of bacteria, the apprenticeship appealed to me as there was day release each week to college to study a BTEC in applied science. An NVQ level 3 was undertaken too as part of the apprenticeship scheme with on the job evidence from lab work carried out during this time. I was lucky enough to be accepted for the apprenticeship role and started when I was 18.

To be honest I had never thought about a degree or attending university. Following my apprenticeship, I successfully gained a permanent contract as a Laboratory Technician at the company's Microbiology Laboratory, I went on to complete NVQ Level 4 LATA. In 2011 Feedwater gave me the opportunity to enrol on a Bachelor

## Defining equality and equity



Image source: Robert Wood Johnson Foundation

of Science (Hons) Open University degree, this was achieved over 6 years, part-time study whilst working in the laboratory and was completed in 2017.

I was appointed Manager of the Microbiology Laboratory Operations in 2020. I love my job and to all other young people out there not sure whether to do a degree or apprenticeship, I would like to say you must follow the right path for you. I personally believe apprenticeships are a great opportunity as you gain hands on experience that you don't always get in college/university, alongside working towards qualifications. Apprenticeships are ideal to get straight into the industry without the added pressure or worry of loans for study.



**Beverley Glasby**  
Director, ABG Safety Consultancy Ltd

Having gained a BSc (Hons) degree in Chemistry and Pharmacology at the University of Sheffield I went on to qualify as an Environmental Health Officer specialising in food safety and health and safety, working both in the public sector, as an enforcement officer, and then in the private sector, as Head of Food Safety and Health and Safety for a national retailer.

I was introduced to the water hygiene industry and specifically legionella control by a service provider later in my career in 2011. I soon found that my science background, experience gained within food safety and health and safety enforcement and management was a good grounding for a career in the water hygiene/treatment industry.

I set up A B G Safety Consultancy Ltd with my husband, Angus, in 2016 and although, a significant part of my work still is within food safety and general health and safety, the majority of my work now lies within legionella control. My work includes undertaking risk assessments, providing advice and training. The majority of clients I worked with in the early days of setting out on my own, I am proud to say, are still with me today. What I enjoy about my work is that every client's needs and every system are different...so every day is a school day and when I was approached to become a freelance assessor for the LCA I accepted without hesitation! In fact, I was the first female assessor appointed and I am pleased to say that the LCA now employs the services of two other female assessors.

As a woman working in a male dominated industry, I have never been fazed. If you are confident in knowing you have done a good job and helped companies strive for excellence in legionella control and health and safety, you can hold your head high, man or woman.

I have been inspired by a few people throughout my career, both male and female, but the person who has inspired me most, is my daughter Charlotte. She was about to take her GCSEs when COVID hit which could have had a significant impact on her education, but it made her determined to succeed. On moving on to her A levels, against the advice of her school, she chose to take 4 A\* levels and

subsequently achieved four A\*s in biology, chemistry, maths and geography. She is now at Edinburgh University studying biology and in keeping with International Women's Day and women in male dominated industries, I am keen for my daughter and other young women to pursue whatever career path they desire.

#### Jill Cooper

##### Own Label Manager at B & V Chemicals

How did I get into water Treatment? The honest answer is completely by accident.



I obtained a degree in Microbiology from Aberystwyth University and I have worked in various fields relating to Microbiology for 30 years, the last 18 years specifically in Water Treatment. Prior to my current role as Own Label Manager for B & V Chemicals my first research project was into Nosocomial *Pseudomonas aeruginosa* infections. This research was then followed up by 12 years working for Applied Chemicals developing and testing chemical formulations for a variety of industrial applications with a particular focus on biocides and sanitisers. I then worked for a couple of years in Sales for Severn Trent Laboratories. One of my customers at the time was B & V and I was asked to give a talk to them about Microbiology and Legionella. At the end of the talk they asked me if I wanted a job!!!

I have never looked back and really enjoy everything to do within my role. Definitely a steep learning curve at first but the many facets of water treatment are extremely interesting and I still love learning. For the first couple of years and as part of my training I looked after steam boilers, cooling towers and closed circuits on a number of sites. Always interesting and at that time, 17 years ago a woman doing this sort of work was something of a novelty, I certainly had no shortage of offers to carry my test kit around site for me. After nearly 18 years working in the field of water treatment, I still find Microbiology and Chemistry fascinating, and I am sure I will continue to do so.

#### Dr Yolla McCoy

##### Technical Director at Feedwater Limited

I developed an early interest in Chemistry, Biology and Mathematics and was lucky enough to have inspiring science teachers who encouraged me to consider science as a future career.



At University I pursued my undergraduate and postgraduate education in Environmental Chemistry and gained a PhD in Environmental Engineering from the University of Birmingham.

My journey in the water treatment sector started in the 90s and was accidental after seeing an advert in the local newspaper at a time when I was desperate, as a fresh graduate, to get a job (any job in the field of science/chemistry). Writing this made me realise how lucky I was to get that first job which led to a successful and very fulfilling career. Although the sector is still male dominated, things are moving in

the right direction and the number of women continues to increase in both laboratory and field jobs. The number of women in senior and managerial roles is also on the increase.

If you are a girl or a woman thinking of joining an energetic, interesting, flexible and a secure career I strongly recommend considering the industrial water treatment sector. The field is full of endless opportunities for progression and you will be supported by both men and women who truly believe in gender equality and progression based on ability irrespective of gender.

#### Shirley Paynter A.W.M.Soc SP Consultancy



I started working in the water treatment industry as an admin assistant for a small water and effluent treatment company over 18 years ago. I progressed to a management position, which led into compliance as the company grew.

My training background was general admin / finance / health and safety. Over the years I completed on the job training, legionella training and furthered my training when I joined the Water Management Society.

I decided the office environment was no longer for me and wanted to venture out into the field, where I could implement my skills and help others learn from what I had done in the past.

I was given the opportunity to join, the Legionella Control Association as an assessor, and admit that at the time, I was very apprehensive as the water treatment industry was male dominated but I felt I had worked in the industry for a good length of time and therefore why not? I decided to join the team and be one of the minority women water treatment assessors and show the team what I can bring!

I have had a few challenges during my time as a female assessor, as women in the past have not usually been field based, however, I have overcome them. I enjoy my role and as even more women enter the world of water treatment; I would highly recommend it. My saying is, "There is no job a women can't do or at least give it a try!"

#### References

1 Global Gender Gap Report 2022:

<https://www.weforum.org/reports/global-gender-gap-report-2022/digest>

2 Outdated stereotypes are main barrier to women entering plumbing industry – Herpeet Kaur Grewal:

[https://www.facilitatemagazine.com/content/news/2023/03/06/outdated-stereotypes-are-main-barrier-women-entering-plumbing-industry?utm\\_term=&utm\\_medium=email&utm\\_source=Adestra](https://www.facilitatemagazine.com/content/news/2023/03/06/outdated-stereotypes-are-main-barrier-women-entering-plumbing-industry?utm_term=&utm_medium=email&utm_source=Adestra)

3 International Women's Day – 8th March 2023:

<https://www.internationalwomensday.com>

## NEW members

Since the last edition of Waterline was printed the WMSoc has approved 55 new membership applications. We welcome members from the following sectors of the industry:

**Water Hygiene – 29, Water Treatment – 11, Consultancy – 8, Building Services – 4, Facilities Management – 2, Healthcare – 1.**

**The following new members have given permission for their names to be printed:**

Cansu Atay, Lee Bainbrigge, Dean Boyd, Dean Buckler, Eleanor Clarson, Ben Conrad, Terence Cook, Edward Coombs, Matt Cornes, Gary Cunningham, Andrew Debrou, Alex Devine, Ryan Druce, Mark Ellison, Jonathon Else, Daniel Fairweather, Andrew Fallowfield, Edward Ford, Haley Goucher, Niraj Gurung, Neil Hammersley, Victoria Hilton, Christopher Howorth, Sonia King, Louis Knowles, Ryan Luxton, Harvey Lyon, Harry Marr, Scott McAuslane, Caitlyn Merrick, Ben Miles, Paul Morton, James Nicoll, Jamie Norton, Gary Payne, Russell Polhill, Jessica Pratesi, Paul Read, Sean Rimmer, Marc Sadler, Craig Simmons, Philip Taylor, John Thow, Mark Tozer, Katie Ward, Georgia Woodd.





ANSWERS TO THE ARTICLE  
IN OUR WINTER 2022-23 ISSUE

## HOW DO I INTERPRET MY ON-SITE TEST RESULTS?

**Q1:** What water parameter test is not normally required when testing closed water systems, and why?

**Q2:** What check/measure is typically done on the MU water and the theoretical 'cycles' of MU water when dealing with evaporative cooling towers?

**Q3:** What is the physical property associated with calcium carbonate that must always be considered when using water as a heat exchange medium?



- **A1:** Hardness is the test that is not normally required as levels should stay stable based on the MU water levels – as a closed water system may only require approx. 5% make up water annually it means the system does not concentrate the dissolved solids usually found in MU water.
- **A2:** There is cause to be aware of the alkaline levels of MU water through the theoretical cycles as well as hardness (particularly from Calcium) as these would indicate scale build up as Calcium + Alkalinity + Heat = CaCO<sub>3</sub>. The main way of checking this is through the Langelier Saturation Index measurements. LSI is calculated using pH, Calcium levels and dissolved solids to give you a theoretical number of cycles you can run the water to before scale build up is risked.
- **A3:** Normally salts such as NaCl (for example) dissolve readily in water and when adding heat to water can become super saturated, this effectively means that the water can hold more salt than it would naturally be able to if heat is added, this is because increases to temperature increases the Kinetic Energy of both the Salt (in this case) and water allowing the molecules to dissolve more readily. In the case of CaCO<sub>3</sub> adding heat to water actually has an inverse effect on the dissolved calcium so effectively the more heat you add to the water the more the calcium in the water will drop out and via various reactions become CaCO<sub>3</sub> which, if allowed to build up will create scale deposits which then limit the effectiveness of the heat exchanger and create a breeding ground for bacteria including but not limited to Legionella.

*We have selected to publish the answers from Luke Richardson, Associate member. If you would like to get involved with this issue's CPD activity, see page 11.*

## course in brief **W255**

### **Evaporative Cooling Water Chemistry - Foundation**

This City & Guilds accredited training course is aimed at recent entrants into the industry, people redefining their jobs, and those requiring a refresher course. This course gives a broad overview of water treatment. Delegates with no chemistry background, to secondary school level or above, should complete W252 Water Treatment Chemistry Foundation before attending this course.

Students should attend W201 Legionella Control & the Law and W202 Legionellosis Causes and Impacts of Infection online courses prior to attending this classroom course. Access to these online courses is included as part of this classroom course booking.

The course gives students a basic understanding of evaporative cooling water chemistry. Gives an overview of evaporative cooling systems and how they work. It provides an understanding of what causes scaling, corrosion, microbiological and general fouling in evaporative cooling systems. Explains how to treat and manage the systems to minimise scaling, corrosion, microbiological and general fouling. And finally provides an understanding of water treatment visit reports, and how to write them.

**This course forms part of the Water Treatment Hot & Cold Water and Evaporative Cooling Systems qualification.**

**SEE ALL OF OUR TRAINING COURSES AT:**

**[www.wmsoc.org.uk/learning](http://www.wmsoc.org.uk/learning)**

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# Water Treatment Training & Meeting Centre

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# BIOCIDES JUST GOT BETTER



Solid THPS has landed in the UK. Here's 3 reasons to switch from CIT/MIT NOW

## Better health and safety:

- ✓ CIT/MIT is a severe skin sensitizer, even at use level
- ✓ CIT/MIT poses greater acute toxicity risks than THPS

## Better stability:

- ✓ CIT/MIT reacts with sulphides, and therefore has poor efficacy against SRB
- ✓ CIT/MIT stability drops above pH9, reducing performance in high cycle systems

## Better performance:

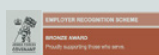
- ✓ Documented cases of resistance to CIT/MIT in common cooling water bacteria
- ✓ THPS is more effective than CIT/MIT against Legionella pneumophila
- ✓ CIT/MIT is a slow acting biocide reducing efficacy in systems with short residence times



www.solidtek.co.uk

Solid THPS biocides, developed in partnership with Solvay, are available exclusively from SolidTek®. Solvay's TolCide THPS liquid biocides also available.

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THE WATER MANAGEMENT SOCIETY

# TOOLBOX TALKS

# CORROSION

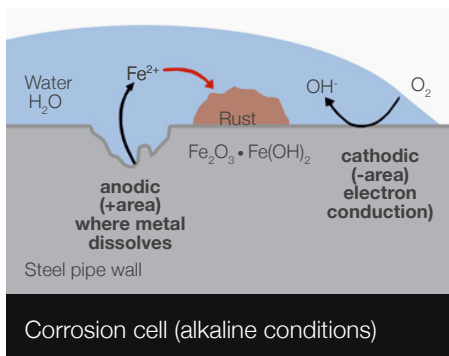
## Corrosion an introduction - what is corrosion?

### The corrosion process

Corrosion is an electrochemical process by which a metal returns to its natural oxide state.

This process is similar to that which occurs in a battery. For an electrochemical cell to function there have to be four components present:

- **The anode** - the area where oxidation takes place, releasing metal ions into solution, where electrons are dispersed and where we see the primary corrosion effects.
- **The cathode** - the area where dissolved oxygen in the water accepts electrons from the metal.
- **The electrolyte** - the water with dissolved salts in it.
- **The conducting circuit** - provided by the metal.



- pH – most metals corrode more rapidly in acidic solutions <6.5. Metals such as mild steel are most stable in alkaline conditions, typically between 8.0 and 10.5, whereas aluminium has an optimum pH level of 6.5 -8.5.
- Total dissolved solids – rising levels increase the electrical conductivity. Dissolved chlorides and sulphates are particularly aggressive to metals.
- Microbial activity – biofilms and other forms of microbial growth encourage development of corrosion cells. In addition, the by-products of some organisms can be very corrosive to many metals.
- Water velocity - high-velocity increases corrosion by transporting oxygen to the metal surface and can also cause erosion of metal surfaces and protective films, particularly softer metals such as copper alloys. Low velocity allows deposition of suspended solids which can establish localised corrosion cells.
- Stress - cracking of metals due to mechanical stress and when exposed to certain environments, for example ammonia with brass and chlorides with stainless steels.
- Condition of surfaces – dirty surfaces can initiate under deposit (differential oxygen) corrosion and can encourage microbial growth.

velocities, using higher grade metals or replacing with non-corrodible materials such as plastics. All systems should be effectively cleaned, flushed, passivated (shielded) and disinfected prior to the introduction of a water treatment programme. Most closed heating and cooling circuits, and open recirculating systems, are chemically treated to minimise the effects of deposition, scaling, corrosion and microbial activity, usually as an 'all in one' formulation plus a biocide, although the component chemistries can also be supplied as separate products as a means of optimising cleaning and passivation, or to enhance the performance of the treatment programme.

Corrosion inhibitors can provide anodic or cathodic inhibition, or can be blended to give a treatment programme that inhibits both the anode and the cathode. Under-dosing certain inhibitors can cause breakages in protective films and lead to localised, pitting corrosion. Non-chemical approaches to the treatment of water are generally targeted at control of scaling, fouling and biological activity, rather than corrosion specifically.

De-aeration is an option for some closed systems, but an oxygen free environment does not suit metals that utilise oxygen to create a passive film, such as stainless steel.

Filtration systems have become commonplace, and although available in many forms all are ultimately designed to remove suspended solids from the water, in turn minimising fouling, under-deposit corrosion and erosion corrosion.

### Corrosion monitoring

All 'at risk' system metals should be identified and a monitoring programme established, typically on a monthly or quarterly basis.

Water samples can be taken for metals analyses, thereby providing evidence of the inhibition levels being achieved. Trends can be established over time.

Sacrificial corrosion coupons can be utilised. These pre-weighed coupons are typically exposed for 30 to 90 days and their weight loss over time, measured. The results will indicate if the rate of corrosion is acceptable and within industry guidelines. Coupons can be manufactured in most metallurgies and alloys encountered in water systems.

Corrosion probes offer a continuous monitoring of corrosion rates. The probe electrodes are usually mild steel but other metals are available. On-line data loggers or portable meters are options. This technique is not usually applied to closed systems.

### Factors that affect corrosion

Metals, and their alloys, that may be present in water systems corrode at different rates but many factors play a role in determining the actual rate.

- Dissolved oxygen – cannot be controlled in open water circuits, but closed systems can be de-oxygenated mechanically or chemically.
- Temperature – generally the corrosion rate increases with temperature.
- Nobility – rate of corrosion of two connected metals is affected by their electrode potential difference.

### Types of Corrosion

There are a number of different types of corrosion that exist, but the most common can be described as general, localised or pitting, and galvanic.

General - where the corrosion is uniformly distributed over a metal's surface.

Localized (or pitting) - where only small areas of the metal corrode. Pitting is the most serious form of corrosion because the process is concentrated in a small area.

Galvanic – which can occur when two different metals are in contact, either plumbed together or where one metal deposits upon the other.

Other types – include; erosion, impingement, cavitation, under-deposit, dezincification, stress-cracking and microbiologically induced.

### Minimising corrosion

There are chemical, physical and mechanical options available to minimise the effects of corrosion in a water system. New water systems should consider at the design stage, processes to engineer out or minimise corrosive effects, such as operating at optimum

Cathodic	Least Active	Platinum
	High Potential	Gold
		Carbon (graphite)
		Titanium
		Type 316 or 304 stainless steel (passive)
		Monel metal (70% nickel, 30% copper)
		Silver
		Nickel
		Lead
		Bronze, Copper, Brass
		Tin
	Low Potential	Lead/Tin solder
		Type 316 or 304 stainless steel (active)
		Cast Iron/Mild Steel
Cadmium		
Anodic	Most Active	Aluminium
	Low Potential	Zinc
		Magnesium

Galvanic series table

# CORROSION



# WELCOME TO GRIME SCENE!

We are running a competition for all our readers.

Please send in the grimeiest pictures you can find on your travels!

We will display them in each of our Waterline editions throughout 2023. The "worst" picture will be chosen by our Waterline Committee. The winner will receive £25 voucher after the winter edition is published.

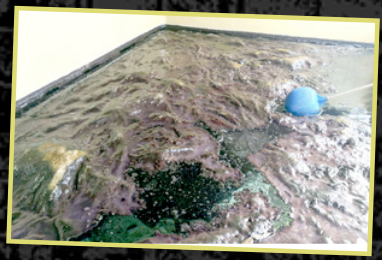
Please send your entries to: [waterline@wmsoc.org.uk](mailto:waterline@wmsoc.org.uk)  
Here are few sent in so far...



1. Sink - Sent in by Committee member



2. Cistern - Shared on social media by Pete Aylesbury



3. A tank that hadn't been cleaned for a very long time with exposure to light and other material... delightful!



4. Hard to recognise, but yes this is a showerhead. Good contender from Matthew George



5. Yes, unbelievable, another showerhead. A cracking photo from Nathan Cook



6. Would you wash your hands with water from this tap! Another excellent grime scene photo from Nathan Cook



7. The photo that started it all off! From our very own Dr Pam Simpson



8. This has to be a favourite so far... Sabrina Elliott was lucky to survive her trip to Costa Rica! The showerhead was so covered in bio film, had no water pressure and added to the risk, the instant water heater was built into the head, with live wires! If she touched it, she got electrocuted!



9. Lovely pictures! Thanks to Simon Ostick. Internal of 2 tanks at a leading hotel chain, they had not been completing any inspections! Hope their visitors survived their stay!



10. Sent in by Ian E Kershaw from his trip to the Grand Canyon

## GET INVOLVED: CAN YOU BEAT THIS GRIME?

Submit your photos & captions to the Waterline email address:

[waterline@wmsoc.org.uk](mailto:waterline@wmsoc.org.uk)

# BIOFILM FORMATION IN COOLING SYSTEMS

*Dave Christophersen, Dave Christophersen Consulting LLC*

In cooling water systems, biofilm formation occurs in hours to a few days. With inadequate biofilm control, both corrosion and deposition probably can be expected even with a good corrosion and scale control chemical treatment program.

Under typical cooling water conditions, and in the absence of an effective biocide program, biofilm formation will begin as soon as a surface is exposed to the recirculating water. So, for a new, clean biofouling coupon placed into the tower, a film consisting mostly of organic matter begins to adsorb to the clean, reactive surface the minute it is exposed to the water.

Not too long after, the planktonic cells begin to collide with the surface. Some will stick, and, assuming conditions for growth are suitable, will begin to reproduce. Within hours a biofilm has started to form.

For existing surfaces in a cooling water system, biofilm growth and removal due to natural or chemical pressures is continuous. Biofilm formation on new and existing surfaces increases over days/weeks up to the point where it is limited by any of a number of physical-chemical factors. At that point a steady-state biofouling condition is reached -- the rate of biofilm formation is balanced by the rate of biofilm removal from the surface.

The point at which biofouling impacts a cooling water system will be entirely dependent on the system, but can be measurable as parameters such as heat transfer resistance and flow resistance

within a couple days.

Several factors promote/limit biofilm formation. Nutrient availability is important. One of the main advantages of growth in biofilms is that a continuous supply of nutrients is delivered to the immobilized organisms by fluid flow past or through the biofilm. Planktonic organisms carried with the fluid have access to nutrients only immediately surrounding the cell. Biofilm cells have a continuous supply of fresh nutrients. They also have the advantage of cooperating with other organisms in the biofilm to degrade different types of nutrients collaboratively.

The flip side is that competition for nutrients in the biofilm is greater. So, from very low nutrient levels, up to moderately low nutrient levels, biofilm organisms outcompete planktonic organisms for available nutrients, and the extent and rate of biofilm formation increases with increasing nutrient availability.

As nutrient availability increases, a point is reached where the advantage of biofilms over planktonic organisms starts to diminish. Essentially, there is a point where planktonic growth is no longer nutrient limited. This rarely occurs in a cooling water system. Limiting nutrients in natural waters generally include the major elements -- carbon, nitrogen, sulfur, phosphorus. In cooling waters these tend to be supplied to limited (and limiting) extents by the treatment chemicals used in the towers (C, N, P) and algal growth in the towers (mainly C). Nutrient limitation in cooling waters tends to promote biofilm formation.

Another major factor affecting biofilm formation is flow-related shear. Biofilm is basically an elastic gel, and can be disrupted by high shear. Biofilms which form under low shear tend to be thicker and of lower density, and are more easily disrupted when high shear is applied. Biofilms which form under high shear tend to be thinner and of higher density, and are less susceptible to disruption by increased shear.

In a tower, a low shear area might be the fill surface, or the basin wall. A high(er) shear area might be the supply and return lines to and from the heat exchangers, or possibly through the exchangers. Shear isn't generally a major factor limiting biofilm formation in cooling water systems.

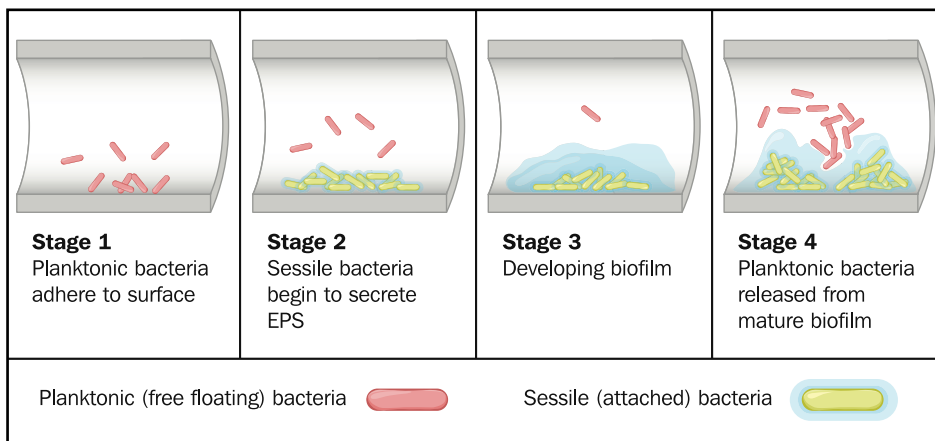
Another important factor in biofilm accumulation and stability is the non-biological components of a biofilm. Biofilms tend to trap small particulates, e.g., sand and clays, and these can contribute significantly to the mass and rate of growth of biofilms. For the most part, however, these do not contribute to the structural strength of the biofilm.

Corrosion products which form within the biofilm, e.g., iron oxides or sulfides, also contribute to the mass and rate of growth of biofilms. These materials, however, do add significant structural strength to the biofilm, making them much less susceptible to natural sloughing or removal by increased shear. They also make them less easily penetrated by biocides and biocides dispersants.

Mineral scales can also form within biofilms, even though scaling is not anticipated from scale prediction calculations, as biofilm water chemistry can be very different from bulk water chemistry. Mineral scales within biofilms will contribute to the mass and rate of growth of biofilms, and provide extra structural stability.

Temperature is another important factor in cooling water systems. The temperature of the exchangers, relative to the rest of the system determines where the major biofouling problems will occur and the rate at which they will develop. Generally growth rate (and biofilm formation) tend to increase as temperatures increase up to an "average

## Biofilm formation





optimum" for the organisms involved in biofilm formation. Temperature is an effective selective pressure, so over time a system will tend to select for organisms able to grow optimally under the conditions that exist in the tower.

Limitations occur only at very high exchanger surface temperatures, such as those that occur in high load industrial process cooling systems. Under these conditions deposits in the exchangers will be a combination of corrosion and scale deposits and non-biological or inactive biological organics (e.g., from algal activity elsewhere in the system).

Overall, the most rapid rates of biofouling occur in the 80F - 120F (27°C - 49°C) water temperature range. Over 120F (49°C) temperature becomes a limiting factor for some populations within biofilms. Under 80F (27°C) there is a reasonably direct relationship between increased temperature and increased rate of biofouling.

So, to summarize, biofilm formation is initiated immediately on new surfaces exposed to cooling water, and is a continuous process on existing surfaces in a system. The rate of biofilm formation is a function of available nutrients (C,

N and P). Fluid shear is a major factor controlling biofouling in some systems, but is generally less significant in cooling water systems. Capture of fine particulate matter from the recirculating water by the biofilms, and the development of corrosion products and mineral scales within biofilms promote biofilm accumulation at rates proportional to these processes, and independent of the microbiological process.

Increasing temperature enhances biofilm formation up to a maximum somewhere in the 80F-120F (27°C - 49°C) range, and then becomes a limiting factor. The time required to reach a steady-state biofouling condition is a function of all of these factors (plus several more, such as surface type/condition, constancy of each controlling parameter, etc.).

In the absence of an effective biodispersants/biocide program, surfaces in a cooling water system are in a near-steady-state biofouling condition most of the time. In the presence of an effective biodispersants/biocide program, a steady-state biofouling condition is never reached; instead the condition fluctuates between "minimally biofouled" and "partially biofouled." This may not sound particularly encouraging, but

control of all biofouling related problems is much easier when treating a minimally/partially biofouled system, compared to a system which is in a maximal/steady-state biofouling condition. Reaching a steady-state biofouling condition in a cooling water system occurs over a period of weeks.

Regarding heat exchangers specifically, biofouling rate will be a function of nutrient availability, flow/shear through the exchanger, surface condition/cleanliness, and surface temperatures in the exchanger.

For corrosion control chemicals to be effective, the surfaces need to be kept in-control of biofilm (minimally to partially biofouled). In out-of-control conditions the biofouling layer is too great which prevents the chemicals from reacting with metals for anodic, cathodic, or adsorptive corrosion protection.

Adjusting corrosion inhibitor concentrations or even changing the chemistry selected may have little benefit in a cooling system where biofouling exists and microbiologically influenced corrosion (MIC) is a problem.



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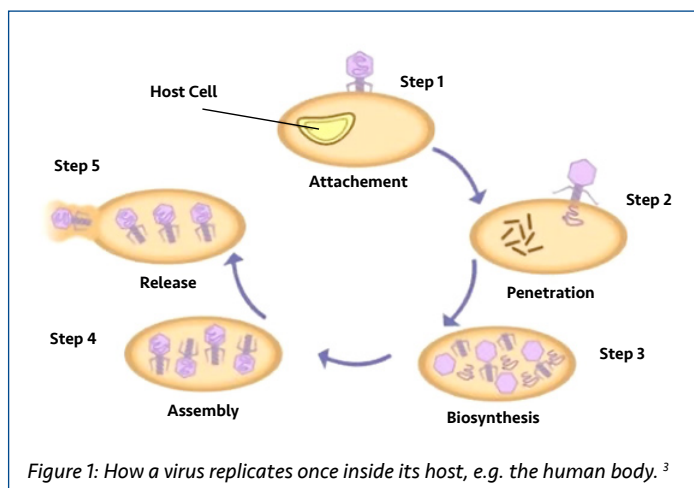
# Effective treatment options for a safe, hygienic supply

By Michelle Roe, Technical Healthcare specialist at Whitewater

**Michelle Roe, Technical Healthcare specialist at water solution provider, Whitewater, discusses the impact water quality has on hospital-acquired infections, and some of the key water treatment methods available to combat the growth and proliferation of harmful waterborne microorganisms.**

Microbes are classified into distinct groups depending on their characteristics, however there are four main groups that have the most potential to cause harm to the human body, if conditions are optimal. These are bacteria, fungi, viruses and protozoa.<sup>1</sup> These groups can also be known as opportunistic pathogens, as they have the ability to integrate themselves into a host i.e. they can invade a human body and cause an infection. Bacteria are one of the most rapid organisms to replicate; they can do so every 4 to 20 minutes.<sup>2</sup> If the bacterium is pathogenic, this can lead to a rapid deterioration in the patient over a short period; hence the importance of a quick diagnosis.

Viruses, on the other hand, are extremely clever organisms that can manipulate the host's immune system in many ways. For example, they can alter their genetic make-up to mimic the host's genes. This effectively "tricks" a human's immune system not to respond, so the virus has sufficient time to replicate and cause not only a localised infection, but one that spreads throughout the body (Figure 1).<sup>3</sup> Not all microorganisms (microbes), cause infections; some are critical for human survival.



## Different transmission pathways

Transmission of pathogenic microorganisms can be through contact, air, food and water. Over the years, healthcare facilities have put in place policies and procedures to try to reduce the amount of Healthcare Associated Infections (HCAs). Despite the daily efforts of healthcare personnel, 1 in 31 patients acquire an infection, if not multiple infections, on a daily basis.<sup>4</sup> The most common HCA is pneumonia which can be caused by a bacterium called *Pseudomonas aeruginosa* (Figure 2).<sup>5</sup>

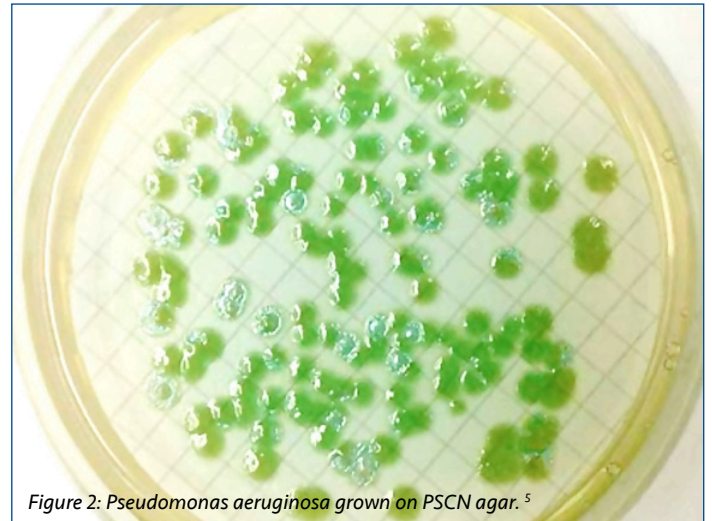


Figure 2: *Pseudomonas aeruginosa* grown on PSCN agar.<sup>5</sup>

Water is a naturally occurring substance that is considered to be one of the most complex molecules known, but what makes water so complex? Water particles are composed of many different compounds - physical, chemical and microbiological. It is when the composition of each water molecule changes, that the water may become contaminated with pollutants and thus unfit for purpose. In the healthcare sector, the utility of water plays a major role not only patient diagnostics but also in patient care.

Water borne infection is a major risk associated with contaminated water, so much so that 80% of infections are caused by water.<sup>6</sup> Out of this percentage, it is estimated that 64% of infections are healthcare associated.<sup>7</sup>

## *Pseudomonas aeruginosa*

- *Pseudomonas aeruginosa* is a most opportunistic pathogen - a Gram-negative, rod bacterium that causes infections in both immunocompromised and immunocompetent humans.<sup>8</sup> This bacterium is typically found in the environment, and in particular in the soil and freshwater. It's the bacterium's love for aquatic environments that results in it being present in sinks, showers, swimming pools, hospital reservoirs, ice machines, disinfecting solutions, endoscopes, catheters and surgical instruments.<sup>8</sup> *P. aeruginosa* can survive on abiotic (non-living components of an ecosystem e.g. water, temperature, sunlight) and biotic (things living in an ecosystem) surfaces can be easily transmitted from one patient to the next.<sup>8</sup> The bacterium also possesses many unfavourable characteristics towards its host, which makes it highly resistant to antibiotics, and has the ability to form a biofilm.

Other more common water borne pathogens are *Enterovirus*, *adenovirus*, *Pseudomonas spp.*, *legionella*, *salmonella* and *Escherichia coli O157:H7*. Outbreaks of these viruses and bacteria are harmful to our healthcare system, as they can be easily transmitted, can be resistant to chemical/ heat disinfection, and possess antibiotic resistance.





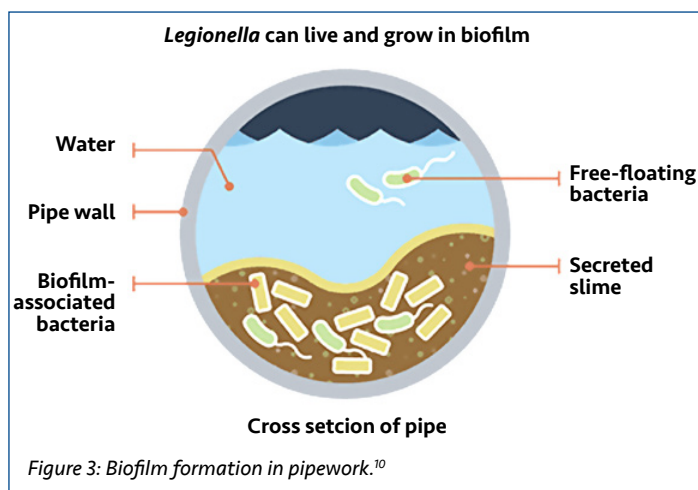
### Biofilm formation

Unfortunately, microorganisms are extremely clever species, which makes it more difficult for the human eye to detect them. Some microorganisms have the ability to manipulate their morphology as an adaptation and survival method. This method is commonly known as biofilm formation. This is a key characteristic for many microorganisms, as it allows them to survive and replicate when conditions become unfavourable for them to sustain life. Biofilms allow some microorganisms (single celled) to survive, as they incorporate them into the "group", so that they, along with multicellular bacteria, fungi, virus, protozoa can continue to replicate and grow.<sup>9</sup>

In order for microorganisms to create a biofilm, they alter their regulatory networks that are responsible for signal generation.<sup>9</sup> This altered signal generation is then used for gene alteration, which results in temporary reconfiguration of the cell.<sup>9</sup> These modified genes are responsible for nutrient usage, virulence factors, and ability to use different surface molecules.<sup>8,9</sup> This causes the formation of a biofilm. In this biofilm, the bacterium wrapped up in a self-produced extracellular polymeric substance (EPS), carbohydrate binding proteins, pilli and flagella, that allows the bacteria to stick to surfaces.<sup>8,9</sup> This EPS layer acts as a shield, that protects the microorganism from unfavourable environmental conditions such as heat and chemicals.

### Resistant and hard to eliminate

The longer a biofilm is attached to a surface such as pipework, the stronger and more resilient it becomes, thus making it extremely hard to break down and eliminate. There are two main common causes of biofilm formation: 1) deadlegs - sections of pipework the water does not cover when flowing through the pipe and, 2) poor water quality. As water is a "naturally made" product, its prototype can vary from one droplet to the next. This makes water particles very unpredictable, which has a significant effect on how it is used throughout healthcare.



### Biofilm case study

As previously mentioned, the formation of a biofilm is not always visible to the human eye. Normally a biofilm only becomes visible when it's too late. This is why medical equipment through which water flows is designed to ensure that there are minimal, or indeed no deadlegs present, reducing the opportunity for these microorganisms to form a biofilm.

That said, a few years ago, an Irish hospital had a confirmed outbreak of *P. aeruginosa* in their water samples, taken as part of their regular validations in the Decontamination

Department. The machine in question was taken out of use, and an investigation was carried out. The first step was to re-sample to ensure it was not a "false positive" result. The results of the re-test showed *P. aeruginosa* was present. The manufacturers of the Department's washer-disinfectors and reverse osmosis units were called in to complete various disinfection activities and troubleshooting to identify the possible source of the contaminant. However, nothing was found in either the water supply or the washer-disinfectors. There were also no deadlegs found.

It was only on further investigation of the Decontamination Department that it was concluded that the PTFE tubing routinely used to take their water samples contained a biofilm. The majority of personnel wouldn't know what a biofilm looks like, but in this case, the representative from one of the manufacturing companies knew what to look out for. Once it was discovered, the presumptive cause of the contamination was investigated, and it was confirmed by microscopy and laboratory analysis. The growth of this biofilm was as a result of the tubing remaining moist, and it being stored in optimal conditions in between the weekly water sampling. Luckily for the hospital, all that was required was to replace the tubing, and the contamination was eliminated.

### Water treatment options

As water is one of the main avenues of transmission of pathogenic bacteria in hospitals, a range of different water treatment systems have been developed, installed and maintained throughout hospitals to reduce the spread of them. Some of these water treatment systems included copper/silver ionisation, chlorine dosing, ion-exchange (water softeners), washer disinfectors and reverse osmosis systems. A lot of these water treatments are used together to ensure that the risk of causing infection to the patient is significantly reduced, or even better eliminated. Innovative technologies for water treatment are continuously being developed and improved to help reduce the number of Healthcare Associated Infections (HCAIs) and continue to target not only pathogenic microorganisms but also various other pollutants.

### Pre-treatment

A key element of the water treatment process is the use of pre-treatment to remove as many chemical ions as possible from the water before it feeds into the reverse osmosis unit. Pre-treatment - which is responsible for the removal of calcium ions, iron, manganese, silica and carbon dioxide - addresses either the hospitals "raw" water supply, or partially treated water. Depending on the site's location, the mains water could be classified as "hard" water, simply signifying that the water supply contains an abundant amount of calcium and magnesium ions, which when allowed to build up, or when heated, can cause a build-up of limescale in pipework, resulting in damage to the system it is feeding. Hard water is very easily treated through pre-treatment and other water treatment technologies such as reverse osmosis.

There are numerous types of pre-treatments available, depending on the desired quality of water required for use. Each pre-treatment is responsible for removing different chemical ions from the water supply, which is why, more often than not, pre-treatment technologies are combined. The most common forms of pre-treatment used in healthcare are sand filtration, carbon filtration, ion exchange (softeners) and organic scavengers. Pre-treatment is not only used to treat the water, but it's also designed to protect the system, which in return results in an increase in the longevity of the system and its components.

**Carbon**

Carbon is one of the most used pre-treatments, as it removes impurities both of chemical and microbiological sediments. This process occurs through absorption in which the contaminants are trapped inside a carbon particle that can be described as being like a pore.<sup>11</sup> While different types of carbon can be used, granular activated carbon (GAC) is used more frequently, as it has a larger pore surface, and can thus absorb more compared with other types.<sup>11</sup> The carbon acts as a catalyst, as it is used to trap the water contaminants. However, it does not trap salts, other important minerals, and some microorganisms. Carbon is frequently used to remove organic ions from a water system.

**Ion exchange**

Softener resin is used to remove the calcium (Ca<sup>2+</sup>) and magnesium (Mg<sup>+</sup>) ions which cause the raw water to be classified as “hard” water. The ion exchange resin in the softening vessel can be thought of as meniscal beads. Each of these beads have multiple negatively charged sites bound to them, which “attract” positively charged sodium ions (Na<sup>+</sup>) to them when the softener is regenerated with a strong salt solution. As the hard water enters the vessel when the softener is in service, the more positively charged calcium and magnesium ions are attracted to the beads, which cause the sodium ions to be released into the free flowing water. Other positively charged ions such as iron, can also bind to the resin beads (Figure 4) but are difficult to remove with routine salt regenerations and tend to damage the ion exchange resin beads over time.

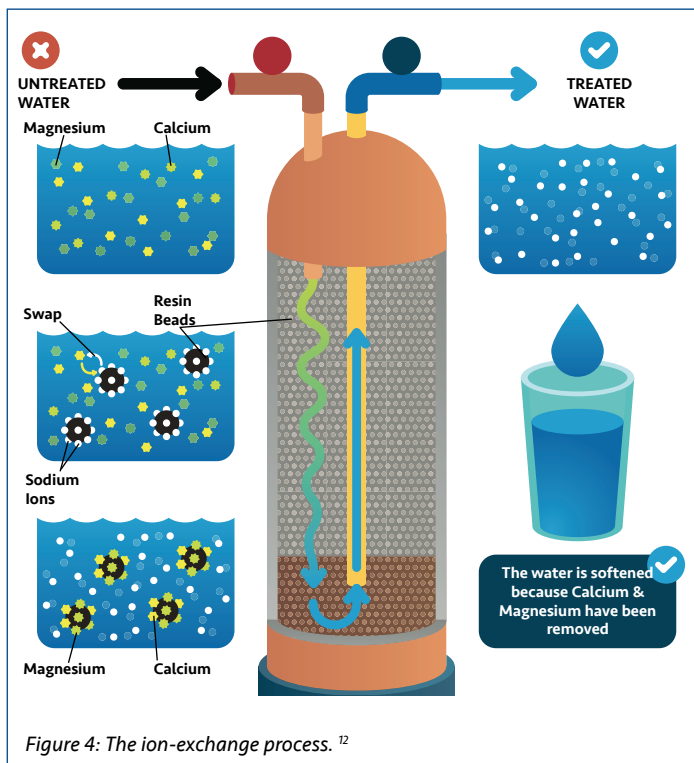


Figure 4: The ion-exchange process.<sup>12</sup>

**Reverse osmosis**

Reverse osmosis is the most generic form of water treatment available today. This valuable technology is widely used across not only the healthcare sector, but many other industries too. So, what is so special about this technology compared with those we have already focussed on? Reverse osmosis systems are designed for the degradation of microorganisms. Osmosis is the scientific term given to the natural movement of water molecules from an area of low concentration to an area of high concentration, across a semi-permeable membrane. A semi-permeable membrane

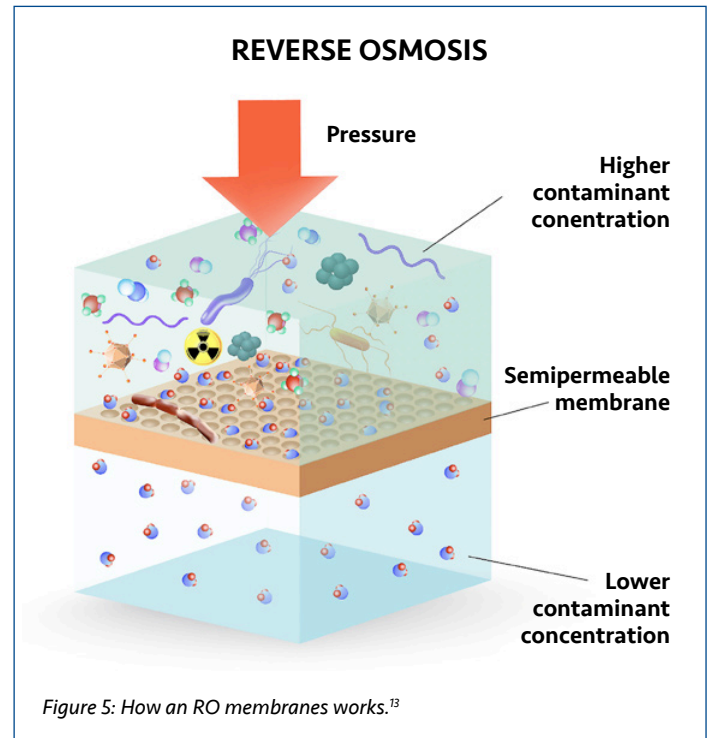


Figure 5: How an RO membranes works.<sup>13</sup>

allows for certain molecules to pass through, while blocking larger molecules from penetrating the membrane. Reverse osmosis is when this process is switched - through the addition of pressure via a pump, which results in a high quantity of particles such as salt, chemical ions and microorganisms getting trapped in the membrane (Figure 5).<sup>13</sup> The most used membrane for reverse osmosis is made from a compound called polyamide. Polyamide membranes are the preferred material used in membrane production. They can be used in a diverse range of applications, as they have more flexibility and require less pressure, as well as a low flow rate, to achieve high rejection of contaminants including microorganisms.

**Conclusion**

There is no doubt that, due to the intelligence of microorganisms, combating healthcare-associated infections will be an ongoing battle for the healthcare sector. That said, however, through continuous improvements in water treatment technology, we are now becoming more efficient in helping reduce the rate of contamination. With this, and a growing understanding of how different microorganisms use their hosts and cause infection, we can strive to bring down the number of HCAs. Frequent water testing in hospitals can ensure quality assurance that the water systems our hospitals have in place are working correctly, which adds to the reassurance, that the correct steps are being taken to uphold patient safety.

**About the author**

Michelle Roe studied Microbiology at University College Dublin, subsequently working in an environmental microbiology laboratory in the city for almost five years, where she progressed through a number of roles. In her current role at Whitewater, she sells water treatment systems for hospitals across both UK and Ireland.

**REFERENCES AVAILABLE UPON REQUEST**

*We would like to acknowledge this article first appeared in the October 2022 edition of Health Estate Journal (<http://www.healthestatejournal.com/>) and is reproduced courtesy of IHEEM.*



# Dates for your diary:

Date	Company	Title	location
25/4/23	LCA	Managing Positives	Tamworth
27/4/23	LCA	Managing Positives	Edinburgh
27/4/23	UHEI	University & Healthcare Estates & Innovation	Glasgow
25 - 27/04/23		The workplace event	NEC Birmingham
16 - 17/05/23	BIA	25 <sup>th</sup> Annual Clinical and Scientific Meeting	Manchester
16 - 17/05/23	UHEI	University & Healthcare Estates & Innovation	Dublin
18/5/23	RSPH	Thinking outside the box: planning plumbing systems for the future	Online
18/5/23	WMSoc	Rainwater Harvesting	Online
28/6/23	UHEI	University & Healthcare Estates & Innovation	London
11/7/23	WMSoc	Waste Not Want Not	Tamworth
11/9/23	WMSoc	AGM	Online
10-11/10/23	IHEEM	Healthcare Estates	Manchester
7/11/23	LCA	*Save the date*	London
8-9/11/23		Infection 360	Manchester
15-16/11/23	UHEI	University & Healthcare Estates & Innovation	Birmingham

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# BS 7592: 2022 SAMPLING FOR LEGIONELLA BACTERIA IN WATER SYSTEMS - WHAT'S NEW?

Roy Sullivan, Senior Consultant, Water Hygiene Centre Ltd

BS 7592 has undergone a re-write, published in January 2022, which resulted in extensive changes. There are 3 new annexes with greater emphasis being placed on the competency of all involved in the sampling process.

## BS 7592 – what has changed?

The changes include useful additional sections that detail sampling for investigations, for abrasive contamination and sampling for commissioning and recommissioning.

Three new annexes, two of which are normative (best practice), include sampling to investigate incidents and outbreaks in hotels and other multi-occupancy buildings, and sampling to investigate incidents and outbreaks in hospitals and healthcare.

The informative annexe includes guidance on when to use respiratory protective equipment (RPE) and there have also been extensive updates to the guidance surrounding sampling plans.

A sampling plan appropriate to the reason for sampling should be prepared and be based on a current site-specific legionella risk assessment. Sampling plans should also have enough detail to identify outlets to be sampled, for example, an up-to-date schematic diagram. The plans must also include the rationale for sampling and resampling, and the additional parameters to be taken at the time of sampling (e.g., temperature, pH, biocide level) to be agreed upon with the Responsible/Authorised person. If there is no water safety plan or sampling plan, then a site survey should be carried out to decide where to take samples, taking BS 8554 into account.

The updated standard now includes guidance on new installations and refurbishments, which was an area not covered in the previous standard.

Also included is updated information and some changes to sampling hot water systems, bringing the standard more in line with HSG274, which considers multi-loop systems and hot water storage.

Another change is that potable water storage tanks should not be opened for routine sampling, as this increases the risk of introducing dust and other

debris into the tank when the lid is lifted. To negate the need for this, routine sampling should be done from a dedicated sample valve point or the nearest outlet to the tank.

Section 7.4.1 also gives new guidance on routine sampling: For routine monitoring purposes, only pre-flush samples should be taken and, where possible, these should be taken from unmixed outlets.

Pre flush samples should be taken with no disinfection or adjustment of devices or inserts to obtain a reflection of the water as it is used.

Checks should also be made as to the type of analysis being carried out: are they sufficiently precise, repeatable, sensitive, and specific?

## Water Sampling for Legionella

The accuracy of the results obtained from water sampling relies principally on 'doing the basics well'. Whilst it is imperative to understand the; how, what, why, where and when we take water samples, these considerations are underpinned by two key requirements:

- The sampler must follow the approved technique when sampling from an outlet;
- As far as reasonable and practicable, think about all aspects of the sampling environment that may pose a cross-contamination risk.

By following the approved methodology/sampling technique coupled with the adoption of good sampling practice, to mitigate factors that may otherwise cross-contaminate the sample taken, it is possible to consistently obtain results that accurately represent the water quality within the outlet sampled.

## Sampling Processes

Guidance is available from British Standards and the Environment Agency, which both offer practical advice on how to sample and monitor from hot and cold water services. BS 7592:2022 describes how to sample specifically for Legionella bacteria in water systems and laboratory advice surrounding the determination/detection and enumeration of aquatic bacteria is found in Microbiology of Drinking

Water – 'Blue Book'.

Therefore 'sampling processes' may be defined by two parts:

- Operational considerations when sampling outlets;
- Laboratory methodologies and associated diagnostics when determining the 'target organism' presence.

## Legionella Sampling Rationale

For legionella sampling, it is advised that water samples are undertaken to demonstrate the effectiveness of the established control scheme and are not considered a control measure themselves. Therefore, superfluous sampling ('fishing for results') is not advised.

- BS 7592 advises that "Sampling for the presence of legionellae for the purposes of monitoring the effectiveness of control measures should be undertaken following a site-specific legionella risk assessment and as a supplement to a full physical and chemical monitoring programme. When sampling large or complex sites, the sampling personnel should have a sampling plan containing sufficient details to identify the outlets to be sampled, e.g. a schematic diagram with a unique identifier for each sampling point. When designing a sampling plan, the following should be taken into account: a) the reason(s) for the choice of sample points; b) the frequency of sampling; c) the sample matrix (type of material and system tested); d) the limit of detection required and sample volume; e) the analytical/evaluation techniques to be used; and f) the location of temperature sensors" This should be the responsibility of the WSG to determine.





### Collecting Samples

When collecting a water sample, the aim is it should be representative of the sample location at the time of collection; hence the importance of using the approved sampling technique and mitigating any risk of cross-contamination.

Equally important is the handling of the sample once it has been taken to minimise change before the laboratory analysis begins. Therefore, careful consideration should be given to the following:



- Choice of sampling point;
- The possible presence of biocides, such as chlorine;
- Whether or not there is a need to disinfect the sampling point;
- Location & timing of the sample – concerning normal operating conditions & control measures of the system. Especially if secondary disinfection is commonplace;
- The type & quantity of sample to be taken – considering the requirement for different volume samples dependent upon the target organism. For example; Legionella samples are usually collected in either 500ml or 1-litre containers.
- Storage of the samples.

### Sampling Technique

With so many possibilities, such as a single pillar, monoblock, thermostatic mixing valves (TMV), sequential mixer, blending taps, showers, outlets etc. your water sampling technique will vary depending on the type of outlet sampled and specific methodologies described.

- **Single Pillar & Monoblock (non-TMV) Outlets** - Hot and cold supply should be sampled separately. Moreover, sampling blended water - from a mixer tap not comprising a TMV is not indicated.
- **TMV Taps** - When sampling from a TMV blended tap; water samples should be obtained from the outlet with the outlet lever set to the 'mid-point'.

*NOTE: With a fail-safe TMV, the sampler has no control over the dispensed water temperature as this is controlled by the TMV itself. It is impossible to obtain a sample comprising solely hot water, as some cold water is blended into the hot water to reduce temperature and prevent scalding.*



- **Showers** - Consideration should be given to ensuring shower waters are captured accurately and safely (when systems are contaminated with aquatic pathogens), as such food-grade bags may be used to funnel water into the sampling container whilst minimising the dissemination of aerosolised water droplets.

Sampling should be completed by a suitably trained individual, this may be an in-house 'competent person' or an appointed contractor. With either individual, ensure they are competent to take samples i.e. where is the evidence they have been trained. The individual should have received suitable microbiological sampling training, to ensure samples are taken aseptically and with no occurrence of contamination when sampling.



- When filling sample containers it is important to use bottles dosed with sufficient sodium thiosulphate pentahydrate (STP), to neutralise any residual chlorine (or copper/silver) that may have been collected in the sample. Failure to do this may result in the receipt of false negative test results - as residual chlorine may continue to disinfect the water sample whilst in transit to the laboratory.

It is also a recommendation that samples from chlorine disinfected water systems should be taken **no sooner** than two days and **no later** than seven days after disinfection (HSG274 Part 2 paragraph 2.132). This ensures that the samples taken are an accurate representation of the water system and not a confirmation of biocide strength.

### When to take Pre or Post-Flush Samples?

To determine the need for pre or post-flush water samples, consideration must also be given to the part of the water system in question: BS7592:2022 section 7.4.1 gives definitive guidance.

*"For routine monitoring purposes, only pre-flush samples should be taken and, where possible, these should be taken from unmixed outlets. Pre-flush samples should be taken with no disinfection or adjustment of devices or inserts to obtain a reflection of the water as it is used.*

*NOTE 1: Post-flush samples are not suitable for routine monitoring.*

*NOTE 2: Pre-flush samples allow for the determination of the colonization of a particular outlet. This is the type of sample that is most representative of the risk to individuals and is the only sample necessary.*

*Whenever possible, when post-flush samples are required, these should be collected from individual taps rather than mixer taps so that the samples are representative of the water flowing around the system and do not just contain localized contamination of the outlet(s)."*

*Section 7.1.5 says: "NOTE: A post-flush sample without disinfection is water collected after water has been run to waste for a prescribed length of time or until a particular endpoint has been reached (e.g. a temperature measurement). Any legionellae in this type of post-flush sample could be derived either from the outlet itself or from the water supplied to the outlet.*

*These samples are not recommended due to the difficulty of interpreting results."*

### How should you store and transport your water samples?

Once water samples have been collected, these samples must be handled, stored and transported appropriately with consideration for the differing requirements of the microorganisms of interest.



• **Legionella samples** - While steps can be taken to minimize the risks of changes in the microbiological characteristics of samples, samples should be analysed as soon as practicable, preferably within 24 h but not more than 48 h of the sample being collected. If sample analysis cannot be commenced within 48 h of collection, the client should be advised of this and the possible effects on sample results.

Any deviation from these prescribed storage & transportation criteria may impact the accuracy of the result being reported by the laboratory.

**Chain of Custody**

The ‘chain of custody’ associated with water samples for microbiological analyses must be understood - to ensure that all samples are suitably received and processed by the test laboratory and that the results reported by the laboratory are correctly cross-referenced to the outlets sampled.

Chain of custody, therefore, refers to the paperwork trail to be completed on the water samples sent to the laboratory. Upon request, UKAS-accredited laboratories will provide

such paperwork in advance, so that sampling points/locations identified in the organisational sampling plan can be entered into this paperwork along with details of the microbiological test(s) to be completed by the laboratory.

Once the paperwork has been prepared, all that remains to do is to update the fields with such details as time of sampling, the temperature of sample etc.

A copy of this paperwork should be retained, and a copy must accompany the samples sent to the laboratory so that they can be booked onto their system and processed within the correct timeframe.

The benefit of using a clear chain of custody paperwork is that this minimises the need to capture lots of information on the sample bottle(s). Therefore, sample bottles can simply be labelled with a unique identification number sequence and ‘legibly’ cross-referenced against the supporting paperwork.

**Other considerations**

Pockets of potential contamination are often missed in areas of poor circulation or low flow if samples are only collected from sink outlets or showers as these areas are not subjected to the thermal disinfection process associated with passing through the hot water storage vessel.

If it is suspected a system is poorly balanced or has flow issues, samples should be collected from sampling or flushing points on each circulating loop and immediately before where the loop returns to the hot water vessel or calorifier as this is where the

temperature is likely to be at its lowest. The use of biocide neutralizing agents is discussed with EDTA no longer being the neutralizer to use when a copper/silver biocide is being used. Instead, ten times the normal amount of sodium thiosulphate (180mg/l) is recommended.

**In Summary**

The updates to BS 7592: 2022 are significant as technology and methodology has evolved since the previous publication of 2008. It is therefore important to make sure all Company’s processes are up to date to consider the changes and align with the new standards.

Sampling can provide valuable information on the efficacy of the control scheme, which pre-planned maintenance (PPMs) such as temperature monitoring may form a part. However, this will only be true if the sampling programme is properly planned and executed following available guidance.

Random ‘fishing for results’ is not recommended. Sampling should be carried out in response to a specific need with a clear underlying rationale.

When sampling has been carried out as a result of a previous loss of control, once it’s been accepted that control has been regained, then sampling following the original regime should resume – supported by the site-specific Legionella risk assessment and the organisational Water Safety Plan (WSP).

# event report e

**NECLFG meeting**

Thursday 2nd March 2023, Chester-le-Street Cricket Club, Durham

The last meeting of the North East Council Legionella Focus Group (NECLFG) was held on Thursday the 2nd March 2023 at the Chester-le-Street Cricket Club. Kevin Belben, from Plexus Innovation the sponsor of the event, gave an excellent presentation on remote monitoring referencing the latest guidance from the WMSoc on the same subject. There then followed presentations from Vicki Wilson (Safesol) on the energy saving product Delta-T, Stephanie Allchurch (altecnic) on thermostatic mixing valves and finally Mark Dawson (Hydrosense) on rapid in field testing for legionella.

A huge thanks to our sponsor of the event - Plexus Innovation, the speakers and those who attended from the various local authorities, housing associations and education authorities who gave up their valuable time to attend. You are very much appreciated.

The NECLFG is a free to attend open forum for members of the public sector. To learn more, offer to sponsor or speak at one of the events, please contact the NECLFG events co-ordinator at [ian.e.kershaw@outlook.com](mailto:ian.e.kershaw@outlook.com). The next meeting will be in June and will be advertised on LinkedIn.



## INFORM

### Wireless water temperature monitoring

Monitoring water temperatures are crucial to water safety and will help to minimise the growth of waterborne pathogens, reducing the risk of infection. Inform is a highly intelligent digital solution designed to monitor, maintain and provide water temperature data on outlets within a building. Shifting to digital operations and management can have huge benefits within a building. This easy-to-use system offers peace of mind that you operate at the highest safety levels and comply with building requirements.



The Inform system box and platform reduces the number of site visits required to audit water temperature within the building. All data is accurate and stored on a secure server which can be accessed anytime with your login.

#### Learn more about Inform

KWC DVS North: 01246 458900 | South: 01803 529021  
kwcdvssales@kwc.com | [www.dartvalley.co.uk](http://www.dartvalley.co.uk)



# INDUSTRY UPDATES

## Legionella Control Association



The LCA have been as busy as ever over the winter months with significant developments taking place on the Skills and Knowledge Matrix, infractions and Service Delivery Standards developments.

The LCA are on the road again at the end of April. We have developed an informative programme on Managing Positive's – with guest presentations from Paul McDermott in Tamworth and Dennis Kelly in Edinburgh. Tamworth – 25th April 2023 - is now sold out with over a month to go before the event and Edinburgh – 27th April 2023 - is filling up nicely.

Competence: how do we make it clearer for members to know what competence assessments should look like, how they should proceed and give our members an idea as to what we (the LCA) are looking for. To do this we have to go back to basics. What skills and knowledge will help develop competency? The current Skills and Knowledge Matrix guidance was always part of the Service Standards Committee remit. It's taken a little longer to develop than we wanted but we are moving towards the completion of this project. Each Service Delivery Standard (SDS) will have its own set of skills and knowledge and each role (Planner, Technician, Reporter, Auditor etc.) will have specific expectations on their knowledge and skills. More to come on this for the next issue of Waterline if this all moves to plan!

In addition to the Matrix, we have also been taking on board feedback from the first set of Company Audits for the SDS. We can see some areas where minor tweaks will improve the audit and make it easier for both the auditor and the auditee to understand what we are driving towards. Communication

is always key, and this is something where we can see some minor developments that can make a significant impact.

The LCA have begun discussions with members who have representation in Ireland (North & the Republic) to gauge interest in a future conference around November 2023. If you would be interested in attending such an event, please contact the secretariat and we will be able to make some decisions on future activities.

Since the Roadshows in May 2022, where Chris Boyd from MARC Strategics gave us an insight into Legionella control the other side of the pond, we have seen the LCA of North America be formed. This business is not financially related to the LCA; they have had a discussion with us and are taking some of the lessons learned from the UK to aid their set up. They have asked for additional support and the expressions of interest on this matter are with Chris and the LCA NA team.

To close I would like to thank an out-going LCA Committee member for her hard work and support over the last couple of years. Anthea Davies has been a great source of knowledge and support for the LCA but has now stepped down from the LCA Committee. Fortunately for us, she is one of our new assessors for the South West and Wales. Anthea joins our other new assessors Sean Rimmer (North West), Colin Shekleton (South East) and Andy Freer (North West).

*Nick Barsby, LCA Chair*

## UKAS

### UKAS accreditation: Bringing confidence to measurement

Infrared non-contact thermometers (IR) provide a convenient means of monitoring or controlling temperature within a wide range of industry sectors. Users of non-contact thermometry whether for medical or non-medical purposes, need to have confidence that the devices they use are delivering consistently accurate and reliable results. If you have purchased an inexpensive device from an online retailer, there is no way of knowing with any degree of certainty whether the results are accurate or misleading. In a variety of circumstances, results which are inaccurate by a few degrees can have severe repercussions.

Full article:

[https://www.linkedin.com/pulse/ukas-accreditation-bringing-confidence-/?midToken=AQGf1l\\_gJhmXJw&midSig=15L5zlyRLfXGA1&trk=eml-email\\_series\\_follow\\_newsletter\\_01-newsletter\\_content\\_preview-0-title\\_&trkEmail=eml-email\\_series\\_follow\\_newsletter\\_01-newsletter\\_content\\_preview-0-title\\_-null-ba9yrp~ldeq6z85~tz-null-null&eid=ba9yrp-ldeq6z85-tz](https://www.linkedin.com/pulse/ukas-accreditation-bringing-confidence-/?midToken=AQGf1l_gJhmXJw&midSig=15L5zlyRLfXGA1&trk=eml-email_series_follow_newsletter_01-newsletter_content_preview-0-title_&trkEmail=eml-email_series_follow_newsletter_01-newsletter_content_preview-0-title_-null-ba9yrp~ldeq6z85~tz-null-null&eid=ba9yrp-ldeq6z85-tz)

## United Kingdom Health Security Agency (UKHSA)



The latest data published (link: <https://www.gov.uk/government/publications/english-surveillance-programme-antimicrobial-utilisation-and-resistance-espaur-report>) by the UKHSA reveals that the estimated total number of severe antibiotic resistant infections in England rose by 2.2% in 2021 compared to 2020 (53,985 compared to 52,842). This is the equivalent of 148 severe antibiotic resistant infections a day in 2021.

The number of severe antibiotic-resistant infections remains below pre-pandemic levels (62,422 in 2019), driven by a number of factors including changes in how NHS services were delivered and how much people contacted

the NHS, as well as social behaviour (reduced social mixing and enhanced hand hygiene) during the pandemic.

In England, total antibiotic use fell by 15.1% between 2017 to 2021, from 18.8 Daily Defined Doses (DDD) per 1,000 inhabitants per day to 15.9. This means that England has exceeded the government's National Action Plan goal to reduce prescribing by 15% by 2024 from a 2014 baseline. However, this downward trend may not be sustained unless we continue to use antibiotics appropriately and continue to drive down infections overall.

## Society of Public Health Engineers (SoPHE)



SoPHE are pleased to announce their brand new quarterly newsletter. The newsletter will give updates from the Society, its Sub-Committees and from across the public health industry- keeping SoPHE members up-to-date with upcoming events, technical output and news.

Link:

<https://www.cibse.org/get-involved/societies/society-of-public-health-engineers-sophe/sophe-newsletter>





## Institute of Corrosion (ICorr)

ICorr Microbiologically Influenced Corrosion (MIC) Training Course Plan for 2023

The Institute of Corrosion (ICorr) is pleased to announce the plan for the MIC training course for 2023. Both the Awareness and Certified MIC Technologist proficiency levels are offered, at ICorr headquarter, twice once in April and then as follows:

October 2023:

- Awareness (one day course) on the 4 October 2023
- Certified MIC Technologist (5-day course) from the 23 to the 27 October 2023.

An MIC Technologist attendance certificate is available for attending the 4-day course without taking the certification exam. Please contact: [admin@icorr.org](mailto:admin@icorr.org) for registration.

## Healthcare Infection Society (HIS)

Spring meeting – *How do you build a safe hospital? IPC considerations for the built environment.*

The HIS Spring meetings are focused on topical issues relating to IPC. They offer an opportunity for poster presentation and are open to anyone with an interest in any aspect of HCAs.

In 2023 the Spring meeting will focus on IPC considerations in the built environment and will take place on the 20 June 2023 at Woburn House Conference Centre in London.

## Chartered Institution of Building Services Engineers (CIBSE)

CIBSE Guide G Public health and plumbing engineering (2014) is in the process of revision with an estimated completion date at the of end 2023.

## Legionella Management Advisory Group (LMAG Australia)

There has been some recent changes with the Legionella Management Advisory Group. The structure of LMAG is now under the umbrella and associated with the Backflow Prevention Association of Australia. Our Secretariat is still Tracy Barkham. This has taken some time to organise and is seen as a beneficial arrangement for both parties and immediately provides

LMAG with a broader national exposure. We are planning a soft relaunch for early 2023 and to that end we would be looking to promote our affiliation with the WMSoc.

## Water Regs UK

Water Regs UK is pleased to announce the launch of new online guidance (<https://www.waterregsuk.co.uk/guidance/>) to replace its technical enquiry service. This informative guidance has been created to help people find answers to some of the most commonly asked questions about the Water Supply (Water Fittings) Regulations and Byelaws.

This information has been developed in collaboration with water companies

and is intended for general guidance purposes only. It now includes some 3D diagrams which can be rotated or zoomed giving a better understanding of what is required, and downloadable printable versions for ease of use.

As the technical enquiry service has been replaced with online guidance, Water Regs UK will no longer respond to these enquiries.

## Closed Systems Control Association (CSCA)

CSCA's Annual General Meeting will be held remotely on 6 June 2023 at 9.30am. The new CSCA website is now live and a face to face event is planned for Summer 2023. CSCA are actively seeking registration applications from pre-commission & remedial and/or maintenance water treatment service providers who agree to work to the standards published by the CSCA and

whose processes are audited by the CSCA. If you are interested in joining, please contact us. Sponsor and Foundation membership is also available for companies who actively support a sound approach to the control of water quality in closed systems. [www.cscassociation.org.uk](http://www.cscassociation.org.uk) Tel: 01827 219508

# CONTRACTS, PRODUCTS & PUBLICATIONS

The information and advertising of products and services in this section and throughout this publication is not necessarily endorsed by the editors or the Water Management Society, who accept no responsibility for the accuracy of information in contributing articles.



## Water Company fines to be channelled into environmental improvements – Gov.UK Press Release

Money from fines handed out to water companies that pollute our rivers and seas will be re-invested in schemes that benefit our natural environment, under new government plans. Water companies were handed a record amount in fines for pollution incidents in 2021 as part of ongoing action to hold rule-breakers to account.

Since 2015, the Environment Agency has concluded 56 prosecutions against water and sewerage companies, securing fines of over £141m.

At present, money from fines imposed by Ofwat and those arising from Environment Agency prosecutions is returned to the Treasury. Under the new plans, ring-fenced funds will go to Defra and will be invested directly back into environmental and water quality improvement projects. This could include initiatives to restore our water environments by creating wetlands, re-vegetating river banks and reconnecting meanders to the main channel of rivers.

Chancellor of the Exchequer, Jeremy Hunt said: “These fines hold rule-breaking companies to account and mean record investment in our waterways. It comes on top of our requirement for water companies to invest in the natural environment – raising the largest ever environmental infrastructure investment of £56 billion over 25 years.”

To crack down on water pollution, government has boosted funding for the Environment Agency, with £2.2 million per year specifically for water company enforcement activity, including at least 4,000 farm visits per year and 500 sewerage inspections.

Where water and sewerage companies are found to be breaking the law, they will face substantial penalties. This can include the Environment Agency imposing civil sanctions or pursuing criminal prosecutions with the courts, for which there can be unlimited fines, and in some cases prosecution of CEOs and company directors where there is evidence against those individuals and where it is in the public interest to prosecute.

*Further details on the plans will follow next year. The full Press Release is available at: <https://www.gov.uk/government/news/water-company-fines-to-be-channelled-into-environmental-improvements>*

## Fully-managed fixed network leakage service launched by Ovarro – Press Release

A new end-to-end leakage reduction service has been launched by Ovarro, as the water sector moves forward with wider implementation of as-a-service models to improve efficiency. LeakNavigator is the UK’s first fully-managed, fixed network leakage service. The leak-locating model comprises advanced acoustic data loggers, cutting-edge cloud-based software and Ovarro’s inhouse leakage expertise. With all elements combined, the service can accurately identify points of interest (POIs) on behalf of water companies, alerting field technicians directly, so they can head straight to site with high confidence that a leak will be found, thereby reducing the need for inhouse data analysis. LeakNavigator has undergone successful trials with UK water companies, recording a combined performance increase of 20-25% in total leaks found, plus a 30% reduction in lost field time through false positives and a POI-to-leak conversion rate of over 85%.

As-a-service models are subscription-based applications, with infrastructure that is entirely managed and maintained by an external supplier. These services allow companies to focus on their core responsibility of water system management and leave the data analysis to external specialists.

Matthew Hawkridge, chief technology officer, Ovarro, said: “Regulators and customers are continuing to push water companies to cut leakage and their expectations will only increase. While acoustic fixed networks – which are permanently in place to pinpoint leaks by monitoring the sound of water escaping from pipes – are bringing major improvements, the sector has at times struggled with the correct placement of acoustic loggers.

Ben Crabtree, Ovarro product line director for analytics, continues, “LeakNavigator solves this challenge by taking complete ownership of the data analysis and leak detection process, working in collaboration with water companies, with results-driven accountability.

The LeakNavigator package uses acoustic loggers from the cutting-edge Enigma range, which are installed following an assessment of a water company’s district metered area (DMA), undertaken by Ovarro’s leakage analysts. This process establishes the most suitable equipment to install, the unit numbers required and the best locations for optimum efficiency. The service can also apply to existing Enigma logger fleets already installed. Once the loggers are in operation, Ovarro’s teams undertake ongoing data analysis, sending POIs directly to water company field technicians via a mobile app. The captured data, which also supports maintenance targeting, is processed and presented to customers in a dashboard.

Smart approaches to leakage detection are expected by regulator Ofwat, which said in its price review 24 (PR24) final methodology, published 13 December 2022: “Innovation will be key. On leakage, for example, companies will be rewarded if they can set and deliver aggressive reductions. We expect companies to embrace the opportunities to improve performance through smart technology and better use of data.”

Ovarro is a global operating company that works with customers across water, oil & gas, broadcast and transportation to help monitor, control and manage their assets.

*More information is available at: [www.ovarro.com/leaknavigator](http://www.ovarro.com/leaknavigator)*



### Increased fishing opportunities worth £750 million agreed for 2023 – Gov.UK Press Release

The UK fishing industry will benefit from 140,000 tonnes of fishing opportunities worth over £280 million in 2023 after the UK today (20 December 2022) reached an agreement with the EU. This brings the total value of fishing opportunities secured for the UK fleet in 2023 in the three main negotiation forums to £750 million, a £34 million increase from last year.

In the third year of annual fisheries negotiations with the UK operating as an independent coastal state, the UK and EU agreed catch levels for 69 important fish stocks. This included some of the most commercially valuable stocks to the UK fishing industry such as North Sea Nephrops (£54m), Anglerfish (£31m) and Western hake (£25m). Throughout the negotiations, the UK Government has worked closely with the devolved administrations to ensure fishing communities across the UK will benefit from the agreement. The Scottish industry, for example, will benefit from improved catch levels for North Sea stocks including cod, hake, whiting and nephrops.

The agreement also commits the UK and EU to work together to provide more sustainable fisheries management.

Fisheries Minister Mark Spencer said: "Our agreement with the EU secures valuable fishing opportunities for the UK fishing industry while cementing our joint commitment to manage fisheries sustainably. These decisions are based on the latest scientific advice to help protect key fish stocks with the long-term health of the marine environment at the forefront of our minds. We are backing the fishing industry across the country to succeed, with a landmark £100m investment in infrastructure, skills and better scientific data so that our fishing industry thrives for generations to come."

This latest deal follows an agreement with the UK, EU and Norway on six North Sea fish stocks including cod, haddock and herring worth £202m to the UK fishing industry, and a further £11 million in stocks in other waters around the UK.

In the same week, the UK secured catch limits worth a further £256m with the North East Atlantic coastal States, while an agreement with Norway last month will see the UK fishing industry benefit from fishing opportunities worth £5 million in 2023.

Sustainability has been at the heart of the UK's approach to all the negotiations to ensure key fish stocks are protected and to support the long-term viability of the UK fishing industry. Wherever possible, catch levels have been set in line with, or lower than, the level advised by scientists at the International Council for the Exploration of the Sea (ICES), and there is an estimated 13% increase in catch levels that align with ICES advice compared to last year.

To view or download this press release in full visit: <https://www.gov.uk/government/news/increased-fishing-opportunities-worth-750-million-agreed-for-2023>

### InfoTiles selected to trial technology in Switzerland – Press Release

Digital technology company InfoTiles has won the opportunity to demonstrate its water management platform with a municipality in western Switzerland.

The BlueArk Challenge is a call for projects that aim to solve water management challenges using open innovation ideas and technologies. The InfoTiles software will be developed and implemented in collaboration with Fully, a municipality in the canton of Valais, and BlueArk Challenge, with the aim of rapidly developing scalable applications. InfoTiles will provide water managers in Fully with continual monitoring of the wastewater network via sensors located in key locations to help identify and remediate stormwater inflow and groundwater infiltration (I&I) into sewerage infrastructure.

As well as being awarded €10,000 for technology development, BlueArk Challenge will provide InfoTiles with solution monitoring, infrastructure test sites, validation reporting and on-going support. If successful, the InfoTiles platform will also be marketed in Switzerland through the collaboration. InfoTiles' digital technology helps municipalities detect and understand when and where I&I occurs in wastewater networks. Inflow is stormwater that flows into wastewater pipes through faults such as holes, cracks, joint failures, and broken connections. Infiltration occurs when groundwater enters the wastewater network through faults in pipes, compounding the flow.

It is widely acknowledged that most I&I is caused by ageing infrastructure that requires maintenance or replacement. When this extra water penetrates the wastewater network, it can cause hydraulic overload which is a particular risk during periods of heavy rain or storm events and can add considerable cost to municipalities in pumping, treating, and discharging processes.

InfoTiles' digital software platform uses artificial intelligence (AI), including machine learning, to consolidate and analyse data. It also uses data from existing SCADA control systems and geographic information systems (GIS) to integrate real-time hydrological, meteorological, and asset data. This enables proactive and intelligent management of water inflow and infiltration into the sewers. Nine water resource management challenges were proposed by the five Swiss municipalities taking part in the BlueArk Challenge. Four solutions were identified with InfoTiles, which is based in Stravangar, Norway, the only one from outside Switzerland.

BlueArk Challenge is an initiative of BlueArk Entremont, a technological innovation centre with a data laboratory, based in Le Châble, Switzerland. Founded in 2018, the hub specialises in the management of natural resources, with a particular focus on smart management and the digitalisation of water. Winners were announced at the Smart Water 2022 conference.

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### UV treatment selected for care home wastewater – Press Release

Technology from water recycling specialist WCS Environmental Engineering (WCSEE) has been selected by a care home in Cornwall to provide onsite wastewater treatment in an environmentally sensitive location. Trevaylor Manor specialises in dementia care and is situated in the picturesque village of Gulval, two miles from the town of Penzance. As it is not connected to the public sewer, the property is served by an onsite wastewater treatment plant.

With the existing system coming to the end of its operational life, the soakaway it had historically discharged to was no longer deemed suitable. A new point of discharge, to a nearby brook, meant more stringent Environment Agency permit conditions were stipulated, requiring enhanced levels of effluent treatment.

After close liaison with installer Jones Drainage & Groundworks and WCSEE, the care home's owner, private care provider Swallowcourt, opted to replace the plant and add a tertiary stage of ultraviolet (UV) treatment. WCSEE has designed a custom onsite solution comprising a below-ground HiPAF® - high performance aerated filter - treatment plant and UV disinfection system with a capacity of approximately 300 population equivalent (PE).

Ultraviolet light destroys microorganisms and reduces dissolved organic material, which can impact the quality of watercourses. It is considered one of the safest methods of disinfection, as it does not require use of chemicals. A configuration of UV bulbs in a below-ground chamber, UV units connect to the outlet of the treatment plant. Effluent passes around the bulbs, with the disinfection occurring when the light comes into contact with the flows. The robust technology will ensure consistent compliance with the Environment Agency's discharge permit requirements, set at 20:30:10mg/l for biological oxygen demand (BOD), suspended solids and ammonia, with UV disinfection.

WCSEE technical manager Dominic Hamblin said: "The end result will be a modern, reliable and robust system that will treat effluent to the very high standards required in this environmentally sensitive location. UV disinfection will provide maximum bacteria and virus removal rates, and therefore give the highest levels of protection to local water environments."

WCSEE's HiPAF technology is suitable for properties for 60 up to 2,000 population equivalent (PE) where mains drainage is unavailable. Modular in design, the compact units are simple to install, operate and maintain, have a small footprint and can manage variable flows and loads. The flexible technology can manage complex site situations, including where space is an issue or where ammonia removal is a requirement. Further information: [Natasha Wiseman natasha@wiseonwater.com](mailto:natasha@wiseonwater.com)



## OTT HydroMet adds Enhanced Connectivity for remote water level logger – Press Release

OTT HydroMet has added additional communication options to its water level and temperature logger, the OTT ecoLog 1000. Now equipped with low-power LTE-M (CAT M1) connectivity, the device provides water professionals with simple, fast access to their water level data.

LTE-M is a type of low-power wide area network communication technology standard for a wide range of cellular devices and services in machine (M2M) and IoT applications, such as networks of groundwater monitoring sites. LTE-M has 5G compatibility making it future proof as cellular networks evolve. Mobile devices, smart phones, and tablets operating with Android, iOS or Windows 10 are all supported. In addition, simple local communication is available via Bluetooth. By supporting 4G and cellular IoT transmission, LTE-M increases the speed and lowers the cost of data transmission, enabling users to conduct remote two-way operations such as configuration, network management, data download or the viewing of real-time data. Robust, simple to install, and running on low-power with a 10-year battery life, the ecoLog 1000 has been designed specifically for long-term, unattended deployment. Enhanced connectivity further reduces the requirement for site visits, and lowers the cost of ownership.

The OTT HydroMet Group manufactures products that enable water professionals to monitor the planet's most precious resource. Through the delivery of accurate reliable data, OTT's instruments and services provide essential tools to help protect the environment. *Further information is available at: [www.ott.com](http://www.ott.com), or contact: OTT HydroMet Ltd, Unit 19 Jessops Riverside, 800 Brightside Lane, Sheffield S9 2RX Tel. 01246 573480 - Fax. 01246 813873 Email: [uksales@otthydromet.com](mailto:uksales@otthydromet.com)*

## UK canals ready-made to meet Government's Environmental Improvement Plan

From the Canal and River Trust Website In response to today's announcement {31st January} by the government about its Environmental Improvement Plan 2023, Richard Parry, our chief executive said: "The government's announcement today that every household in England is 'to be within 15 minutes of green space or water' is welcome news. The nation's 250-year-old canal network, protected by the Canal & River Trust, is ready-made to play a vital role in providing this. Canal towpaths are already the most accessible and free space for many communities, on the doorstep of nine million people who live within a ten to fifteen-minute walk."

"A legacy from our industrial past, canals now flow as arteries of nature throughout towns and cities, often through the country's most deprived communities where health inequalities, green space deficit and lack of gardens are most pronounced. Our role is making life better by water. No other charity brings so much accessible green space on the doorstep of so many people – saving the NHS £1.1 billion per annum in preventative health by getting people active and amongst nature." "Our recent study with Kings College London showed that the real time effect of spending time on canals comes with a 6% improvement in mental wellbeing, compared to just green spaces alone."

"Canals are playing a vital role in biodiversity recovery – providing and connecting urban green spaces as well as linking urban areas with the countryside. However, the nation's Georgian-built canal network, still used by thousands of boats, is old and increasingly vulnerable to the threats of a changing climate. Our ongoing mission is protecting and enhancing the canal network for the benefit of this and future generations."

"This requires the support of all who use, donate and volunteer on our waterways. It also demands a continued commitment from government who, in the coming weeks, will make a crucial decision about the vital funding that they provide to help keep alive this unique network of canals, rivers, docks and reservoirs."

"So, whilst we welcome the government's plan for new and enlarged nature reserves, it must also, for a relatively modest continued financial commitment, continue to fund and help support nature for the millions of people who use and rely on the linear canal 'nature reserves' on their doorstep for everyday health and wellbeing."

## The Boiler Upgrade Scheme is failing to deliver, says Lords committee

The Lords Environment and Climate Change Committee has concluded from its inquiry into the Government's Boiler Upgrade Scheme that the scheme is failing to deliver on its objectives, following a disappointingly low take-up of grants.

In a letter sent to Lord Callanan, Parliamentary under Secretary of State for Energy Security and Net Zero today (Wednesday 22 February), the Committee warns that if the current take-up rate continues, only half of the allocated budget will be used to help households switch to low-carbon heating systems and a healthy market of installers and manufacturers will not be in place in time to implement low-carbon heating policy measures smoothly. Therefore, the Government's 2028 target of 600,000 installations per year is very unlikely to be met. The Committee has found: public awareness of low-carbon heating systems is very limited, and promotion of the BUS has been inadequate; there is a shortage of heat-pump installers & insufficient independent advice for homeowners; Hydrogen is not a serious option for home heating for the short to medium-term and misleading messages, including from the Government, are negatively affecting take-up of established low-carbon home heating technologies like heat pumps; upfront costs are too high for many households, even with the help of the grant, making it impossible for low-income households to benefit from the scheme; while heat pump running costs are becoming competitive with gas boilers in some modelling, progress is urgently needed through electricity market reform to ensure running costs are affordable.

The Committee is calling on the Government to: provide greater clarity to industry and consumers on feasible options for low-carbon home heating through a consistent policy framework, public communications, and household advice; roll over the remainder of the BUS first year budget into the second year and establish a review to consider extending the scheme; correct the Energy Performance Certificates (EPC) methodology so that certificates properly reward households for making the switch to low-carbon heating and flawed EPC recommendations cease being a barrier to BUS eligibility; upgrade the provision of Government advice, alongside recognising the role of independent retrofit coordinators, to help households navigate low-carbon heating installations; relax the requirement arising from Permitted Development Rights to site a heat pump a certain distance from neighbouring properties.

Baroness Parminter, Chair of the Environment and Climate Change Committee, said: "The transition to low-carbon heat is fundamental in the path to net zero, given that 17% of the UK's greenhouse gas emissions come from our homes. The Government must quickly address the barriers we have identified to a successful take-up of the Boiler Upgrade Scheme in order to help grow the take up of low-carbon heating systems. It is vital they do so if we are going to meet our Net Zero ambitions."



**DO YOU  
HAVE  
A PRESS RELEASE,  
PRODUCT  
OR SERVICE NEWS  
TO SHARE?  
SEND IN  
YOUR  
CONTRACTS,  
PRODUCTS  
& PUBLICATIONS  
NEWS TO:  
[waterline@wmsoc.org.uk](mailto:waterline@wmsoc.org.uk)**



#### Confederation of British Industry report on value of the green economy

The transition to a greener economy in the UK is worth £71bn and has brought investment and job opportunities to areas that were previously experiencing industrial decline, the Confederation of British Industry (CBI) has found.

The report, titled 'Mapping the Net Zero Economy', showed that over 20,000 businesses are currently involved in the drive towards net zero emissions. It also noted the green economy is responsible for 840,000 jobs in sectors such as renewable energy and waste management. Mapping the net zero economy, by CBI Economics and The Data City, was published on 31 January.

Researchers found that Scotland and some English regions, such as Tyneside and Merseyside, have performed better than average in the green economy, with average wages significantly higher than the national average. However, the report warned that the UK's position as a leader in green technology is at risk due to increased competition from other countries.

The passing of the Inflation Reduction Act in the US last year has changed the global dynamic for green investment, with many companies now seeing the US as the best destination for their money.

The report also criticises the lack of consistency in UK policy and restrictive planning regulations for onshore wind and solar as holding back investment from the private sector.

#### Catalan Legionellosis Study Group has budget doubled – Press Release

The Public Health Agency of Catalonia (ASPCAT) has increased the budget granted to the Legionellosis Study Group (GELeg) of the Clinical and Environmental Infectious Diseases Research Group (CEID) of the Germans Trias i Pujol Research Institute (IGTP), ratifying its confidence in the resolution of Legionella outbreaks. The increase is almost double the budget items of previous years and will expand the scope of the work carried out in the laboratory. GELEG was formed in 2002, when members of the Germans Trias Hospital came together to address requests for the study of Legionella strains related to clinical cases. Since then, it has given continuous support to ASPCAT, postulating it as a reference laboratory thanks to its great experience in sample processing. The main objective of GELEG is the molecular study of isolated strains, both of clinical and environmental origin, to try to clarify the environmental source of the clinical case or outbreak.

The group is attached to the Autonomous University of Barcelona (UAB) and the IGTP, where it is part of the CEID, led by Dr Maria Luisa Pedro-Botet and specialized in the study of infectious diseases such as legionellosis. Its lines of research include Legionella bacteria, but also other microorganisms and diseases: multidrug-resistant bacteria, nosocomial infection, infectious endocarditis, primary immunodeficiency, emerging infectious diseases and development of new antibacterial substances.

GELEG's contact with other institutions is constant and very important. The Epidemiological Surveillance Units process the shipment of positive clinical samples, while the Health Protection Agency and the Public Health laboratories are in charge of analysing water samples from suspected facilities and isolating environmental strains.

Looking forward, GELEG is increasing the range of clinical samples it analyses following advances in molecular studies. For example, in cases where isolation of a strain is not possible and the patient has been diagnosed with legionellosis by antigenuria techniques, the study is performed directly on a respiratory sample, such as sputum or bronchoalveolar lavage. In any case, the increase in the budget by ASPCAT reinforces the role of GELEG and will allow it to continue fighting against Legionella outbreaks.

#### VWT UK Delivers Water Treatment

##### Solution to Gin Distillery – Press Release

Veolia Water Technologies UK (VWT UK) recently supplied a water treatment solution to optimise the operational processes at a large-scale gin distillery. By adding its Hydrex™ 4301 water treatment chemical via a single dosing pump, VWT UK successfully removed excessive levels of residual free chlorine from the feedwater to improve the efficiency of the water conditioning units and prevent damage to the water softeners.

One of the oldest distilleries in the world, producing a significant percentage of the UK's gin, the company uses a set of water conditioning units to process approximately 30m<sup>3</sup>/hr of raw water. However, since moving location, the distillery suffered from an uncontrolled deterioration of the ion exchange resin beds inside these units. While this issue did not affect product quality from the site, it resulted in increased CAPEX to maintain the required levels of gin production. This was due to excessive levels of residual free chlorine, approximately 0.89 mg/l, in the facility's feedwater.

The distillery decided to work with a water treatment specialist that could help to reduce the presence of residual free chlorine in the feedwater to approximately 0.2 mg/l, a level that would not damage the distillery's water softeners. It was also crucial that the solution was installed efficiently to resolve the issues as quickly as possible.

Following a competitive bid, the company selected water treatment specialist VWT UK. VWT UK had previously carried out periodic servicing of the distillery's water softeners and reverse osmosis (RO) systems, so the two companies had a good rapport. To effectively treat the residual free chlorine for removal from the facility's feedwater, VWT UK supplied its Hydrex™ 4301 – a water treatment chemical that is specifically formulated for RO systems with polyamide membranes that can be affected by chlorine.

As it was vital that the issue could be resolved with minimal operator input, VWT UK installed a single dosing pump with flexible dosing pipework and an intermediate bulk container (IBC) bundstand. The dosing pump was then connected via a 110v lead and socket to transmit a signal to stop and start dosing depending upon whether the water feed pump was active. This ensured that the Hydrex™ 4301 chemical was only dosed when required. Thanks to the water treatment solution, the distillery has now been able to reduce the level of residual free chlorine in its feedwater to <0.2 mg/l and prolong the life of the components in the water softeners. This eliminated the need to bring in demineralised water with the use of road tankers, a process that had been required when the resin beds had failed previously. The company has also been able to accurately baseline its facility output and plan its day-to-day operations more effectively, resulting in reduced unplanned spend and CAPEX while maintaining the same levels of gin production.

For more information on Veolia Water Technologies UK and its range of solutions, including its range of Hydrex™ water treatment chemicals, visit:

[www.veoliawatertechnologies.co.uk](http://www.veoliawatertechnologies.co.uk)





**Northern Ireland Water adopts Satellite Leak Detection Technology – Press Release**

Northern Ireland Water is reaching for the stars by using leading-edge satellite leak detection technology in its aim to cut leakage to sustainable levels. SUEZ Smart & Environmental Solutions and technology partner, ASTERRA UK, have been appointed to supply ASTERRA Recover satellite leak detection services to Northern Ireland Water Ltd.

The contract, worth £2 million over four years, follows successful trials in the region. Over the past few years Northern Ireland Water has made progress in reducing leakage, but is committed to doing more. In PC21, the Northern Ireland Utility Regulator has set a target of 150 MI/d by March 2027.

The reductions in the level of leakage use satellite-mounted SAR technology to locate water leaking from underground pipes so that repairs can be planned and expedited in a more efficient way. With Recover, entire drinking water systems can be analysed instantaneously. Even leaks that are non-surfacing or have left no surface evidence at all can be located.

Satellite leak detection represents the most significant advance in water leak detection in 80 years, being recognised as such by winning both an American Water Works Association Innovation award and a Japan Water Works award in 2021. Using algorithms that have been fine-tuned to recognise the signatures of water leaking from different systems, Recover locates points of interest, which are provided as GIS (geographic information system) data files; these files are overlaid with the pipe layer from the system owner to create a 'highlighted pipe' image. Compared to traditional leak detection services and methods, satellite-based leak detection technology not only identifies more leaks per day, it increases field crew efficiency by more than 300%.

"NI Water is very much committed to reducing leakage. We will benefit from this step-change in approach as the situation is becoming increasingly more challenging and the influence of abnormal and severe weather is significant," stated Stephen Havern, NI Water Networks Area Manager.

"ASTERRA's innovative satellite leak detection technology can penetrate below the ground surface and will allow the field crews to significantly cut their search time for leaks. This will be a game changer for NI Water," remarked Steve Baker, Managing Director of ASTERRA UK.

Nick Haskins, Business Development Manager at SUEZ, said: "We are delighted to have been awarded this contract and very much look forward to working together with Northern Ireland Water. The agreement reflects the needs of our changing world – providing a smart and environmental solution to the challenge of finding leaks."

Further information: [charlotte.thursz@suez.com](mailto:charlotte.thursz@suez.com)

**Thames Water to spend a record £1.6 billion over the next two years on upgrading sewage treatment works and sewers**

The chief executive of Britain's largest water company has said she is "heartbroken" by the impact of sewage spills. Announcing plans to spend a record £1.6 billion over the next two years on upgrading sewage treatment works and sewers, the chief executive of Thames Water, Sarah Bentley, said levels of pollution in rivers today were the result of "decades of underinvestment".

She said: "We are absolutely ramping up. I've been the first to say Thames Water's performance has not been acceptable. Sewage discharges are unacceptable. We need to make the investment."

Last month Thames Water released a near-live map of storm overflow spills, becoming the first company to do so before it becomes a legal obligation in 2025. It shows that Hardwick Brook, a small stream in Oxfordshire, was polluted by sewage spilt for thousands of minutes in one week, making it the worst in Thames Water's area.

England and Wales water regulator Ofwat and Britain's Environment Agency are investigating several water companies that admitted they might be illegally discharging sewage.

Thames Water's planned investment, starting in April, includes 1.12 billion pounds to upgrade its wastewater treatment plants and sewerage networks, the company, one of the UK's biggest water and wastewater services providers, said on 27th February.

"We are committed to tackling this problem," said Chief Executive Sarah Bentley. "However, there are no quick fixes."

Last year Ofwat served formal notices to Thames Water and others over concerns about the firm's responses to its queries on their sewage treatment operations. British water treatment facilities temporarily discharge raw sewage into seas and rivers if they are inundated by heavy rainfall and risk flooding, but the government in 2021 put legal controls on the amount of wastewater companies could dump.

W.B. 20th February the country's Environment Secretary Therese Coffey demanded water companies share their plans to improve their water infrastructure and said they will face higher penalties for breaches that are quicker and easier to enforce.

Thames Water, which provides services to 15 million customers across London, the Thames Valley and surrounding areas, said it was committed to reduce its yearly discharges by 50% by 2030.



**Nijhuis Saur Industries acquires Suez Industrial Water Ltd. – Press Release**

Nijhuis Saur Industries is pleased to announce that it has finalized the acquisition of Suez Industrial Water Ltd following the approval of the CMA, the Competition & Markets Authority in the UK. Suez Industrial Water Ltd will now join our already well-established team in the UK.

With vast experience and a diverse portfolio of leading industrial clients, the Suez Industrial Water team is a welcome addition to Nijhuis Saur Industries' rapidly growing solutions offering in the UK & Eire and an important expansion of the group's O&M activities. The Nijhuis Saur Operations & Maintenance team will offer both long-term O&M contracts and short-term asset care services supported by expert guidance and laboratory capacity and capabilities.

Nijhuis Saur Industries O&M customers will also have access to the game-changing technology portfolio of (waste)water treatment, biogas, energy and resource recovery solutions and added value services to help their industrial customers to meet the ever-demanding requirements to reduce their water, energy and CO2 footprint, contribute to their Net Zero targets and a more sustainable and resilient future.

Ian Stentford, Managing Director of Nijhuis Saur Industries UK & Eire: "We are really excited to welcome our new colleagues of Suez Industrial Water Ltd to the Nijhuis Saur Industries UK team. We believe our Customer for Life philosophy differentiates us and augmenting our already strong Service teams with the market leader in Industrial Operations & Maintenance completes our strategy to deliver integrated solutions to our rapidly expanding clientele."

Jason Smith, Managing Director of Suez Industrial Water Ltd: "We are delighted to be joining Nijhuis Saur Industries, our business is recognized as the UK leader for industrial water services and we have been providing our valued industrial end-users with successful water services for many years. At the heart of everything we do is always: safety, quality, reliability and efficiency. By joining Nijhuis Saur Industries our customers will be further enhanced and contribute to Saur's #MissionWater."

Nijhuis Saur Industries provides solid and adaptive solutions for sustainable and resilient water use, energy and resource recovery for Light and Heavy Industries, Utilities, and Commercial Buildings around the world.

For more information, please visit: <http://www.nijhuissaurindustries.com>

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### Aquacycl's modular technology helps clean up contaminated water before it flows down the drain

In a shipping container next to a PepsiCo bottling plant in Fresno, California, a startup called Aquacycl is working with the food giant to pioneer new technology that can help tackle one of the lesser-known sources of climate emissions: cleaning up industrial wastewater. "Globally, water and wastewater treatment accounts for more greenhouse gas emissions than the entire shipping industry," says Orianna Bretschger, Aquacycl's CEO. Most of those emissions come from the energy used to run large wastewater treatment plants, where building-sized tanks process dirty water. The traditional system also generates sludge that often ends in landfills.

Aquacycl's modular technology helps clean up contaminated water before it flows down the drain. In some cases, it can also be reused onsite after it is cleaned. Inside the shipping container, hundreds of microbial fuel cells, each roughly the size of a car battery, use natural, locally-sourced bacteria to break down contaminants. The system can be sized up or down depending on the volume of wastewater, with the fuel cells attached together like Legos. Aquacycl's system is also designed to make the microbes work quickly. "We basically are giving the bacteria a nonstop treadmill," she says. "That's enabling us to provide treatments in a small footprint very efficiently, because we can do in hours what a conventional technology takes days to do." For wastewater with very concentrated contaminants, like the sodas coming out of bottling plant, the process doesn't fully clean the water. But when it's sent to a wastewater treatment plant, it's so much cleaner that it can reduce greenhouse gas emissions by 90%.

On average, the system at the Pepsi plant is eliminating 110 tons of greenhouse gas emissions per month. It also saves the company money because its bills from the utility have dropped. Pepsi pays Aquacycl a smaller service fee.

*Information source:*

<https://www.fastcompany.com/90812005/this-startup-uses-microbial-fuel-cells-to-clean-up-wastewater>

### Celebrating 2,000 miles of national treasures at Crick Boat Show

From the Canal and River Trust website:

We will be celebrating the 2,000 miles of national treasures in our care at this year's Crick Boat Show, 27-29 May 2023. Now Britain's biggest inland waterways event, the Show takes place at Crick Marina, near Daventry in Northamptonshire, with an exclusive Trade & Preview Day on Friday 26 May.

Matthew Symonds, our national boating manager, explains: "Canal & River Trust cares for and brings to life 2,000 miles of canals and rivers across England & Wales. Our ongoing mission is to protect and preserve this oldest working heritage network in the world and make it available for people to use and enjoy. Still used and navigated by boats as it was hundreds of years ago, these unique places are available and on the doorstep for millions of us to use and enjoy for our health and wellbeing. At this year's Crick Boat Show, we'll be hosting a 'national treasures' exhibition in our Canal & River Trust Marquee, shining a light on the historic and much-loved treasures in our care, including 2,707 listed structures, 1,000 wildlife conservation sites and 446 miles of Green Flag status waterways."

"Visitors to our Marquee can find out about the recreation, health and wellbeing opportunities available to them on their local waterways, and how they can help us to #ActNowForCanals to ensure our 2,000 miles of national treasures are secured for the benefit of this and future generations."

Crick Boat Show is organised by Waterways World in association with the Canal & River Trust and Crick Waterside and Marina, and is expected to attract over 26,000 visitors. As well as being the canal world's biggest marketplace, showcasing the inland waterways industry with over 200 exhibitors, Crick Boat Show offers a fantastic day out with more than 30 new boats to view, plus used boats, free boat trips, free advice seminars on boat ownership, technical masterclasses, live music, children's activities, a real ale marquee, and a wide range of food and drink stalls.

*For more information and to book tickets, camping pitches and moorings, visit:*

[www.crickboatshow.com](http://www.crickboatshow.com) or call 01283 742970, Monday to Friday 9am to 3pm.

### Orbis announces new US channel partner – Press Release

Smart monitoring company Orbis Intelligent Systems has announced a new distributor. AV Water Technologies (AVWT) is a distributor of advanced systems to the water utility market, providing innovative and smart technologies. The company will be supplying the Orbis SmartCap in Southern and Central US, covering Texas, Oklahoma, Kansas, Missouri, and Arkansas.

The SmartCap is an intelligent fire hydrant and pipe monitoring device that enables remote leak detection by providing real-time data from a multi-sensor. In early 2022, the device helped a Southeastern water utility find a leak that had been running for 15 months. The SmartCap pinpointed the leak within three days of deployment, bringing significant water and cost savings.

Ross Thomson, AV Water Technologies president, said: "As a distributor of advanced water technologies, AV Water Technologies is pleased to be working in partnership with Orbis Intelligent Systems to provide the innovative SmartCap to water utilities. The partnership will help water providers across the Southern and Central US quickly pinpoint leaks on their networks, reducing non-revenue water loss and saving precious supplies."

Lou Rossetti, Orbis senior vice president of sales, North America, said: "Orbis's new partnership with AV Water Technologies is fantastic news for both companies, as well as for water utilities in Southern and Central US. We are very much aligned in our mission to deliver smart water technologies. The wider distribution of our SmartCap will create great value for both businesses and support municipalities in their critical role of delivering safe and reliable water services."

Orbis Intelligent Systems is committed to delivering smart technologies that support utilities and municipalities in delivering safe and reliable water services. Its technologies create real-time data on pipeline infrastructure, providing vital insights into how to optimise water networks for maximum efficiency.

*Press enquiries to: Leilah Nicola, WiseOnWater*

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*T: +44 (0)7464 262555*

*Issued on behalf of: Lou Rossetti- Sr VP of Sales, North America, [lrossetti@orbis-sys.com](mailto:lrossetti@orbis-sys.com).*



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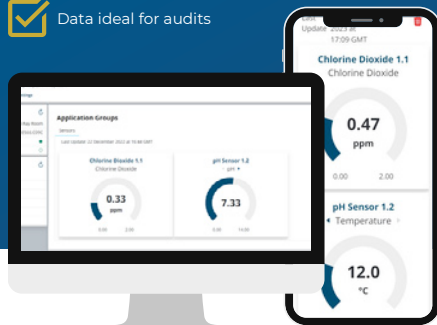
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# TECHNICAL Q&A

## SENT INTO WMSoc. TECHNICAL:

I note that in HSG274 Part 2 there is mention that water softening increases corrosiveness of the system however I am not sure how this would be the case for cation-exchange softened water as generally speaking water fed through a cation-exchange system, does not significantly change any of the parameters that may increase corrosiveness such as TDS/conductivity, pH, temperature, chloride level, sulphate level etc. I appreciate that indeed naturally soft water is corrosive due to its normally low TDS and pH, but I wonder if this is where an erroneous placement of "naturally" soft and cation-exchange soft have been lumped in the same category and published within the HSG? Is there any view of this from the WMSoc?

I ask, as a client is currently blending their soft water supply to their evaporative condensers due to the presence of galvanised steel heat exchange pipework, and I am noticing a lot more scale deposition due to this blending. The corrosion before this blending was minimal (a few specks in the corners of the steel tubing bundles). I am worried that the scale as a result of the blending would be causing more issues than it is worth, especially if the risk of corrosion from cation-exchange softened water services is low.

Q:

A:

## ANSWERED BY THE WMSoc. TECHNICAL COMMITTEE

There are two aspects why the softened water is corrosive.

1<sup>st</sup> is down to any water without any hardness is corrosive, having a small amount of hardness puts down a protective layer of calcium carbonate (cathodic film) which is worn away and replaced on a consistent cycle, water without hardness will not form a cathodic film and therefore is corrosive.

2<sup>nd</sup> depending on the skin temperature of the condenser tubes, it is possible to produce carbonic acid from the sodium bicarbonate content of the softened water. Soft water with high bicarbonate alkalinity stimulates tuberculation.

Blending the water is also beneficial as many common inhibitors require the presence of calcium to form a calcium complex. Poor control of the blending can often be the root cause of problems.

Depending on how the softened water is blended and how the Evaporative condenser fills with the water, will depend on how much hardness is blended.

If there is just a bypass valve cracked open and the evaporative condenser has a simple ball float valve fitted, at high flow you will get the blended water, at low flow or trickle flow from the ball float valve the water will go through the route of least resistance and most if not all of the hard water will go through the bypass. If blending water, a level control system should be installed to allow full flow and consistent blending.

The question refers to deposition on galvanised steel heat exchange pipework in an evaporative condenser. The suppliers of cooling towers commonly stipulate water quality criteria often with minimum hardness levels especially for systems with galvanised components. Galvanised steel is prone to a type of corrosion known as white rust, commonly mistaken for scale deposition on condenser tubes. The causes of white rust include the use of soft water explaining why the suppliers recommend that fully softened water is not used.

## DO YOU HAVE A QUESTION FOR OUR TECHNICAL COMMITTEE?

Send in your question via email to: [admin@wmsoc.org.uk](mailto:admin@wmsoc.org.uk)

# Clinical Mobile Fleet – an assessor’s thoughts on how to approach a legionella risk assessment

By Tomek Olesinski, Director of TWO Facilities Management Ltd ([www.twofm.co.uk](http://www.twofm.co.uk))

It is my professional opinion that water quality and water management practices in medical settings should be viewed as an integral part of the clinical services being delivered to sustain the best and safest working environments.

This may be even more relevant when clinical services are delivered on mobile units (trailers). They come in different sizes with different fit outs depending on what type of clinics they deliver. The usual term to describe it is ‘modalities’.

Such has been my understanding while working as an assessor in a number of clinical diagnostic mobile units that deliver services such as PET CT, MRI, CT, Breast Clinics, Cardiac, DEXA and Endoscopy (hence the term ‘modalities’).

Whatever type of diagnostic service takes place on a unit, it must be supported by all other M&E services including the water supply to ensure the clinical services are safe and excellent. Why? Because ‘you are worth it’? By ‘you’ I mean the patient. One day it could be you undergoing the examination.

### Their complexity, design and unorthodox working routines

In order to sustain the correct and site-specific controlling measures on clinical mobile units, I have learned that, aside from any obvious and potential water-related risk factors, there may be other areas stemming from the type and complexity of the cold-water supply and the water infrastructure itself on board the units.

Some may be simple (one hand wash unit) but this may not always equate to the risk of proliferation of bacteria being equally low because ‘there is only one hand wash unit’. I recall identifying various pathogenic presences on mobile diagnostic units fitted with only one POU.

On the other hand, there may be more sophisticated/modern trailers with kitchenettes, shower rooms and WCs present not to mention the CAL, CWST, break tank and a waste tank.



It has become clear to me that risks of inoculation with what we regard as water-borne bacteria like Legionella or Pseudomonas may be heightened on mobile units compared with other clinical settings due to their ‘unorthodox’ working routines.

This often involves connecting and disconnecting the water supply to the trailer due to it visiting different sites, and using different water sources as per the locations of the units.

Sometimes water is stored on board of the units, use of the cold-water supply mediums and their considering condition (often long flexible uninsulated hoses).

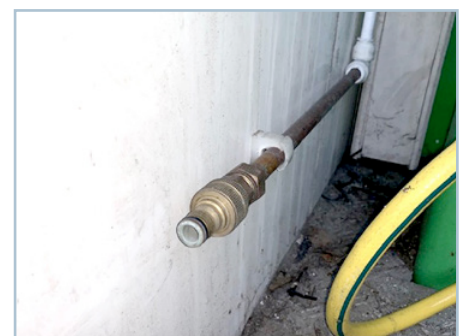
**Legionella Risk Assessment for the water installation, I believe should therefore be viewed as part of the ongoing management system and not just as a one-off exercise which some may view it as a ‘tick box’ exercise to be carried out in the O&M folder.**

It would also be prudent to mention that the commissioning and decommissioning process of the units, usually carried out by the drivers, may be another area where the risk assessor should focus his/her attention.

Water systems, dare I say all water systems, may be susceptible to contamination with Legionella and Pseudomonas via the water supply or dust entering the system (BS 8580-1:2019). This is particularly relevant

in mobile clinical units which take the water supply from different sources on a regular basis.

Also, plenty of dust can indeed find its way through uncapped cold-water supply flexible hoses and connectors if they are not properly secured for transport and also while the units are parked up when not delivering clinical services. It’s been my experience to see external connectors being uncapped which makes them prone to being penetrated by dust and debris from the road while on route.





We should also mention insects which can get into the pipe work.

The design and condition of storage facilities on mobile units can also add to or reduce the negative impact on the overall evaluation of risk of contamination and amplification of the pathogens.



On one occasion I noticed rabbits' droppings where the CWSTs were installed.

It was most likely due to the remote parking facility area (lots of open grass and fields around the car park) where the units had been parked. These little creatures could easily penetrate the inside of the unit's undercarriage and ultimately get into the storage bellies where the CWSTs and the pipe work were located.

The owner of the unit's surprise when we shared our observations was something which will never be forgotten. *'How about the exploded foul waste tank cap'* I added, which allowed its contents to be spread out in the belly of the unit (clinical unit that is) where there was a fresh water CWST? I needed to make the 'right person' feel a little nervous about bringing the unit's water installation to a fit for purpose condition.

#### 'Hidden' risk areas to be considered during a risk assessment survey

So, we can see that water systems that are traditionally considered as simple, low risk systems due to possibly one or two taps and one or two electric heaters can have 'hidden' risks, which may not be evident at the very first glance. The watchful eye of the assessor should pick up other 'abnormalities' and include them into the overall risk scoring matrix. That's why before entering a mobile unit,

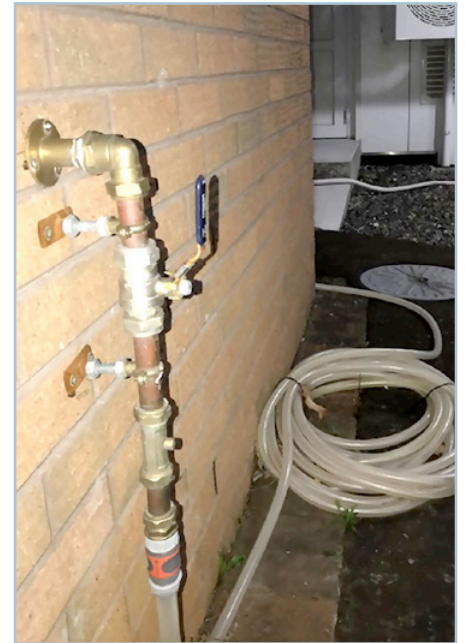
I like to do my 'walk' round it to see if anything 'interesting' could be found to improve my site survey.

These 'interesting' issues could be for example their external cold-water supply which is usually delivered to a trailer via a long flexible hose pipe. The pipe is usually connected to an external tap which I call the 'demarcation' point when discussing this part of the water installation with my clients. Why? Because this is the point at which both parties should agree where their management responsibility starts or ends. Otherwise, it could be 'fluid'.

The controlling program may already include flushing through the DWS on a regular basis as part of the clinical infection control routine, but some hoses might be unjustifiably long for the distance between the unit and the external cold-water supply point.

I recall a mobile unit parked in a hospital car park not far away from the external cold-water tap but the hose supplying the cold-water was so long that the owner of the unit ran this pipe across on top of the roof of another building (!) then alongside of the carpark to finally reach the trailer.

I estimated that in this particular instance there was more than 30 meters of a flexible hose pipe used to supply the cold-water to the trailer. The unit was located approx. 10 meters away which would mean at least 20 meters of unnecessary pipe work had been used for that purpose. No thermal insulation for the pipe work was identified on the day either.



One can only imagine the risk of water stagnation during possible periods of no draw-offs which would have led to increased cold-water temperatures due to lack of thermal protection. I do not want to comment on the suitability of such medium (flexible plastic hose) for clinical settings.



A further issue to consider is how the host's water supply is protected by the mobile unit's owner while clinical services are being delivered.

Using the appropriate method (double non-return valve) to minimise the risk of back flow will significantly reduce not only the risk of possible contamination of the host's water supply but should also aim to reduce the risk regarding the commercial relationship between the owner of the unit and the host to limit any potential dispute in relation to their water system being affected by a pathogen, allegedly brought in by the mobile unit.

My professional experience has taken me along the path when I saw such disputes between two parties.

Fortunately for my Client, we were able to evidence that same bacteria which had allegedly been brought by a diagnostic mobile unit was in fact already present in other parts of the host's establishment (hospital).

So, ensuring (not assuming!) that the Host's water supply is *always* protected with a double check valve is another example whereby the assessor should consider and suggest appropriate controlling measures.

I believe it should be highlighted in the risk assessment report as a key component of the water installation as this can save a multitude of misunderstandings and finger pointing discussions.

For this reason, the LRA should be carried out by a competent person who has had training and, if possible, experience in this kind of clinical (mobile) settings to identify such areas of potential risks.

In accordance with numerous editions of the ACoP L8 one needs to recognise that an LRA is a *live document*, not just a *one-off exercise*, and needs to be reviewed regularly, ideally in anticipation of, rather than in response to, changes.

### **LRA as part of the management processes**

The LRA is a starting point in a chain of individual management tasks which should help to identify hazards and ultimately lead to site specific recommendations on how to manage/reduce the identified risks and, if possible, eradicate them in the area of water management on mobile units.

I see it closely linked with the clinical risk assessment driven by complex Care Quality Commission (CQC) requirements (one of them being an evaluation of clinical governance).

However, the underlining motive for the LRA is not only to understand the design of the water installation but also, if not first, to identify and assess the risks from legionellosis from *work activities (...)* on premises and determine any necessary precautionary measures (as per ACoP L8 and BS 8580 – 1: 2019).

For example, how the mobile unit's water installation is prepared before being commissioned to deliver clinical services?

How the removable water delivery mediums are *stored for transit*? Are

they open to the elements and is there possible exposure to debris, impurities, dust or insects?

What is the *process of connecting* the water supply from the unit to the external cold-water point (usually external gardener's tap)?

Is the *temporary pipe work cleaned/flushed* by the operator (driver or other competent/trained person) of the unit before it is connected to the external cold-water supply?

If so, have they had suitable exposure to how and why this needs to be carried out?

What about the *design of the water installation* on board of the unit? Some of them are manufactured abroad where technical standards for water installation may be different to what is required in the UK.

What about the *use of flexible tails* as part of the DWS? Should they be replaced with copper or plastic pipes to reduce the risk of contamination and transmission due to the possibility of biofilm forming inside the flexible pipes?

If the *cold-water storage facility* is part of the DWS, is it appropriately maintained to reduce the risk of water stagnation and possible accumulation of impurities on the bottom of the tank?

What about the *process of refilling the water* in the tank? Does water come from many (perhaps unchecked) sources? How does the unit's operator ensure the water is suitable for use in the clinical environment?

What about the *waste water* discharge methods? Is it stored in a dedicated waste tank or disposed of externally?

Are there any *regular checks of water quality* in place?

Are there specific method statements for the above activities?

These, and many other questions, could form the process for the risk assessment to provide the user of the mobile unit with a more robust report with key findings and site-specific recommendations.

So, in other words, one needs to consider the work activities, the environment and the end users who work in it *before* launching into the 'traditional technical aspects' of the

design of the water installation.

How the exposure to possible water spray from a hand wash unit may affect the clinical staff and the patients if the water quality is understood to be compromised? This is a relevant issue when carrying out the evaluation of the water system design on board of the mobile units.

Ventilation also forms part of the evaluation as most of the mobile trailers do not have windows (openings) due to their characteristic design.

It needs to be remembered that some staff and visitors (patients) may be more likely to become infected than others. Possible susceptibility of such individuals should never be ignored when preparing the risk evaluation for water installation, control of legionella.

That's why, when undertaking the survey, some of the questions I ask are directed at the health conditions of the working clinical staff on those units.

One also needs to remember the maintenance/engineering operatives working on those units who might be immune suppressed. This should lead the assessor to suggest the most appropriate (not necessarily generic) controlling measures to manage the identified risks.

Such an approach sets the direction which an appraiser may wish to consider in order to suggest recommendations based on the evaluation of risks and whom they might affect and when.

And let's not forget that the LRA should be reviewed on a *regular* basis (ACoP L8) and as per HTM 04-01 (2016).

The review of all proposed controlling measures should ensure that compliance is ongoing and not notional.

**Tomek Olesinski,  
Director of  
TWO Facilities  
Management  
Ltd**





# A discussion with...

## Dr Pamela Simpson *CBiol, FRSB, FWMS, MICorr*

This month I am delighted to say we are chatting with one of the few women who has taken the decision to work in the water treatment industry. We are given a great insight into her



**Dr Pamela Simpson**

career path of over 30 years, 25 of those working for herself. Pam is well respected in the industry for her biocide, microbiological and training support.

Our first question to Dr Pam: **Describe your career journey so far.**

I am a Chartered Fellow of the Royal Society of Biology and currently Fellow and council member of the Water Management Society and the Closed Systems Control Association (CSCA). I have always been interested in Biology and studied Plant Sciences at Leeds University. It was during this time that my interest grew in the use of biocides to control marine antifouling and chose to study a PhD in Birmingham looking at the use of biocides in paint technologies. My PhD changed direction slightly and I developed a paint/biocide combination which would allow a biocide to slowly migrate to the paint film surface, offering protection for longer. I analysed test panels in hot humid environments and in particular, in the brewing industry.

Once qualified, I moved into the Biocide Industry and developed the portfolio for a new biocide and supported the Sales team globally. This was one of the highlights of my career.

I then moved on to a Speciality Chemical company and assisted customers with problem solving with biocides in both cooling towers, paper industry, paints and adhesives (to name a few). I enjoyed using my expertise to solve problems and enjoyed the challenge, especially at the time when the Industrial Water Treatment Industry workforce was predominantly male. I eventually became European Director and was responsible for the biocide sales across UK and Europe. This was a challenging role but I enjoyed it a lot.

I decided to set up a Technical Consultancy to offer my expertise to industry and established Whitewater Technologies Limited in 1998. In the latter years, I have focused more on microbial issues within both domestic water systems and closed heating and cooling systems for both healthcare new-builds and commercial premises. My recent work involved expert work for microbially-influenced corrosion (MIC) in a range of commercial and healthcare buildings of hot and cold domestic water systems and MIC in closed heating and cooling systems.

I also decided to become an approved HABC trainer for Legionella awareness courses for water treatment engineers and also a BSRIA trainer for pre-commissioning cleaning as I feel strongly about sharing my expertise with the next generation of water treatment specialists. I am author of BSRIA BG50/2021: *Water treatment for closed heating and cooling systems.*

Secondly: **Who or what had the biggest impact on your career development and why?**

Alex Milne at International Paints, he was my industrial mentor and helped me tremendously whilst I was doing my PhD. He has sadly passed away now but was very inspirational to me. He was the most knowledgeable man in his field. I felt I could ask him any question, no matter how silly I thought it was, he would reassure me and was very nurturing in the way he supported me.

Then we asked: **What advice would you give to your younger self?**

Believe in yourself. Have confidence. If you know what you want, go for it. Don't be put off or intimidated by a male dominated industry. I have overcome some serious obstacles; I look back and realise what an achievement it is to have overcome them and would encourage all young people to never give up.

Our next question: **What is your main focus at the moment and why do you see that is important?** My main focus at the moment is closed heating and cooling systems and educating people to get it right first time. When the systems become contaminated it is very expensive to put right as well as being very difficult. I am working with people in the construction industry to make sure designs are suitable and fit for purpose. I am also focussed on hot and cold

systems in hospitals. Ensuring the correct procedures and chemicals are in place in the beginning so that 10 years down the line you are not faced with a mitigation process. I am passionate about training and very involved, I feel it is paramount, if people are trained well in the first instance it saves problems in the future.

We moved on to discuss: **What are your views regarding degree vs vocational training?**

Years ago I would have said a degree is the most important but as time has gone by, I would say not necessarily. I think there should be more emphasis now on vocational training. From personal experience I feel some courses could be done vocationally but the courses have not been developed enough yet. Some degrees are actually like vocational training under the umbrella of a degree. My opinion about degrees has changed quite dramatically over the last few years. Previously, I would never have thought about anything other than a degree to gain the necessary qualification, however, things have changed since Covid. If you are going into a specialist field, training is key, so vocational training may be the way forward, as long as it is done correctly.

Then on to a lighter topic: **Do you prefer to read hard copy books and journals or are digital methods preferable?** Hard copy! I have tried to go digital, but it's not for me, I prefer to have a book or a journal in my hand.

Final question before the quickfire round: **What improvements could be made to the industry that you are allied with?** More training, understanding and definitely more females.

### Quick fire round

**Beer or wine?** Wine

**Pizza or curry?** Curry

**Cheese or dessert?** Dessert

**What's your favourite vehicle?** Mazda 2, great car, never let me down.

**What three things would you take if deserted on a tropical island?** Swiss army knife, a crate of wine and some matches as can't be doing with rubbing sticks together!

**bsi.** Updates**Working Group E/H 3/4****BS 8693 Water treatment for small volume closed systems in residential dwellings (including apartments)**

Project on hold as the document has an overlap with another standard under another committee.

**Pseudomonas Sampling – Proposal for a new British Standard**

Business case being presented to the Planning & Approval team at BSI. Working group nominations welcome.

**ISO/TC 147/SC 4 work programme**

- ISO/AWI 7014 - Water quality — Detection and quantification of SARS-CoV-2 in wastewater
- ISO/DIS 7704 - Water quality — Requirements for the performance testing of membrane filters used for direct enumeration of microorganisms by culture methods
- ISO/AWI 7899-3 - Water quality — Enumeration of intestinal enterococci — Part 3: Most probable number method
- ISO/AWI 9308-2 - Water quality — Enumeration of Escherichia coli and coliform bacteria — Part 2: Most probable number method
- ISO/NP 9308-4 - Water quality — Detection and enumeration of Escherichia coli — Part 4: Membrane filtration method for water with high levels of background bacteria
- ISO/AWI TS 12869-2 - Water quality — Detection and quantification of Legionella spp. and/or Legionella pneumophila by concentration and genic amplification by quantitative polymerase chain reaction (qPCR) — Part 2: On-site methods
- ISO/AWI 13647 - Water quality — Enumeration of culturable microorganisms — Colony count by spread plate inoculation on R2A medium
- ISO/AWI TS 16099 - Water quality — Polymerase chain reaction (PCR) for the detection and quantification of microorganisms — Quality control and validation of molecular method

**The ISO meetings will be held in Finland 17-22nd April 2023 as a hybrid event.**



**OUR AGM FOR 2023 HAS BEEN ANNOUNCED:  
Monday 11<sup>th</sup> September 2023**

**THIS AGM WILL BE DELIVERED ONLINE:  
DETAILS ON HOW YOU CAN JOIN US WILL BE ANNOUNCED IN DUE COURSE**



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## NEW WEBINAR JUST ANNOUNCED:

# The Principles of Legionella Risk Assessment in Industrial Process Water Systems

*By Colin Shekleton & hosted by Stuart Nixon  
Join us Thursday 23<sup>rd</sup> November 2023 13:00 GMT*

**FREE FOR WMSoc MEMBERS  
& AVAILABLE TO BOOK NOW:**  
<https://bit.ly/WMS-WEB-LRA-23>

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# Committee roundup – Spring 2023

## Membership Committee

The membership committee meets every 2 months to discuss new or upgraded members.

At our meeting in February there was an incredible amount of new and upgraded members to consider, in fact there was 43 in total of which 9 were female. There seems to be a rapid increase in the number of new people joining in recent times, so the committee are returning to monthly meetings and a second meeting was held in March.

The team have discussed upgrading the wording of membership categories making qualification requirements clearer and once this is finished this will be distributed out to Council for further discussion.

The team also asked the Waterline committee to publish interviews with female members which you can read on page 30.

There was a discussion around when applicants are eligible for a higher grade than requested, should this be granted? According to the CPD roadmap the upgrading process takes 2 years, however it was noted that some companies don't want to pay for a higher grade. The agreement was to award the level applied for in these instances.

All members who have not yet paid their membership invoices have been contacted, and outstanding memberships have been blocked from 1st April.

## Technical Committee

There have been 3 new documents published since the last Waterline update.

The first of 2 documents on remote temperature monitoring is available on the website for all to see. This has been produced in collaboration with the HSE and a link will be placed on their website. The document is intended to help users of systems decide if this technology is appropriate and, if it is, to make the right purchasing choices. The second document will centre on once the system is installed and will discuss data evaluation and risk management. Work has just started on this.

Guidance on scald risk assessment has also been published which is intended to help evaluate risks better and manage systems.

A toolbox talk on Rainwater Harvesting explains more about these systems and provides useful information for members and operators of systems. We are now working on toolbox talks for tank inspections and metal working fluids as well as collaborating with our partners such as CIBSE and BSI on future guidelines and updates.

So, as ever, there is a lot going on. Don't forget the members questions function on the website if we can help you with advice and guidance. As ever, we encourage members to engage with the committee so please do not hesitate to get in touch.

## Training & Accreditation Committee

Thanks to Elise Maynard for the effort and work put in during her tenure, please don't disappear!

Here is an overview of the recent transition:

Elise has steered the Training & Accreditation Committee (TAC) during a difficult period, not least this included COVID, but also David Bebbington stepping down, and introduction of new tutors to secure the future of the WMSoc training provision.

Over the years David not only developed a number of the courses, but also was involved in delivering a great many of them too. When David became unable to continue this led to significant challenges, and I would like to thank all those who stepped up to fill the void left by David.

As the WMSoc has grown over recent years, there has rightly been focus on training. The training that is delivered by the

WMSoc, I would argue sits alongside the Waterline, the Events and the work that the Technical Committee do as a primary benefit of membership of the WMSoc. Therefore it was only right and proper that with the likes of David, unfortunately, being unable to continue that a new approach was needed.

Filling David's shoes was always going to be a challenge, and the size and continued growth of the WMSoc also demanded that the future of the delivery of the training provision be considered. It was with that in mind that Elise looked to engage with more individuals to deliver training on behalf of the WMSoc and put in place a back-up plan such that in the event that a tutor cannot deliver a course, a back-up tutor could be engaged and deliver the course to the required standard.

This also meant putting in place a more robust competence check of sorts for tutors such that the WMSoc has options on tutors who are available. In doing so, this does mean, that while we now have a wider "bank" of tutors, the training is spread across more individuals. This does of course mean that the number of courses delivered by individuals has changed. This was a necessary change such that the WMSoc training is more robust moving forward.

But this also means that, in the future, the WMSoc is better placed to explore the possibility of delivering more courses (possibly covering more subjects, or more "levels" of subjects). Of course this cannot be done without establishing there is a suitable market for this additional training and to ensure the WMSoc Council backs this proposed future expansion. And this will take some time.

The progress made so far is immense, but we are excited with the continued development of WMSoc training for the future.

## Waterline Committee

Welcome to your Spring 2023 edition of Waterline from Pamela Simpson. We have come through an interesting Winter with extreme temperature fluctuations at a time when an energy crisis was in place. I hope we have seen the back of the cold weather (or is that speaking too soon!) and we are moving into Spring and I always feel relieved when the first snowdrops start to bloom. Summer is on its way.

Thanks to Ian Penney for being my Co-Chair whilst I became more familiar with what was expected of me. I look forward to the role of Chair but it's a team effort and the Committee work hard to make sure we offer you a fantastic Waterline Journal. So what's new? We are holding a "Grime Scene" competition and we want our Members to send in the best "worst photographs" of taps, showers, tanks, pipes etc and these will be published in each of the Journals over 2023. At the end of the year, we will ask all Members to cast their vote for the best "worst photograph" and the winner will be sent a voucher, so happy clicking and keep them coming.

We have included a short article celebrating International Womens Day and compared Global Statistics to Women on the WMSoc Committee. Interestingly these both show 30% women represented in the workplace. We would like to see more women entering the industrial water industry and would love to have more on the Water Management Committees. Do get in touch if you would like to be involved, we would love to have you.

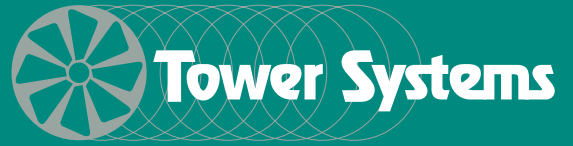
Please remember we are always on the look out for new articles or case studies to publish and if anyone wishes to be Guest Editor please get in touch with the Waterline administration team on [waterline@wmsoc.org.uk](mailto:waterline@wmsoc.org.uk). Your points of view matter and we look forward to hearing from you.

And finally, we are looking to contact all Members to see if they would prefer to receive the Waterline Journal electronically or whether they wish to continue receiving it as a paper copy. WMSoc will be getting in touch soon.



# The Cooling Tower Specialists

Stay cool, we're on top of it.



## What we do: Products and Services

### New Equipment/Turnkey Installation Solution

**The Cooling Tower Specialists**

**New Equipment/Turnkey installation solutions**

Tower Systems offer complete and professional design for the most technical cooling tower specialist requirements.

Tower Systems can supply and install replacement cooling towers in a range of applications and capacities. Whether you require a replacement cooling tower for an existing plant or a new cooling tower for a new plant, we can provide a complete solution.

With our fully experienced personnel we can offer a combination of quality in equipment and service to ensure your cooling tower is the most reliable and efficient cooling tower available.

The full turnkey installation of a cooling tower solution is available on an O&M (O&M) contract.

### Removable Crossflow Fill Pack Solution

**The Cooling Tower Specialists**

**Crossflow Cooling Tower? You need a removable fill pack solution.**

Removable fill packs are the most efficient and reliable solution for crossflow cooling towers. They are designed to be removed and replaced without the need for a full tower shutdown.

The benefits of a removable fill pack solution are:

- Easy to install and remove
- No need for a full tower shutdown
- No need for a full tower replacement
- No need for a full tower replacement
- No need for a full tower replacement
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- No need for a full tower replacement

Evaporative Cooling Equipment Specialist Maintenance Repair & Renewal

### High Efficiency Drift Eliminators

**The Cooling Tower Specialists**

**High Efficiency Drift Eliminators**

Drift eliminators are designed to reduce the amount of water droplets that are carried out of the cooling tower. This helps to reduce the amount of water that is lost to the atmosphere.

The benefits of a high efficiency drift eliminator are:

- Reduces water loss
- Reduces energy consumption
- Reduces the amount of water that is lost to the atmosphere
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Evaporative Cooling Equipment Specialist Maintenance Repair & Renewal

### Routine Maintenance Visits

**The Cooling Tower Specialists**

**Can you afford not to maintain your cooling tower? Tower Systems provide evaporative cooling tower mechanical maintenance contracts.**

It is essential to ensure evaporative cooling towers and condensers are correctly and professionally maintained to ensure the cooling tower operates to its full capacity.

Tower Systems provide a range of maintenance contracts to suit your needs. Our contracts include:

- Routine maintenance visits
- Component replacement
- Repairs and replacements
- Safety checks
- Water quality testing
- Drift eliminator cleaning
- Nozzle cleaning
- Fan motor maintenance
- Fan belt replacement
- Fan speed adjustment
- Fan speed adjustment
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- Fan speed adjustment

The full maintenance contract is available on an O&M (O&M) contract.

### Replacement Parts

**The Cooling Tower Specialists**

**Replacement Parts**

We stock a wide range of replacement parts for all major cooling tower manufacturers. Our parts are of high quality and are guaranteed to fit.

Our stock includes:

- Fan motors
- Fan belts
- Fan blades
- Fan bearings
- Fan capacitors
- Fan switches
- Fan starters
- Fan controllers
- Fan speed controllers
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Evaporative Cooling Equipment Specialist Maintenance Repair & Renewal

### Maintenance Access

**The Cooling Tower Specialists**

**Cooling Tower Maintenance Access**  
Ladders, ganties and handrailing systems

It is essential that evaporative cooling towers are properly maintained to ensure they operate to their full capacity. This requires access to all parts of the tower.

Our maintenance access solutions include:

- Ladders
- Ganties
- Handrailing systems
- Safety harnesses
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Evaporative Cooling Equipment Specialist Maintenance Repair & Renewal

### Safety Deck

**The Cooling Tower Specialists**

**Tower Systems Safety Deck**  
A safe platform for fill pack

Working on a cooling tower can be a dangerous task. Our safety decks provide a safe platform for workers to carry out maintenance on the fill pack.

The benefits of a safety deck are:

- Safe platform for workers
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Evaporative Cooling Equipment Specialist Maintenance Repair & Renewal

### Condition Surveys

**The Cooling Tower Specialists**

**Cooling Tower Compliance and Operational Inspections**

It is essential to ensure evaporative cooling towers and condensers are correctly and professionally maintained to ensure the cooling tower operates to its full capacity.

Tower Systems provide a range of condition surveys to suit your needs. Our surveys include:

- Compliance inspections
- Operational inspections
- Safety inspections
- Safety inspections
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- Safety inspections

The full condition survey is available on an O&M (O&M) contract.

### Refurbishment

**The Cooling Tower Specialists**

**Cooling Tower Refurbishment**  
Coating Systems and Component Renewal

Refurbishment is the process of restoring a cooling tower to its original condition. This involves cleaning, painting, and replacing worn components.

The benefits of a cooling tower refurbishment are:

- Extends the life of the cooling tower
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Evaporative Cooling Equipment Specialist Maintenance Repair & Renewal

### Leak Repairs

**The Cooling Tower Specialists**

**Cooling Tower Leak Repairs**  
We specialise in permanent repairs

Leak repairs are essential to ensure that a cooling tower operates to its full capacity. Our leak repair specialists can identify and repair leaks quickly and efficiently.

The benefits of a leak repair are:

- Reduces water loss
- Reduces water loss
- Reduces water loss
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- Reduces water loss
- Reduces water loss
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Evaporative Cooling Equipment Specialist Maintenance Repair & Renewal

### Top Air Inlet Shields

**The Cooling Tower Specialists**

**Top Air Inlet Shields**  
For Hybrid Evaporative Coolers and Condensers

Top air inlet shields are designed to reduce the amount of air that is lost to the atmosphere. This helps to reduce the amount of energy that is required to cool the water.

The benefits of a top air inlet shield are:

- Reduces energy consumption
- Reduces energy consumption
- Reduces energy consumption
- Reduces energy consumption
- Reduces energy consumption
- Reduces energy consumption
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- Reduces energy consumption

Evaporative Cooling Equipment Specialist Maintenance Repair & Renewal

### Cooling Tower Air Intake Mesh

**The Cooling Tower Specialists**

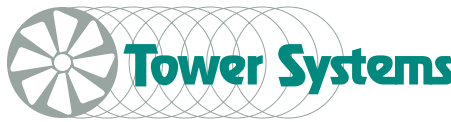
**Cooling Tower Air Intake Mesh**

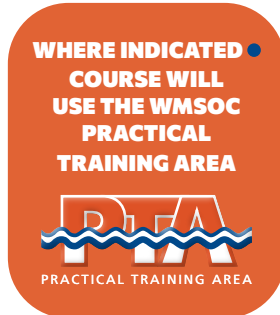
Air intake mesh is designed to filter out debris and dirt from the air that enters the cooling tower. This helps to prevent the cooling tower from becoming blocked and inefficient.

The benefits of an air intake mesh are:

- Prevents debris from entering the cooling tower
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Evaporative Cooling Equipment Specialist Maintenance Repair & Renewal





Tuesday 24th January	Temperature Monitoring, Sampling & Inspection Of Hot & Cold Water Systems For Technicians ●
Wednesday 25th January	Cleaning & Disinfection of Hot & Cold Water Systems ●
Thursday 26th January	Water Treatment Hot & Cold Systems EXAM
Tuesday 31st January	Practical Legionella Risk Assessment Hot & Cold Water Systems Advanced* ●
Wednesday 1st February	Management And Control Of Closed Systems
Tuesday 7th February	Legionella Risk Assessment Of Hot & Cold Water Systems Foundation
Wednesday 8th February	Legionella Control & Management for Dutyholders & Responsible Persons - Hot & Cold Water Systems
Tuesday 14th February	Steam Boiler Water Chemistry Foundation
Wednesday 15th February	Cleaning & Disinfection of Hot & Cold Water Systems ●
Tuesday 28th February	Legionella Risk Assessment of Evaporative Cooling Systems
Wednesday 1st March	Spa and Swimming Pool Chemical Control and Management
Tuesday 7th March	Practical Legionella Risk Assessment Hot & Cold Water Systems Advanced* ●
Wednesday 8th March	Legionella Risk Assessment Of Hot & Cold Water Systems Foundation
Tuesday 14th March	Temperature Monitoring, Sampling & Inspection Of Hot & Cold Water Systems For Technicians ●
Wednesday 15th March	Water Treatment Chemistry Foundation
Tuesday 21st March	Evaporative Cooling Water Chemistry Foundation
Wednesday 22nd March	Water Treatment Steam Boiler Systems EXAM
Tuesday 28th March	Cleaning & Disinfection of Evaporative Cooling Systems ●
Wednesday 29th March	Cleaning & Disinfection of Hot & Cold Water Systems ●
Tuesday 18th April	HTM 04-01 Water Hygiene Training: Managing & Controlling Risk of Waterborne Pathogens in Healthcare Water Systems ●
Wednesday 19th April	Temperature Monitoring, Sampling & Inspection Of Hot & Cold Water Systems For Technicians ●
Tuesday 25th April	Practical Legionella Risk Assessment Hot & Cold Water Systems Advanced* ●
Wednesday 26th April	Evaporative Cooling Water Chemistry Advanced*
Wednesday 3rd May	Cleaning & Disinfection of Hot & Cold Water Systems ●
Tuesday 9th May	Legionella Risk Assessment Of Hot & Cold Water Systems Foundation
Wednesday 10th May	Legionella Control & Management for Dutyholders & Responsible Persons - Hot & Cold Water Systems
Tuesday 16th May	Management And Control Of Closed Systems
Wednesday 17th May	Legionella Control & Management for Dutyholders & Responsible Persons - Evaporative Cooling Systems
Tuesday 23rd May	Practical Legionella Risk Assessment Hot & Cold Water Systems Advanced* ●
Wednesday 24th May	Water Treatment Cooling Systems EXAM
Tuesday 6th June	Temperature Monitoring, Sampling & Inspection Of Hot & Cold Water Systems For Technicians ●
Wednesday 7th June	Legionella Risk Assessment Of Hot & Cold Water Systems Foundation
Tuesday 13th June	Cleaning & Disinfection of Evaporative Cooling Systems ●
Wednesday 14th June	Legionella Risk Assessment of Evaporative Cooling Systems
Tuesday 20th June	Water Treatment Closed Systems EXAM
Wednesday 21st June	Legionella Risk Assessment Cooling Systems EXAM
Tuesday 4th July	Cleaning & Disinfection of Hot & Cold Water Systems ●
Wednesday 5th July	Management And Control Of Closed Systems
Tuesday 11th July	Practical Legionella Risk Assessment Hot & Cold Water Systems Advanced* ●
Wednesday 12th July	Legionella Risk Assessment Of Hot & Cold Water Systems Foundation
Tuesday 18th July	Temperature Monitoring, Sampling & Inspection Of Hot & Cold Water Systems For Technicians ●
Tuesday 5th September	Legionella Control & Management for Dutyholders & Responsible Persons - Hot & Cold Water Systems
Wednesday 6th September	Legionella Risk Assessment Of Hot & Cold Water Systems Foundation
Tuesday 12th September	Water Treatment Chemistry Foundation
Wednesday 13th September	Steam Boiler Water Chemistry Foundation
Tuesday 19th September	Practical Legionella Risk Assessment Hot & Cold Water Systems Advanced* ●
Wednesday 20th September	Temperature Monitoring, Sampling & Inspection Of Hot & Cold Water Systems For Technicians ●
Tuesday 26th September	Cleaning & Disinfection of Hot & Cold Water Systems ●
Wednesday 27th September	Legionella Risk Assessment Hot & Cold Water EXAM
Tuesday 3rd October	Evaporative Cooling Water Chemistry Foundation
Wednesday 4th October	Steam Boiler Water Chemistry Advanced*
Tuesday 10th October	Practical Legionella Risk Assessment Hot & Cold Water Systems Advanced* ●
Wednesday 11th October	Legionella Risk Assessment Of Hot & Cold Water Systems Foundation
Tuesday 17th October	Cleaning & Disinfection of Evaporative Cooling Systems ●
Wednesday 18th October	Temperature Monitoring, Sampling & Inspection Of Hot & Cold Water Systems For Technicians ●
Tuesday 24th October	Management And Control Of Closed Systems
Wednesday 25th October	Legionella Risk Assessment of Evaporative Cooling Systems
Tuesday 7th November	Cleaning & Disinfection of Hot & Cold Water Systems ●
Wednesday 8th November	Legionella Control & Management for Dutyholders & Responsible Persons - Evaporative Cooling Systems
Tuesday 14th November	Practical Legionella Risk Assessment Hot & Cold Water Systems Advanced* ●
Wednesday 15th November	Legionella Risk Assessment Of Hot & Cold Water Systems Foundation
Thursday 16th November	Evaporative Cooling Water Chemistry Advanced*
Tuesday 21st November	HTM 04-01 Water Hygiene Training: Managing & Controlling Risk of Waterborne Pathogens in Healthcare Water Systems ●
Wednesday 22nd November	Legionella Risk Assessment Healthcare EXAM
Tuesday 28th November	Legionella Control & Management for Dutyholders & Responsible Persons - Hot & Cold Water Systems
Wednesday 29th November	Spa and Swimming Pool Chemical Control and Management
Tuesday 5th December	Cleaning & Disinfection of Hot & Cold Water Systems ●
Wednesday 6th December	Temperature Monitoring, Sampling & Inspection Of Hot & Cold Water Systems For Technicians ●
Thursday 7th December	Practical Legionella Risk Assessment Hot & Cold Water Systems Advanced* ●

*\*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.*

**ALL OF OUR COURSES ARE PART OF**



ACCREDITED PROGRAMME