



How do l interpret my on-site test results?

Effect of sample pH on the identification of an NRB in Closed Hot and Cold Water Systems

Field testing time optimization

PLUS

• Does ongoing remote monitoring of subordinate and tertiary loops highlight a hidden and significant risk of Legionella proliferation?

BG50 Case studies

 Case Study of Using the Strengite Process to Clean a Heavily Rusted Glycol System Without Creating Discharge



Your Next Career in Water Treatment

Feedwater Limited is the **UK's largest independent water treatment company** with a **great culture and valued staff.** It truly is a fantastic place to work and now is a good time to join us as we continue our growth.

Due to this expansion, we are looking for driven, self-motivated, skilled team players to recruit to the following new roles:

- Engineering Manager (based in Midlands)
- Water Treatment Account Managers (UK wide)
- Water Hygiene Engineers (UK wide)
- Administrators (based in Moreton, Merseyside)
- Legionella Risk Assessors (UK wide)

In return we offer **25 days annual leave**, **enrolment into our company pension scheme**, **retail vouchers and discounts** as part of our employee benefits scheme and we are a **living wage employer**.

So why not come and join us? Send your CV and covering email to <u>HR@feedwater.co.uk</u>

Please note, only applicants moving to interview will be contacted.















The articles and papers throughout this Journal are offered as interest and information and editorial views are not necessarily shared by the Editors or the Society, or endorsed by them.

Paid advertisements appear in Water Management Society (WMSoc) Waterline publication, including print and other digital formats. WMSoc does not endorse or evaluate the advertised product, service or company, nor any of the claims made in the advertisement. Advertisers making claims are expected to have relevant research data that substantiates these claims and the research or citation is to be made available upon request. WMSoc reserves the right to refuse, reject, or cancel any advertisement for any reason at any time without liability or explanation.

The Directors, Society, Editors and contributors shall be under no liability whatsoever for the content published in this journal.

Council of Management and Officers

The Water Management Society is governed by a Council of Management which has the responsibility for the day-to-day supervision of operational and financial control. It meets bimonthly, and the executive officers meet more frequently.

There is continuing cooperation and liaison between the Council and the Secretariat.

Council Members 2022-23

Chair - Ian Penney Immediate Past Chair - Ian E Kershaw Honorary Treasurer - Dr Tom Laffey

Colin Brown Anthea Davies Giles Green Linda Hannah David Harper Simon Hughes Mike Hunter Garry Kerin Elise Maynard Stuart Nixon John Sandford Colin Shekleton Pamela Simpson Caroline Summers Jemma Tennant Jonathon Waggot Geoff Walker

All Full members of the Society can apply for election to the Council. Elections are held at the AGM annually, and final selection is made by ballot if necessary. Additional members may be co-opted. It only remains to be pointed out that the responsibilities and obligations of Council members require a clear and definite commitment in terms of time and effort.

waterline Editor: Geoff Walker

Guest Editor: lan Penney











IN THIS ISSUE

111.10-1-4

5 Pipeline

a Martin

AN to Ho at fame

- 6 Letter to the Editor
- 8 How do I interpret my on-site test results?
- 15 Words from the Editor
- 16 Effect of sample pH on the identification of an NRB in Closed Hot and Cold Water Systems
- 18 Waterscan
- 30 Field testing time optimization
- 34 Event Report: Water Quality It's all Hanging in the Balance?
- 36 Does ongoing remote monitoring of subordinate and tertiary loops highlight a hidden and significant risk of Legionella proliferation?
- 40 BG50 Case studies
- 44 Case Study of Using the Strengite Process to Clean a Heavily Rusted Glycol System Without Creating Discharge
- 46 Toolbox Talks How to use a field test kit
- 50 Contracts, Products & Publications
- 60 A discussion with...
- 64 Committee roundup Autumn 2022



- Water Management Society, Water House, Office 6, Fairway Court, Amber Close, Tamworth, B77 4RP
- Telephone: 01827 289 558 | Fax: 01827 250 408
- Email: admin@wmsoc.org.uk
- www.wmsoc.org.uk | www.waterline.digital
- @WMSoc1 | @WMSoc_Waterline
- Copyright of The Water Management Society 2023. The use of the WMSoc logo or any related imagery is not permitted for personal or commercial use. Please report any improper use to the office.

The WMSoc Training Programme is not commercially biased and is provided at a competitive cost.



GRIME SCENE

ADVERTISERS SUPPORTING THIS ISSUE

22	Accepta	15	Reich
28	Altecnic	48	Roam Technologies
33	Cavendish	39	SolidTek
2	Feedwater	5	Spatex
35	Horne Engineering	42	Surevent
59	Legionella Control Association	65	Tower Systems
14	Legionella Dossier	29	Treatment4Water
23	Lutz	and in	and the second
Net St	To advertise in the next issue of waterline , cor or email waterline	ntact the WMSoc e@wmsoc.org.	c secretariat on <u>01827 289 558</u> <u>uk</u> .
	The next issue will be pu	ublished mid-A	pril 2023.
	Book your advert slot by Friday 3rd March 2023 ar The WMSoc is grateful for the continuing su	nd submit your o upport of this pu	conte <mark>nt</mark> by Friday 17th March 2023 . Iblication by the advertisers.
	and the second by the fit for	10 -	

HOW CAN YOU TELL IF IT'S CLEAN?

Seen on holiday by one of the WMSoc admin team.

GET INVOLVED: Can you beat this grime?

Submit your photos & captions to the Waterline email address:

waterline@wmsoc.org.uk



ESCENE

ENE

OSS

CRO



PipeLine Ian Penney, Chairman WMSoc

Hi

As we start a new year I hope that all of you managed to take some time with families and friends over the festive period. Just before the break we enjoyed an excellent event in Edinburgh, enjoying the delights of this city along with exceptional presentations from our Northern colleagues.

This year we plan to continue to deliver 2 face to face events, but we understand that our members can't always travel to these locations, so we will be continuing with our webinars throughout the year. We hope to see you all at one of these events.

As we move into 2023 I am pleased to see the fruition of lots of hard work from the Technical Committee last year with the release of a new Scald Risk Assessment guidance, and a separate guidance document on Remote Temperature Monitoring for Legionella Control. These can be found on our website and I encourage all of you to take the time to read this information. Further guidance on remote monitoring will be delivered throughout the year and should prove to be an invaluable resource.

At the end of 2022 we also saw the first cohort of students pass the new WMSoc Risk Assessment Qualification. Those proving their knowledge in the end examination have gained the right to use WMSoc Qualified and will be listed on our website for 3 years. If you are interested in joining this select list, please take a look online at the options for both Risk Assessment and Water Treatment qualifications.

Those attending training at the end of last year will also have experienced our new premises with improved Practical Training Area. We can't wait to see more of you on our practical courses throughout 2023, enjoying this investment in the future of the industry.

As you may know, there are several sub-committees that exist within the WMS which provide the membership with knowledge and support. We've had some recent changes in the 'Chairs' of these sub-committees so we'd like to thank the individuals stepping down and welcome the new Chairs to their positions, here are the changes:

- Waterline Geoff Walker passing to Pam Simpson & myself
- Events Emma Jorgenson passing to Ian E Kershaw
- Training & Accreditation Elise Maynard passing to Colin Shekleton
- CPD David Beddington passing to Ian E Kershaw

Finally, we understand that times are tough at the moment, but as we work to continue to provide excellent technical expertise to you the membership we have seen prices rise across the board. We have therefore taken the difficult decision to raise membership fees by 10% to ensure we can continue to deliver the benefits you require. We are after all here to serve you, the membership.

Best Regards Ian Penney Chairman





WINTER 2022-23

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.

Letter to the Editor

Following the publication of my article in the summer edition I saw the response from Mr Coates printed in the autumn edition. I note that Mr Coates has raised numerous concerns, and I have responded to these below.

[1] Pseudomonas is covered in the Department of Health's guidance document HTM 04-01 Part C and HTM 04-01 Part B. The documents give recommendations for post-flush samples to be taken to show a live indication of Pseudomonas presence however I feel this has been greatly misinterpreted in the article.

Response: This is incorrect - the guidance recommends a <u>pre-flush</u> specimen. A subsequent post flush specimen is required if the initial pre-flush is positive.

[2] The article suggests that an issue had arisen after staff were asked to take samples and all results came back negative. The article then suggests the most likely reason was due to it not being a post-flush sample. This could be a possibility however I would suggest starting with the staff, are they trained to take samples and were they tested in a UKAS Lab in the correct time span and temperatures.

Response: The concern was that this was not a <u>true pre-flush sample</u>. The staff were trained to take samples, and it was within correct time spans. The UKAS accreditation is specific to a test, not the laboratory (it was accredited for the test).

[3] The article suggests the idea of putting a bag over the wash basin and outlet over night to stop use and 'ensure a true pre-flush sample is collected'. This is not the guidance given in the HTM as it only suggests Lower Use or a period of two hours minimum.

Response: This is a misquote of the HTM which states 'no use (at least two hours or preferably longer)'.

[4] The bag is unlikely to physically stop someone using the basin where signage could achieve the same level of control for the outlet.

Response: The concept of the bag was from the ward sister as in her experience the only way to ensure no use prior to sampling. If signage works, then great.

[5] The bag would most likely cause a humid greenhouse environment that also could allow harmful bacteria or viruses and opportunistic pathogens to get into the outlet from the waste. The addition of the bag could be seen as a breach of the Air gap recommended by the Water Supply (Water Fittings) Regulations as the Bag creates a clear connection from the above ground drainage to the domestic water supply. In addition is the bag sterile?

Response: Water systems are humid and the biofilm is within the pipework. Organisms will not transfer from the waste to the outlet due to a presence of a bag (there is probably more risk from splashing when an outlet is run in normal practice as this will generate splashes and potentially aerosols).

This is not a contravention of the air gap, how is back siphonage going to occur? The bag was a new unused bag so essentially free from organisms of concern.

[6] Majority of augmented care patients require additional controls to reduce risks from bacteria, funguses and viruses as far as reasonably practicable. Taking a wash basin out of action when a room is in use reduces a very important part of infection control, hand hygiene. Often the best control measure for reducing transmission.

Response: Mr Coates makes a valid point, although hand washing is applicable to all patient groups not just augmented care. Any intervention which removes a hand wash station (HWS) must be agreed with senior staff to ensure it is safe to do so. Alcohol hand rub is the preferred method of hand decontamination. Use of a HWS is only necessary if hands are visible dirty or dealing with an alcohol resistant organism. With the use of gloves for most patient contact, the requirement to use a HWS is very much reduced. (Some units around the world have moved to water free patient care with only a couple of HWS on the whole of the ITU). In most units there is an overabundance of HWS and provision can normally be made to access one elsewhere if required.

[7] My interpretation is that the sample should be a true reflective sample but ideally be pre-flush. A flush of an outlet is based on flow rate and length of time open. This ensures a draw-off of the entire pipe run or dead-leg based on temperature. In healthcare this would be to a temperature of <20°C within 2 mins or +2°C from the cold water inlet to the building or Cold Water Storage. And >55°C within 1 min. So typically a flush would be fully opening an outlet for at least two minutes. It is unlikely routine hand washing would achieve a full flush unless used many times in a short duration of time.

Response: Outlets are used not just for hand washing. Many units have a daily flushing programme in place and water may be collected for washing patients depending on the practices on a unit. Additionally for surgical scrub



sinks the use of water can be quite high even for a single operator.

Biofilm will vary in size and location even when at the periphery of the system. The ability to detect planktonic forms (or break off from biofilm) in a water sample will vary with extent of biofilm, local condition supporting growth, turbulence of flow and importantly water usage. Why does Mr Coates think that it will take a full two-minute flush to remove the planktonic forms? (see 9 below)

[8] So I would say it's reasonable to suggest speaking to staff asking to avoid using an outlet for a duration of at least two hours but not to restrict total usage as this would not show a live system sample of the outlet, but instead a preincubated sample. How could anyone interpret higher samples as being a risk to patients when normally the outlet would have been used several times giving a lower risk to patients. The idea is to look for the presence of bacteria and control the risk, the goal is not to achieve a high count, a low count would show the same. Only a post-flush would show the extent of the issue.

Response: Use of outlets is highly variable over a 24-hour period. Overnight use of outlets is likely to be much reduced. Remember the primary method of hand decontamination is alcohol rub. If water is collected for washing a patient from an outlet that has not been used overnight (quite possible with hand rub being used so widely) then this is the quality of water that will reach the patient. This is a true reflective sample. Mr Coates recommendation will not provide a 'live' system risk.

Mr Coates misunderstands in that one is not looking for a high count but is looking for the presence or absence of Pseudomonas aeruginosa. It is the presence or absence which dictates whether any action is taken, not the count (see HTM discussion below). Prior use of an outlet is a major risk factor to providing a false negative water sample result, it is this that we are trying to control.

[9] The article also shows plates with growth at different time intervals, I must question if the plate samples were taken on an outlet with a bag over it.

Response: The image shown was taken in 2006, before guidance was issued. The sink had not been bagged. I am not sure why Mr Coates feels that to observe such results indicates the presence of a bag. As can be seen the level of Pseudomonas drops from what is an uncountable confluent growth very rapidly. If the initial count had only been 11 cfu/100ml, how much water would need to pass before this became undetectable? Not two minutes' worth. Our experience shows that unless true pre-flush samples are obtained false negative results can be obtained.

[10] This is not the guidance given in the HTM as it only suggest Lower Use or a period of two hours minimum.

Response: Guidance is the result of a committee decision and often a compromise. Guidance should never remove the requirement to think. Compliance must never be the end goal; it is patient safety.

Many of us who contributed to HTM 04-01 would have liked several areas to have been different. The HTM refers to low use but how is this defined in practice? Different staff will use a hand wash station, so who is checking on what is low use? The time of two hours was not based on scientific data and as the HTM says, preferably longer than 2 hours.

Whilst the topic of this discussion is water sampling and testing, ultimately what we are talking about is patient's lives. A false negative water result for Pseudomonas aeruginosa, depending on local practices, can readily result in a life-threatening or fatal infection to patients on these units. Detection of waterborne transmission events with sensitive strains of Pseudomonas aeruginosa lack sensitivity, mainly due to the issue of endogenous carriage. Hence an undetected positive water outlet may affect many patients, as acquisition of Pseudomonas is unlikely to be traced back to the outlet.

It is essential that everybody understands the consequence of their actions on the patient. The current situation where water sampling staff may walk onto a unit without any prior discussion (at least the day before) with senior ward staff is untenable. Suggesting that requesting low use of hand wash stations prior to sampling is sufficient, is very convenient for those conducting sampling. This undefined sampling methodology does not place the patient's interests at the front and centre of what and why we do things. Does anyone explain to the staff that using an outlet just prior to water sampling can give rise to a false negative result?

There is a view that it is the doctors and nurses in the vicinity of the patient who are responsible for making mistakes in patient care. This is of course not true. Greater damage can be done by those at a distance.

It is essential water safety groups include audit as part of their remit, including the water testing pathway.

Dr Michael Weinbren



How do I interpret my on-site test results?

Ian Penney, DTK Water

Industrial water treatment in one form or another has been around for a very long time. Without looking too hard I found a citing for phosphorus as a corrosion inhibitor used in the construction of the iron pillar of Delhi more than 1500 years ago ¹. And if that's not long enough ago, the ancient Greeks in the time of Hypocrates (400 BC) discovered the sanitizing power of copper. Apparently, they prescribed copper for pulmonary diseases and for purifying drinking water.

I think you would therefore agree that the use of chemical additives for the treatment/prevention of water borne and/or water formed issues like corrosion, scale and microbiological growth problems goes a long way back. What is not quite so well publicized is the level of testing and control that has been needed throughout the years to keep the chemicals and the water itself in check.

Those of us who have been in the industry for longer than we care to remember will quickly tell you about the 'good old days' when companies like Betz, Dearborn and Houseman provided weeks if not months of training for new recruits, and they're also quick to tell you that 'it doesn't happen like that anymore'.

The following article is not the 'be all and end all' with respect to recommendations and interpretation of on-site testing/ results and I am sure there will be discussions on areas that have been missed. It also needs to be noted that these are what the author considers to be the **'minimum tests that are usually needed'**, not the full suite of tests that can be done. However, hopefully it goes someway in helping those that are new into the water treatment industry to understand their results and what remedial actions one might take accordingly. In addition, any reference to usual, expected results or standard methods are drawn from the authors experience and may differ for the user, dependent on the standard operating procedure of their company.

See - How to Use a Test Kit? - Toolbox Talk March 2021 Raw/Make-Up Water (MU)

Sample Type	Minimum Recommended Tests
Raw/make-up (MU) water	рН
	Conductivity/TDS
	Total Hardness
	Chloride (periodically)

Raw/make-up water (MU) should be tested to at least a minimum level every time you visit site for a service visit (SV). A minimum level of tests is shown here. This is especially true with recent climate issues resulting in areas of drought and/or flooding which can affect the make-up quality of the system(s) being served (closed system/cooling tower/boiler).

• Conductivity – measures the dissolved solids level and can be used to quickly indicate if your site is experiencing a change in MU water quality when compared to previous readings.

 pH – again, confirms MU water quality (can indicate contamination, but the likelihood of mains water contamination is not very common).

 Hardness – confirms MU water quality and can be used to diagnose/set-up any pre-treatment plant that exists downstream. If the hardness level has increased, an on-site water softener's regeneration frequency will likely need resetting. Failure to address can result in softener overruns and scale control issues.

• Chloride – chloride needs to be checked periodically and whenever a change in 'normal' MU water quality is suspected.

See - What is Conductivity? - Toolbox Talk Feb 2022 V3 Softened Water

Sample Type	Minimum Recommended Tests
Softened water	Conductivity/TDS
	Total Hardness
	Chloride

Since you've tested your MU water to the minimum level as above, you really need only check the performance of the water softening process. Conductivity/TDS has been included as it's a simple test which can quickly indicate issues with water softener regenerations. As you may know a water softener requires regenerating with salt (sodium chloride) after it has been 'exhausted' by removing hardness from the inlet MU water.

• Hardness – A properly functioning water softener should be capable of providing < 2ppm hardness.

• Chloride (Conductivity/TDS) – This is to check if your water softener has regenerated properly and rinsed all the excess salt off the softener before going into service. To accurately assess this, you should test the softener immediately after it finishes the regeneration process, before it goes into service, which is not always easy to catch naturally. Chloride levels should be no greater than the MU water level. If safe to do so, performing a regeneration while you are on-site can allow this check to be made.

Overview of the softener regeneration process (4 steps):

1. Backwash – this step sends water in the reverse direction through the softener vessel to remove particulates that have been 'filtered' from the water flow by the softener resin. Backwash is usually performed at 1.5-2.0 times the forward service flow rate (for typically 10-15 mins).

2. Brine Draw – this step introduces salt on to the resin bed via a venturi system. Typically, a 10% salt (or 40% saturated salt solution) is used to regenerate a softener resin. Brine draw is run at normal service flow rate (for typically 20-30 mins).

3. Slow Rinse – this step continues to flow water (only) through the softener at normal service flow rate so the brine solution can be 'moved' through the entire resin bed (for



typically 20-30mins).

4. Fast Rinse - this step increases the flow rate of water through the softener to 1.5-2.0 times normal service flow rate so the brine solution can be totally washed from the entire softener resin bed (for typically 10-15mins).

Water Softeners - Toolbox Talk May 2022 v2

Other forms of pre-treatment

There are many other forms of pretreatment available, dealkalisation, reverse osmosis, de-mineralisation, ultra-filtration etc. Overall recommendation here would be to assess what the pre-treatment is designed to do and then like with the softener above, test that it has performed successfully. A quick example, a de-mineralisation plant can produce near distilled water quality with almost zero dissolved solids. So, a simple conductivity check would be a good measurement to assess performance. Remember, these are the minimum recommended tests.

Closed Water Systems



Sample Type	Minimum Recommended Tests	
Closed water systems	Conductivity/TDS	
	рН	
	Iron (Dissolved & Total)	
	Inhibitor (test as applicable)	
	Other metals (test as applicable)	
	Microbiological check(s)	
	Turbidity / Suspended Solids	

Closed water systems, as the name implies are closed to the greater environment and use very little MU water in their normal operation. A properly 'tight' system will have no more than 5% MU water annually. As such closed water systems do not concentrate up the amount of dissolved solid present in the MU water. This fact usually means 'calcium' based scale formation is not as significant a risk as corrosion is for these systems. Minimum recommended tests for a closed water system would include the following:

• Conductivity – the conductivity of a closed system can vary based on the initial MU water conductivity and the type of chemical treatments that are in use. Measuring the conductivity on start-up and on each SV allows you to monitor in-spec trends and identify any large changes in readings. A significantly lower conductivity reading may suggest a system leak has occurred with new MU water being added which dilutes the system, reducing the conductivity level from the last visit. A significantly higher reading may suggest that there has been an addition of a chemical(s) since the last visit, or some form of contamination has occurred. Dependent on the type of closed system (condenser, chilled, hot water) will determine what type of contaminant you should probably look for.

• pH – routine monitoring (trending) of the pH, like with conductivity will give a reasonable confirmation that the system is running OK. High pH could mean excess chemical addition or some form of contamination. Low pH would usually mean some form of contamination has occurred or a high level of sulphate reducing bacteria (SRB's) may have taken hold in the system giving off low pH hydrogen sulphide as a byproduct. Systems with measurably high SRB's will likely have a heavy biofilm formation as well.

See - What is Biofilm? - Toolbox Talks June 2020 v2

• Hardness – Not normally required. As closed systems do not 'cycle-up' from evaporation, hardness levels should stay around MU water levels or just below as some hardness may have dropped out of solution.

• Iron – Unlike hardness, corrosion is a common problem and is typically the main cause of failures with closed water systems. Corrosion problems can sometimes link right back to the installation of the system, and all too often are the result of an insufficient pre-commissioning program. See the galvanic series for metals in *Figure 1* below. Both dissolved and total Iron should be tested on each SV.

Figure 1



• Dissolved iron – To properly assess dissolved iron, filter your sample through a 0.45-micron filter paper, then proceed with your test. The level of dissolved iron can usually be used as a measure of active corrosion of the system.

• Total Iron – For total iron, do not filter your sample but instead perform an acid digestion step on the unfiltered sample for a few minutes prior to adding your colour developing reagent; this will give you a total iron result.

• Suspended Iron - When you have both dissolved and total iron results, subtract the dissolved from the total to obtain your suspended iron level. Unfortunately, it's not always easy to assess the significance of a suspended iron result. It



can be historic corrosion, but high levels of suspended iron would normally suggest a need for side-stream filtration **(see Figure 2)** to work on reducing suspended material levels.

• Installing a corrosion coupon rack is always a good recommendation. It will allow you to assess levels of corrosion across the various materials of construction (mild steel, copper, aluminum etc.) and give you a visual assessment of how your system is operating. FYI, a mild steel corrosion rate of less than 2 mils per year is considered an excellent result. It's important to note that coupons should be installed for no less than 1 month and more normally coupons are installed for 3 months. There will be an initial high rate of corrosion that will occur when you first install your coupon(s), and this rate of corrosion will then tend to steady state. Assessing corrosion rates after a very short install periods will give skewed results due to the initial corrosion rate.

Note: Other metals involved in the system construction can be assessed in a similar way to iron levels as above, and corrosion coupons in most metal types are available for assessing on-site corrosion rates.

See - What is Corrosion? - Toolbox Talk Jan 2021

See - What are Corrosion Coupons? - Toolbox Talk June 2021

 Inhibitor Levels – One of the more important tests that should be performed each SV is a check on the inhibitor level. This article will not try and overview all the various inhibitor treatment programs or programs like VDI 2035 where chemical additives play a very small part in the overall control of the water treatment. In general, most closed water systems tend to be treated with molybdate-based or nitrite-based corrosion inhibitors as the primary chemical component. There are many proprietary blended inhibitors on the market in the UK today and selection of a suitable inhibitor is based on several factors like the materials of construction of the system, system temperature. As an example, a system using a primarily nitrite-based inhibitor program will result in a pH in the operating system of typically 9.5-10.5 and as such should not be selected for systems that have significant aluminium components. Proprietary blended products will likely also contain dispersants, yellow metal inhibitors and may have some form of hardness control.

Whichever inhibitor is in use, there should be clear guidance on the control levels needed and it should be tested for its active ingredient every SV. The test results are then used to assess whether any chemical additions need to be made to the operating system.

Note: Other tests that can be done on closed systems include alkalinities (P & M), chloride, hardness etc. but the above water tests should be sufficient to allow an operator enough information to keep control of any closed water system.

• Microbiological testing – There are several microbiological tests that can be done during a SV on a closed water system. These include dipslides for general bacteria levels (TVC's), more specific dipslides for pseudomonas (aeruginosa or species) as well as tests for nitrite reducing bacteria (NRB's) and sulphate reducing bacteria (SRB's). For systems that contain glycol for freeze point depression, checks for yeast and moulds is a good recommendation. Any of these micro checks will require incubating your sample for prescribed times at set temperatures but will usually provide activity levels well ahead of samples sent to a laboratory.

See - What are Biocides? - Toolbox Talks Feb 2020

• Turbidity / Suspended Solids – A visual check of the water clarity is the easiest of tests but is always a good indicator of the state of the operating system. Turbidity / suspended solids is usually left as the visual check and an 'appearance' result is entered. If a multi-parameter photometer is used for site testing it's likely that one or both tests can be performed by the electronic meter. High levels of turbidity / suspended solids should signal the need for some form of side-stream filtration to clean-up the circulating material which will reduce the potential for blockages and underdeposit corrosion should the material be allowed to settle out. An example of one type of side-stream filtration is shown in **Figure 2** below. In this type of side-stream filter the water is sent in a vortex/cyclone motion through the filter and solids are thrown out of the water flow for collection and removal by purging.

Figure 2 - Centrifugal (Cyclone) Separator



See - What is Filtration? - Toolbox Talk Feb 2020

Cooling Tower Systems



Sample Type	Minimum Recommended Tests	
Cooling tower systems	All Closed System Tests - PLUS	
	Alkalinities (M & P)	
	Hardness (total & calcium)	
	Biocide levels (test as applicable)	



This article assumes the reader has a general understanding of how evaporative cooling tower systems function and will not try and cover the myriad of different types of evaporative cooling towers/systems. However, it is important to understand the 'meaning' of the word evaporative in the name, as this explains how cooling tower systems differ from closed water systems in one very important aspect. 'Cooling' towers are used to expel heat from some process needing to be cooled (i.e., machine cooling/air conditioning/refrigeration) via a water re-circulation system that eventually flows over a cooling tower. When operating, a cooling tower by design is open to the environment and will incur evaporation losses to varying degrees. It's this evaporation loss that results in the concentrating up of the MU water dissolved solids level in the system. Commonly known as 'cycling-up', this aspect of cooling towers tends to change the emphasis from corrosion to scale formation when looking at the major concerns with using water as a heat rejection medium, unless some form of water softening is involved. In very general terms 'all' of the tests that have been discussed with closed water systems are applicable when routinely testing cooling towers. However, there is significant interest in the alkalinities (M & P) and the hardness levels (particularly calcium hardness) as they relate to the likelihood of scale formation. In most instances a measure of the water systems Langelier Saturation Index (LSI)² will be performed on the MU water and theoretical 'cycles' of this water to see how many cycles of concentration you can safely run to, based on the expected performance of the scale/corrosion inhibitor in use. Many modern inhibitors will allow a concentration of dissolved solids in the recirculating water up to a level which results in an LSI \leq +3.0-3.5.

See - What is Concentration Factor? - Toolbox Talk Feb 2022 v3

Figure 3



• Alkalinities (M, P & OH) – There are generally 3 types of alkalinities that need to be discussed when talking about general water chemistry, these are bicarbonate (HCO₃) alkalinity, carbonate (CO₃) alkalinity and hydroxide (OH) alkalinity (see Figure 3). If we look in very general terms at the characteristics of these alkalinity types, we can see that they have varying levels of alkaline nature

- HCO_3 Alkalinity – exists to a maximum pH of approx. 8.0

- CO₃ Alkalinity - exists to a maximum pH of approx. 10.5

- OH Alkalinity - exists to a maximum pH of approx. 14.0

All raw waters in the UK as well as elsewhere in the world have varying levels of HCO₃ alkalinity (i.e., London has around 240ppm while areas around Glasgow has around only 20ppm). As this form of alkalinity can only produce a pH of around 8.0 and most importantly has a high solubility level in the presence of water hardness, it would seem to be 'safe' to use water with HCO₃ alkalinity for most cooling water applications. However, it's well-documented that when water with HCO₃ alkalinity is heated, it will convert through chemical process to form CO3 alkalinity which has a higher characteristic pH of around 10.5. And if we continue to heat this water and apply pressure, like in a steam boiler application, the CO₃ will react further generating OH alkalinity with a resulting increase in pH. We'll look at OH alkalinity and its pH capability to pH of 14 later in this article when we talk about understanding boiler water testing. So, keep this concept in mind as we next look at water hardness the more you use water for heat rejection which will naturally increase the water's temperature, the more CO₃ alkalinity we will generate with a corresponding increase in pH.

• Hardness (Total & Calcium) - Testing the hardness levels each SV is key to monitoring the system for potential scaling issues. Monitoring the calcium hardness levels in the MU water and comparing it to the level of calcium hardness in the cycled-up cooling tower is referred to as performing a 'calcium balance'. If MU water calcium hardness is 200ppm, and you were controlling your cooling tower at 3.0 cycles of concentration (CoC) then you would like to see a calcium hardness level of 600ppm in the cooling tower. Anything less than a factor of 3 would suggest some calcium is dropping out as scale formation. When we discussed alkalinities, it was mentioned that the more you heat water the more carbonate alkalinity is formed. Now is probably a good time to let you know that unlike most species that you can dissolved in water, the more heat the more you can dissolve i.e., sugar, salt etc., calcium carbonate (CaCO₃) has an 'inverse solubility'. This means that the higher the temperature, the more CaCO₃ will drop out of solution. So, let's be perfectly clear on this majorly important point We want to use water as a heat rejection medium; the more we heat the water the more CO₃ alkalinity will form and the more heat we pick up, the more CaCO, wants to drop out of solution. I think this could be referred to as a 'perfect storm' for the potential for hardness deposition. It's for this reason that many systems will use partially softened MU water to reduce the risk of scale formation. It should be noted the author does not recommend using fully softened water as it reduces the natural buffering capacity of the MU water and makes it more corrosive in nature. Remember, scale formation can be reversed but corrosion is irreversible!

See - What is Scale? - Toolbox Talk Feb 2020

• Conductivity/TDS – Measuring conductivity/TDS has been mentioned under closed water systems but it's important to note that it is usually used as a controlling parameter for cooling towers systems. An automatic bleed control system based on an in-line conductivity probe will control a bleed valve to maintain the required CoC.

 Biocides – Control of the microbiological content in a cooling tower system is critical for several reasons. We've all heard of the need to control Legionella bacteria to reduce the risk of someone contracting Legionnaires' Disease as well as the need to control other pathogenic microbes. Control usually involves a combination of physical control of the cooling tower to reduce the risk of exposure to an aerosol during operation (i.e., drift eliminators), with the use of chemical and/or non-chemical biocides. It should be noted that microbiological control will also help to minimize the formation of biofilms which will reduce the possibility of blockages, low flow areas, poor heat exchange and lessen the possibility of under-deposit corrosion. Oxidizing biocides such as bromine, chlorine and chlorine dioxide are typically used on a continuous low level dosing program with evaporative cooling systems. These oxidizing biocides are routinely backed up with the use of a non-oxidizing 'shock dosed' biocide. Oxidizing biocides should be checked for the active level in the re-circulating water every SV.



Non-oxidizing biocides are usually dosed based on the system volume, but some types can be tested for. If an oxidizing biocide is in use you are required under HSG274 Part 1³ to perform a weekly level check, record your results and take remedial actions if found to be out of specification. It's important to not overdose the oxidizing biocide as it can promote higher corrosion levels.

• Dipslides – As with the oxidizing biocide, the current UK guidance in HSG274 Part 13 requires a dipslide to be performed every week to assess the general bacteria level that exists in the re-circulating cooling tower system. There are several different types of dipslides on the market. The different types refer to various 'combinations' of agar growth medium on each side of the dipslide paddle. The guidance requires at least one side of the dipslide to have TTC agar which will test for general aerobic bacteria levels.

See - What are Dipslides? - Toolbox Talk May 2020

Steam Boilers



Sample Type	Minimum Recommended Tests
	All MU and Softener/Pre- treatment Tests - PLUS
Boiler systems (includes Raw MU, Softener (or other Pre-Treatment), Condensate, Feedwater & Boiler Water)	Alkalinities (M, P & OH) re-visited
	Temperature (feedwater)
	Oxygen Scavenger (test as applicable)
	Sludge Conditioner (test as applicable)
	pH (condensate)

As with the preceding section on cooling tower systems, this article assumes the reader has a general understanding of how steam boiler systems function and will not try and cover the various equipment layouts and different boiler types that can exist with steam boiler systems. Current UK regulations/ guidance on operating steam boiler systems can be found in BS2486:1997⁵ In very general terms we expect the following sequence of water qualities will need water testing to maintain satisfactory operating conditions.

- Raw MU water
- Softened MU water (requires ZERO hardness levels)
- Condensate returns

- Feedwater (combination of above waters in varying quantities)
- Boiler water

See - How To Take a Boiler Sample - Toolbox Talk July 2021 V2

• Alkalinity - Due to the temperatures and pressures involved within an 'operating' steam boiler, the alkalinity discussion which started with cooling tower systems now carries on and OH hydroxide alkalinity is formed in the boiler. Some might think this would be a problem due to the high expected pH but mild steel 'prefers' pH to be in the region of 11.0-12.5 which minimises the corrosion potential for the steel construction. Each boiler type (manufacturer) will have recommended levels for M & P alkalinity control which will provide suitable levels of OH alkalinity. Remember the formula for calculating your level of OH alkalinity (2P - M = OH). It's this OH alkalinity when combined with the proper levels of your sludge conditioner additive (typically phosphate) that will allow any calcium or magnesium hardness to be properly 'conditioned' as a fluid sludge that can be removed via bottom blowdowns. It's good to point out that where manual or automated surface blowdowns are employed, this will help to control the conductivity/TDS of the boiler water. If no surface blowdown is employed, the bottom blowdowns need to control both the conductivity/ TDS as well as sludge removal. It's also important to note that allowing alkalinity levels to run too high in a boiler increases the surface tension of the water making it difficult for steam bubbles to break free at the water/steam interface and join the steam space in the boiler. This is referred to as 'wet' steam and results in carryover of boiler water into the steam which can cause problems related to steam use and steam trap operation.

• Temperature – We know levels of dissolved gases (particularly O₂ & CO₂) in water are directly proportional to the temperature of the water. As we do not want either dissolved gas to enter the boiler, both can cause corrosion problems, we try to maintain as high a feedwater temperature as possible. Condensate returns, live steam injection system and/or deaerators can be beneficial in raising the feedwater temperature. Usually the physical head pressure at the inlet to the feedwater pumps will be the limiting factor on how high a feedwater temperature you can operate at. Too high a feedwater temperature without sufficient head pressure will allow steam to form in the lowpressure inlet side of the pump, commonly referred to as steam cavitation.

• Oxygen Scavengers – As per above discussion on temperature, we don't want any oxygen in our boiler feedwater. As such it's common to dose an oxygen scavenger into the feedwater tank (or hot well) or directly into the feedwater line ahead of the feedwater pump. It's important that the chemical addition is made with sufficient reaction time to scavenge all the oxygen before it reaches the boiler. Most sulfite-based oxygen scavengers are catalysed so the pick-up of oxygen is 10 to 100 faster than un-catalysed sulphite. When cobalt is used as the catalyst it will become inactive at a pH of 9.3 or greater, as such it's important to use a separate mix/dosing tank just for the catalysed sulfite solutions. The cobalt catalyst precipitates as a brown floc, if you see this material collecting in the dosing tank, your catalyst has dropped out. When testing your sampled boiler water it's important to test the sulphite level first as the level can change as your sample picks up atmospheric oxygen when cooling down. Other forms of oxygen scavenger include the below chemicals. Tannin is listed here but acts as both a filming agent (tannate film)⁴, as well as an oxygen scavenger.

- Sodium Sulfite
- Erythorbate



- Diethylhydroxylamine (DEHA)
- Hydroquinone
- Hydrazine
- Carbohydrazide
- Methyl Ethyl Ketoxime (MEKO)
- Tannin

It's important to note that guidance for the control levels of each of these different types of oxygen scavengers is available from the boiler manufacturers or the chemical suppliers. If we take sodium sulfite as an example, you're typically recommended a control level of 30-70ppm reserve be maintained (packaged shell & tube boiler up to 300psig operating pressure). However the author has found through experience that this control level works well for a boiler operated 24/7 but not when the boiler shuts down overnight and/or on weekends. When dealing with an intermittent use boiler it's normally good practice to increase the reserve level to account for offline periods where some additional oxygen ingress may occur. For 9-5 only operation consider 50-100ppm reserves and for lower use boilers, consider 100-150ppm reserves of sodium sulfite.

• Sludge Conditioners – As with oxygen scavengers there are many different formats for sludge conditioner with likely hundreds of proprietary blends. Some will attempt to keep solids in solution, to be removed with surface blowdown e.g., chelant based conditioners. Others like phosphatebased conditioners will seek to form 'fluid' sludges for bottom blowdown removal.

Unlike oxygen scavenger dosing, if the boiler is 'offline' there is no real need to increase the reserve level as without actual feedwater entering the boiler, there is no increase in demand for the sludge conditioner. It's important to note that the boiler sample needs to be filtered prior to testing for a phosphate reserve so it removed calcium/phosphate complexes that could test as reserve phosphate.

• pH (condensate) – We've discussed the breakdown of HCO_3 to CO_3 and finally to OH alkalinity but what wasn't mentioned is that in these conversion reactions, CO_2 is released which as a gas will travel off with the steam. If when the steam cools enough to condense to condensate, the CO_2 dissolved back in as HCO_3 we would be very happy with pH's around the 8.0 level. However, unfortunately when the CO_2 dissolves back into the condensate it forms carbonic acid H_2CO_3 which can lower the condensate pH to levels as low as 4.0-5.0 pH. This low pH condensate can corrode the condensate return pipework especially at the bottom of the pipe exposed to the acidic liquid. Many years ago I heard

of a steam boiler account that 'rotated' their condensate pipework by 90 degrees every 2 years to extend the life of the pipework due to corrosion from 3 years to closer to 10 years.

Conclusion

Well, it seems I've run out of my allotted 5,000-word count. Hopefully this article will be useful to those starting out in the field of water testing and can be used as the nucleus for future learning.

References:

1 - https://en.wikipedia.org/wiki/Iron pillar of Delhi

2 - https://blog.orendatech.com/langelier-saturation-index

3 - https://www.hse.gov.uk/pubns/books/hsg274.htm

4 - https://feedwater.co.uk/sulphite-vs-tannin-oxygenscavenger-treatments

5 – BS 2486:1997 Recommendations for treatment of water for steam boilers and water heaters - European Standards (enstandard.eu)



The various 'Toolbox Talks' referenced throughout this article can be found on the Members Area of WMS website.

The first Toolbox Talk mentioned 'How to Use a Test Kit?' can be found in this edition of Waterline - See pages 46 & 47.



GAIN A CPD POINT BY ANSWERING THESE QUESTIONS ON THIS ARTICLE

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?

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

The answers will be published in the Spring 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.



LEGIÔNELLA DOSSIER

WIN TENDERS WITH THE SUPPORT OF LEGIONELLADOSSIER

A tender procedure is a delicate process: you want to convince your customer that you are able to provide great service. But even if you are the best in your field, you still have to prove it. If you are bidding in a tender as a partner of LegionellaDossier, we will provide you with all the technical support you need to make your bid a success.

Broderick Harper is Business Development Manager at **Water & Air**. Contending in tenders is something Broderick does on a regular basis, he is confident about his company and the services they offer and now incorporates the LD legionella software in his tender presentations. **Read more**



As I work with the software, I become aware of more benefits than I knew before.



We do a lot of tenders and I now have the confidence I need to do all the presentations myself.'



CURIOUS TO FIND OUT MORE?

Get in touch Louis Gane louis@legionelladossier.com +44 7588 371 923



Words from the Editor

Welcome to you winter 2022/23 edition of **Waterline** from Geoff Walker. We are now halfway through meteorological winter, so sunnier and warmer days await us, hopefully accompanied by lower fuel and food costs. 2022 is certainly a year to remember.

As I mentioned in the autumn edition, following the convention of a 3 year term as Chair of a WMSoc committee, and as **Waterline** Editor, this winter edition is the last under my editorship. Supported by the **Waterline** committee and the Secretariat throughout this period, I offer my thanks to them all for their collective support and input. I have enjoyed the challenge immensely.

So the time has come to introduce our new editor and sub-committee chairs, Ian Penney and Pam Simpson.

Thanks Geoff and hello avid readers of *Waterline*. We'd like to take this opportunity to speak directly to you as the new joint-chairs of the *Waterline* Committee and as such the joint-editors, which gives us 'some control' of what goes into our flagship quarterly magazine. However, we're pleased to point out that this control comes from our intentions to run the magazine's editing decisions as a democracy across the full committee.

Before going any further, it's only right to offer a huge thank you to Geoff Walker for his sterling work as editor over the last three years. We're pleased to say, Geoff isn't going away and will still be heavily involved with CPP & Waterscan sections of **Waterline**. Of course, It's only right to thank the whole of the **Waterline** committee for their continued input & support.

So, what can you expect going forward with *Waterline*? Well, what won't be changing is the themed approach to each edition which has been ongoing for quite a few issues now. We will need to keep an eye on the balance between the amount of advertising compared to articles included in each edition. It's important to note that *Waterline*, as a printed copy is quite expensive to produce. Whilst in all surveys of the membership it has come out as the most appreciated membership benefit, the level of advertising needs to ensure it does not become a drain on the Society's resources.

Lastly, it's been noted by a few readers, that not all of the adverts have been exactly transparent in their content. Please appreciate we do not have the time to 'fact check' every advert hence the need for our disclaimer in *Waterline*.

Please remember, we are always on the lookout for new articles, papers and comments letters, and will be looking to get you all more involved in the coming year.

Thanks for listening & happy reading, Geoff Walker, Pam Simpson & Ian Penney

Specialist insurance for the water treatment industry

Do you have adequate cover?

Reich Insurance offers tailored cover for the water treatment industry including specialist extensions, such as:

- Legionella
- Risk management cover
 Cover for business
- Professional indemnity insurance
- Efficacy

 Cover for business contents and equipment

For more information

Call us: 0161 830 5461 Email us: isaac.lowe@reichinsurance.co.uk

www.reichinsurance.co.uk/water

Part of the



Authorised and regulated by the Financial Conduct Authority. 'Reich Group' is a trading style of Reich Insurance Brokers Ltd FRN: 300416 (Company Reg No: 03697314), Reich Life Ltd FRN: 498639 (Company Reg No: 06408048) and Reich Healthcare Ltd FRN: 498659 (Company Reg No: 06839162). Reich Healthcare Ltd is an Appointed Representative of Reich Insurance Brokers Ltd. 'Reich Insurance', is a trading style of Reich Insurance Brokers Ltd.



From the Archive: This article first appeared in waterline Winter 2019-2020

Effect of sample pH on the identification of an NRB in Closed Hot and Cold Water Systems

Pamela Simpson (PhD), Whitewater Technologies Ltd; Richard Jones (MSc), Cheshire Scientific Ltd.

Introduction

A closed re-circulating pipework system is one which, as the name implies, is closed i.e. the water in them is not exposed to the atmosphere and is not significantly depleted due to evaporation or draw-off. The water is permanently enclosed and typically spends all of its time being heated, cooled and re-circulated in the process of delivering heating or cooling.

The potential problems in closed systems can start during construction. In large buildings, heating and cooling circuits can include pipes that are over a metre in diameter. In an ideal world, these pipes would be installed in a clean, debris-free condition but in practice, this is not always the case.

Pre-commission cleaning of closed circuit pipework systems and the subsequent monitoring of water quality are essential in any building. The implications of getting these wrong can be catastrophic. The resulting problems include disruption to occupants whilst systems are re-cleaned or, in the worst cases, complete closure of buildings whilst entire systems are ripped out and replaced due to early failure.

In theory, once the system is put into operation, the corrosion process should be controllable. If there is no replacement of the water in the system, the oxygen in the water should gradually become depleted thereby stifling the corrosion. Furthermore, corrosion inhibitor chemicals (such as nitrite and molybdate) should be added to further reduce the rate of corrosion. However, these may be depleted in a closed system by developing protective layers on pipes or reacting with any remaining oxygen in the water. Of more concern is the realisation that some inhibitors can provide a food source for certain bacteria, known as NRBs, especially if an appropriate biocide has not been dosed or maintained within the system.

Sources of Bacteria and Associated Problems

All natural sources of water (including mains water) contain many different types of bacteria, some of which may multiply and lead to problems within closed systems if they encounter suitable conditions for growth. Mild steel, stainless steel and copper are thought to be particularly prone to microbial influenced corrosion (MIC). For MIC to occur, it is necessary for some types of bacterial species to colonise the metal surface. The extracellular material produced by rapidly multiplying aerobic bacteria species e.g. *Pseudomonas* spp develops into a biofilm (i.e. slime) which produces both aerobic and anaerobic zones. The low oxygen levels within the system and under the biofilm enable anaerobic bacteria, e.g. sulphate reducing bacteria (SRB), to multiply and these species can be associated with localised pitting corrosion.

Another further species often associated with a biofilm is the NRB, *Pseudomonas denitrificans*. This species can enter closed systems via fill or top-up water during commissioning and will multiply if given an adequate food source such as a nitrite corrosion inhibitor. Loss of this corrosion inhibitor may contribute to a decrease in metal surface protection, but also an increase in corrosive ammonia and nitrogen gases within the water system. It is therefore essential to be able to identify the presence of NRB within a closed system to prevent pipe surfaces being left vulnerable to corrosion.

Microbial Water Analyses of Closed Systems and Pitfalls when looking at NRB

Often water analyses can provide useful information about the state of a closed system. However, on occasion, the results obtained for bacteria, in particular NRB, can be misleading and the detection of NRB should be correlated to the water chemistry results. Table 1 illustrates how the detection of NRB is considered unlikely on 4/12/17 as neither TVC nor *Pseudomonas* spp were detected suggesting that the water was of acceptable quality microbiologically. However NRB were recorded as "heavy growth" and the nitrite levels were low suggesting that NRB had consumed the inhibitor. But is this the case?

As *Pseudomonas* spp. are one of many denitrifying bacteria, their presence (certainly if present as "heavy growth") would be detected in the TVC analysis and possibly also in the *Pseudomonas* spp. analysis. Although NRB have specific nutrient requirements for growth, some NRB species (other than *Pseudomonas* spp) may grow on both NRB Sig Nitrite Media and TVC Yeast Extract Agar but may be absent from a Pseudomonas Agar plate. Thus NRB species would always be detected on either TVC or Pseudomonas growth media if "heavy growth" has been recorded in the NRB test.

Table 1 on the next page illustrates the point that the NRB recorded (as heavy growth) may be a false positive, especially in light that no bacteria are recorded for TVC and *Pseudomonas spp.*. Low levels of nitrite inhibitor, in this case, were more likely attributed to the inhibitor being absent or at a low concentration.

In this example, the system water pH was 9.9 (high for a closed system, usually in the range 7 - 9.5) and it was considered that the high pH may be contributing to the false positive of the NRB test. Laboratory techniques often use a Sig Nitrite Test. This utilises the production of ammonia and nitrogen gas by NRB to detect their presence in aqueous solutions. A positive reaction for this test is indicated by a pink colouration of the media as the production of ammonia by NRB increases the media's pH and/or the production of bubbles in the media by nitrogen or other gas production.

Water samples from closed systems often have a high alkalinity and have been shown to produce an instant pink colouration in the Sig Nitrite Media test. The colouration is intensified the longer the samples are left. If looking for a colour change as part of the laboratory protocol, these



samples would be recorded as having "heavy growth" even though NRB are absent, leading to a false positive result and possibly unnecessary re-dosing of a system with biocide.

 Table 1: Typical water analysis for a LTHW closed system.

Date	LTHW System	Pseudomonas spp (cfu/100ml)	TVC at 22°C (cfu/ml)	NRB	рН	Nitrite (mg/L)
4/12/17	LTHW riser L13 Block X	0	<10	Heavy Growth	9.9	<9.9
	LTHW riser L11 Block Y1	0	<10	Heavy Growth	9.9	< 9.9
	LTHW riser L09 Block Y2	0	<10	Heavy Growth	9.9	< 9.9
	LTHW riser L11 Block Y3	0	<10	Heavy Growth	9.9	< 9.9

Controlled laboratory Investigation to Correlate pH with Colour Change

A laboratory investigation was carried out to identify if pH could contribute to a false positive as observed by a colour change. **Figure 1** below illustrated how sterile water samples influenced the colour change when pH was altered.

Figure 1: Effect of pH on the colour change in sig Nitrite Test Media after 48 hours and 5 days respectively.





These tests confirmed that the effects of sample pH on the interpretation of Sig Nitrite Test results were deemed negligible at less than pH 7.4, but significantly altered the colouration above this pH which, for closed systems, would give a false positive result each time.

One other criteria of this test was to look for bubbles of ammonia gas produced by the growth of NRB bacteria within the media. However further studies using water samples inoculated with *Pseudomonas denitrificans* showed that bubbles were not produced by this species at any pH tested. A more intense pink colouration formed however, and it would be advised to set up a sterile blank of the same pH value for samples above pH 7.4. This would then be incubated alongside the sample and used as a comparison to differentiate the pink colouration caused by ammonia production from the pink colouration caused by sample pH. As discussed, *P. denitrificans* may not produce copious gas bubbles in the Sig Nitrite media and this may also be the case for other NRB species, thus it is only possible to rely on the pink colouration caused by ammonia production and differentiate this from the pink colouration caused by high sample pH in order to confirm the presence of NRB.

Conclusion

Closed water systems operate at a water pH in excess of 7.5. The methodology used within laboratories to identify NRB species is known as a Sig Nitrite Test. Often water results are reported as having heavy growth of NRB even in the absence of the detection of *Pseudomonas* species and Total Viable Counts (TVC). Having carried out a study using sterile pH adjusted water, it became apparent that the media used in the Sig Nitrite Test is pH sensitive and a pink colouration occurs in the absence of NRB species at a pH as low as 7.4. Furthermore, the NRB species, *Pseudomonas denitrificans*, did not produce bubbles of gas which are often used as a second indicator of NRB activity within the test. These species did contribute to a colour change within the test media and at a higher pH (i.e. greater than pH7.4 and characteristic of closed systems) it is advised that a sterile pH adjusted control is included in the test to compare the intensity of the pink colouration. It is hoped that by the inclusion of a sterile blank that false positives will be reduced within the closed water industry and avoid any unnecessary addition of biocides and/or system re-cleans.

About the Authors

Dr Pamela Simpson is a Chartered Fellow of the Society of Biology. She established Whitewater Technologies in 1998, before which she spent over eight years working in the speciality chemicals industry, initially as a Technical and European Director of the Industrial Biocides Division of a major chemicals manufacturing and processing company. She has developed a broad knowledge of the application of microbial control techniques in product preservation and antimicrobial surface protection, process water control, and microbial issues within hot and cold closed systems for both healthcare new-builds and commercial premises. She is also an approved trainer for Legionella awareness courses for water treatment engineers. Her recent work involved expert work for microbially-influenced corrosion in a range of commercial and healthcare buildings of hot and cold closed systems. She was on the Steering Group for the writing of BSRIA BG50/2013: Water treatment for closed heating and cooling systems.

Richard Jones (MSc) is a skilled and confident microbiology technician at Cheshire Scientific Laboratories, with 8 years experience in bacteriological water analysis using a broad range of traditional culture and molecular biology assays, further expanding his skill set in 2017 by obtaining a MSc Biomedical Science Distinction.



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.

Four women chosen to run Antarctic post office....and count penguins

It was one of the strangest of job alerts: a call to run the world's most remote, coldest post office – on an island with no permanent residents – and count penguins in almost continuous daylight. However it struck a chord: 6,000 people applied for the four jobs on Goudier Island in Port Lockroy, and now the winners have been announced: a newlywed, who will leave her husband behind for what she is calling a "solo honeymoon" and three other British women, who are equally thrilled by the adventure ahead.

Mairi Hilton, Lucy Bruzzone, Clare Ballantyne and Natalie Corbett, have been picked by the UK Antarctic Heritage Trust charity to exchange their home comforts for five months spent in sub-zero temperatures, with no electricity or flushing toilet, sleeping in bunk beds – and they say that they could not be more excited.

Natalie, the 31-year-old newlywed, is from Hampshire, where she runs a pet accessories business. She will be in charge of running the gift shop in the oldest permanent British base on the Antarctic Peninsula. The site has not had visitors for more than two years because of Covid but usually welcomes about 18,000 people a year, between November and March, the Antarctic summer.

Thames Water hosepipe ban to stay in force until 2023

A temporary hosepipe ban affecting 10 million people across the south of England is expected to remain in place until next year, Thames Water has announced. The ban came into force across the Thames Valley and London on 24th August. Andrew Tucker, Thames Water's water demand manager, said that there was no definite date for when the hosepipe ban would end but confirmed it was unlikely it would be lifted until the new-year. He said: "We are still trying to recover from a really tough year that Mother Nature threw at us. Ten of the last 12 months have been below average rainfall. We've had a little bit in September and we can see the grass is now greening up but an average September doesn't make up for 10 months of dry and record heat.

Mr Tucker added that it was a national issue, with most of England and Wales still declared as in drought by the National Environment Agency. "We've got to make sure that we've got enough water going forward for everyone in the longer term," he explained.

Vast marine protected area 'boosts tuna stocks'

A huge marine reserve in the Pacific Ocean has led to the recovery of tuna and other migratory fish around its borders, according to a study. The Papahānaumokuākea Marine National Monument in Hawaii is almost four times the size of California. Fishing is banned inside the zone, but a spillover effect has boosted tuna stocks in nearby waters, scientists have found. Marine protected areas, or MPAs, act as sanctuaries for marine life. Scientists on board fishing boats found that the marine protections put in place had also boosted tuna species just outside the marine reserve. Catch rates for yellowfin tuna had increased by 54%, bigeye tuna by 12% and all fish species combined by 8%, according to the research, published in the iournal. Science.

It's likely that the size of the protected area and the homing behaviour of some tuna species in the region played a role in the positive effects observed, they said. "It's important to point out that this protected area was not created with the intention of protecting tuna," said Professor John Lynham from the University of Hawaii at Mānoa. "This fish benefit was a happy accident of the initial intent, which was to protect biodiversity and culturally important areas."

British kayaker rescued halfway to France in just his trunks

A British kayaker wearing only swimming trunks has been found clinging to a buoy in the middle of the English Channel after his inflatable kayak capsized. The man claims to have set out from Dover heading for France.

He was found by a Dutch fishing crew, clinging to a buoy halfway been England and France, where he had apparently been for about 48 hours. The unnamed castaway was hauled to safety by the crew of De Madelaine after being spotted by

the captain, Teunis de Boer, as they were sailing between England and France. Mr De Boer noticed him "waving like a madman"

after a "disappointing" morning's fishing. The crew immediately threw the man a lifebuoy and hauled him aboard. According to a Facebook post by de Boer, the man had severe hypothermia his temperature was 26C - dehydration and was covered in bruises. He said that it was a miracle he was alive.

The rescued Brit later commented to reporters: "I dragged my kayak onto the buoy but it was punctured and sank. It cost me £150 from Argos."

Poor toilet facilities in London 'fuel social isolation'

Most Londoners (81%) say that public toilet provision in their borough is bad, with only 3% of people surveyed reporting that it is good. The poll also reveals that nine in 10 Londoners (90%) sometimes or always consider whether there is a public toilet available before leaving home. The London Loos survey was undertaken by charity Age UK as part of its Out and About campaign, which seeks to tackle the root causes of social isolation and loneliness among older people. One reason older people might not go out as much as they would like to is the worry that they will not be able to access a toilet when required.

Respondents also said places where the provision of toilets was poor included high streets (70%) and parks (47%). In terms of what was regarded as most important when it came to public toilets 48% said cleanliness, followed by opening times (25%) and accessibility (13%).

Abigail Wood, CEO of Age UK London, said: "Good public toilet provision is a hallmark of a civilised society and the fact that 81% of people think that the availability of toilets in their borough is bad is a scandal. The 'loo leash', where people don't leave their homes as much as they might like because of worries that they will not be able to find a public toilet, is a significant cause of social isolation." "Last year we called on local authorities across London to think of public toilets as part of their public health responsibility."

The research reveals that over half of Londoners sometimes reduce the amount they drink because of concern about the lack of available public toilets at a particular location. Wood said: "This finding is shocking as dehydration is associated with ill health among people of all ages but especially older people, from infections to dizziness that can cause falls."

Age UK London is calling on councils to adopt local toilet strategies to monitor and improve local provision. It is also calling for more Community Toilet Schemes, whereby the local council supports businesses in their borough that allow non-paying customers to use their facilities. In the survey three in four people said they did not feel confident asking to use the toilets in a café or shop where they had not spent money, but four in five said they would feel confident asking if the business was part of a Community Toilet Scheme. The survey was carried out from May to June 2022 with 637 respondents.



Did great white sharks lead to demise of the megalodon?

A prehistoric food fight may help explain the mysterious disappearance of megalodon, the world's biggest shark. It may have found itself in a losing battle for prey with great whites, suggests an analysis of zinc in ancient tooth enamel of both types of shark.

It has been an estimated 3.5 million years since the last megalodon died, but the reason for the giant carnivore's demise remains a mystery. Previous research suggests megalodon may have struggled to find enough food to meet their huge appetite, and Kenshu Shimada at DePaul University, Illinois, and colleagues were eager to find out more about its place in the food chain. Their paper was published at: *Nature Communications*, DOI: 10.1038/s41467-022-30528-9

Megalodon's roughly 15-metre-long body contained a skeleton made of cartilage – which doesn't fossilise well – so researchers are left with the animals' palm-sized teeth for clues about how it lived. "My collaborators and I wanted to see if we could decipher the diet of megalodon and other extinct sharks, including the prehistoric great white shark, using zinc isotopes preserved in fossilised teeth," says Shimada.

Using a dental drill to collect tooth enamel, the team sampled 20 living shark species and 13 extinct species including megalodon. They then compared the varying levels of zinc trapped in the 262 individual teeth. Zinc is essential for animal life and is mostly sourced from diet – with the exact balance of zinc isotopes in the diet, and hence tooth enamel, indicative of the type of food an animal has eaten.

The researchers found that the zinc isotope ratio in megalodon's sample closely matched that of ancient great white sharks. Because both species had low levels of zinc in their tooth enamel, they probably shared a similar apex predator position during the early Pliocene, about 5 million years ago, when the two co-existed.

Shimada notes that previous evidence of fossilised bite marks points to the fact that great whites and megalodon probably shared a diet of small whales, seals and sea lions. While there may have been multiple reasons for megalodon's extinction, Shimada says he is "very excited" to see that their study offers more evidence that competition for food with great whites was a factor.



UK response to Nord Stream gas pipeline blasts

A Royal Navy frigate has been sent to the North Sea to support Norwegian authorities working near the Nord Stream gas pipelines impacted by reported attacks.

In a statement, the UK Ministry of Defence said: "The Joint Expeditionary Force met today and discussed coordinating security responses following attacks on the Nord Stream pipelines, including increased maritime presence". "A Royal Navy frigate is in the North Sea, working with the Norwegian Navy to reassure those working near the gas pipelines."

A few days ago, Defence Secretary Ben Wallace unveiled the government's plan to order 'specialist' vessels for surveillance across areas accommodating cables and other critical infrastructure. Mr Wallace added: "In this period of heightened concern for all like-minded partner nations, it is right that we act with speed, agility and collective resolve to actively demonstrate our shared commitment to mutual security." Norway, Europe's main gas supplier, said it had deployed soldiers to guard onshore oil and gas processing plants.

Water voles make a comeback in the New Forest

Endangered water voles are ready to recolonise the streams and rivers of the New Forest. This comes 24 years after animal activists inadvertently wiped them out when they released 7,000 mink from a fur farm.

In 1998 members of the Animal Liberation Front raided the farm in Ringwood and slashed open cages to let out the voracious predators. At the time ecologists slammed the act, saying the marauding mammals would endanger local wildlife which could take years to recover.

About 2,000 of the escaped American mink were shot or run over by local farmers and landowners or caught in traps. Among the native species targeted by the carnivorous creatures was the local population of water voles.

Numbers of water voles in the UK have massively declined in recent years due to habitat loss, housing development and pollution, but in the New Forest they were obliterated by the impact of the mink. It has taken more than two decades for the invasive mink to disappear and now experts have deemed it safe for water voles to make a return.

Ecologists at the Environment Agency have released 50 voles that have bred in captivity into a secret stream near Ringwood. They have joined a handful of wild voles that had to be relocated from a waterway in nearby Salisbury.

Another 50 voles will be introduced to the same location next spring. It is hoped the rodents will quickly breed and recolonise the waterways of the New Forest. By 2027 it is expected that there will be a population of 1,000 of them.

Andy Wallis, of the Environment Agency, said: "Over the last 40 years the water vole population has dropped by 90 per cent. They are one of the most endangered species in the UK. We really need about 50

voles to create a survival population."

RRS Discovery departs on 9,000-mile expedition

A research ship has left from Southampton on a 9,000-mile expedition to the South Atlantic Ocean. The Royal Research Ship (RRS) Discovery is making the six-week voyage to survey the seabed off Ascension Island and St Helena. During the trip, the team of scientists on-board will use underwater cameras to explore hydrothermal vents on the 4,000m deep (13,123ft) seabed. They hope to gather and analyse samples and find previously unknown species.

The ship is sailing as part of the UK Government's Blue Belt Programme - an international maritime conservation scheme. St Helena and Ascension have been chosen as they are home to two of the world's largest Marine Protected Areas and host a variety of species, such as whale sharks, yellowfin tuna, humpback whales and green turtles. The RRS Discovery is equipped with dry and wet labs for the scientists to store and analyse the samples collected, as well as state-of-theart survey equipment such as the deep-water cameras.

The team will also be monitoring human activities, such as illegal fishing in the protected waters. Lord Goldsmith, minister for climate and environment, said "This is the latest example of British science leading the way in understanding and protecting our oceans for future generations. The knowledge the survey contributes will help us understand the abundance of rare species in need of our protection and I am incredibly excited to see what the scientists find."

The ship left on the $\rm 27^{th}$ October and is expected to arrive in early December.

Man loses arm to alligator and survives in swamp

A Florida man survived for three days in a swamp after an alligator ripped off his arm while he was attempting to swim in the lake - a move he admits was 'not the smartest decision a Florida boy can make.' Eric Merda, 43, from Sarasota, was visiting the Lake Manatee Fish Camp in Myakka City on July 17 when he got lost. He said he came upon the water and decided to swim across.

'I look over and there's a gator on my right-hand side,' he said. 'She got my forearm so I grabbed her like this, she was trying to roll by.' Merda said he was dragged underwater three times, but he fought back, and eventually, the alligator left - with his arm.

Merda said he walked for three days until he found a fence and saw a man who he asked to help. "I said a gator got me arm, he said, 'holy smokes man!'" The rescuer said he found Merda naked and bloodied in the swamp. 'I didn't know if he was dead or alive when I first walked upon him,' the rescuer said.

Merda was immediately flown to Sarasota Memorial Hospital, where doctors amputated the remnants of his arm. An alligator trapper was dispatched to the scene, but it is not known if the animal which attacked Merda was found. There have been at least six alligator attacks near Tampa so far this year, it is reported.

Fatal alligator attacks are rare in the United States, typically occurring about once a year.



Improved water quality comes at a cost

Better water quality has been linked to smaller cockles growing in Wales, new research has revealed. Cockles have been harvested along the south Wales coast for centuries with the Burry Inlet and Loughor Estuary, near Swansea, being the main habitats. The Swansea University study, which has looked at 50 years of data, also found a higher mortality rate.

Marine biologist Dr Ruth Callaway said the findings were "baffling". Following her study, she argued the change was likely to be a natural adjustment and said she believed smaller cockles may be just the price we have to pay for cleaner water in Loughor.

Between 1958 and 2009 water quality around the south Wales coast has been massively improved and before 1997 wastewater effluent was discharged into the estuary from seven sewage plants. This was modernised with two new plants using treatment processes that disinfected the effluent and removed the nitrogen. This meant cleaner, healthier water for humans. Although the estuary is still subjected to sewage outlets, there seem to be fewer nutrients to sustain cockles. "Studies of cockles across south Wales show they're amazingly adaptable to their

surroundings," she said. "We've found healthy cockles in the Bristol Channel's most polluted waterways, such as Port Talbot harbour. However in the Burry Inlet they've been smaller and less commercially viable, it's a question which has been baffling all of us."

Untreated sewage releases nitrogen into the water, encouraging the growth of algae, on which cockles feed. As the water has got cleaner, adult cockles have been unable to grow to their maximum size, though their numbers have increased.

"It's very easy to age cockles, they grow rings like trees," she added. In the past dominant adult cockles could live for up to three or four years, however in cleaner water, they tend to die inside a year or two.

"Since the change in wastewater treatment there are more cockles,

but maybe not in the size which people want to eat.





waterscan

Can an enormous seaweed farm help curb climate change? Imagine a huge 20,000 sq. mile seaweed farm floating in the South Atlantic between Africa and South America. A UK businessman plans to have this up and running by 2026. Spinning in a natural ocean eddy, it is designed to suck a billion tonnes of carbon out of the atmosphere every year and sink it to the ocean floor out of harm's way. Businessman John Auckland wants to exploit what he calls "the wondrous properties" of the

floating seaweed sargassum. He's confident his Seafields floating farm will draw sufficient CO2 from the air to moderate the effects of climate change, while also earning its backers carbon credits.

At 55,000 sq km (21,200 sq miles) Auckland is thinking big. It needs to be vast to put a dent in the fifty gigatonnes of carbon dioxide we pump into the atmosphere every year. A gigatonne is a billion tonnes: the amount of carbon Auckland's mega-farm aims to capture annually. The project is currently road-testing its technology in the Caribbean and Mexico, and is inspired by the ideas of Prof Victor Smetacek, a marine biologist. Described by Seafields as their Scientific Founder, he has long been fascinated by the potential to grow seaweed in enormous rotating ocean currents known as gyres. "They collect all kinds of stuff in the middle," he says. "The best known examples, of course, are the plastic garbage that is accumulating in the middle of the subtropical gyres.

In the same way these giant eddies trap islands of floating plastics, Seafields plans to hem in its crop of sargassum. "The gyre just stops the sargassum from escaping," explains John Auckland. "As long as we create the right conditions for it, it will only grow there. If any escapes from our farm, it will just die off or just fail to continue growing."

Shetland cut off from mainland after trawler cuts cable

A major incident was declared in October by police after residents of the Shetland islands were left without a phone and internet connection due to a break in the subsea cable connecting their homes to mainland Scotland.

Police Scotland worked with the Scottish Fire and Rescue Service and HM Coastguard to bring additional emergency support to the island.

Operator BT said the break was in a third-party cable and that engineers were working to divert services via other lines as soon as possible. A BT Group spokesperson said: "Due to a break in a third-party subsea cable connecting Shetland with the Scottish mainland, some phone, broadband and mobile services are affected. Our external subsea provider is also looking to restore their link quickly. Anyone who needs to call 999 should try their landline or their mobile, even if they don't have a signal from their own mobile provider."

The severed cable runs from the Faroe Islands to the UK mainland via Shetland and is understood to have been damaged between the Faroe Islands and Shetland by a UK registered trawler.







In a series of filmed experiments, researchers from the University of Minnesota discovered octopuses always attack their prey using the second arm from the middle of their body. The scientists studied the California two-spot octopus, which lives for around two years and grows to the size of tennis balls. The team dropped different types of prey, including crabs and shrimps, into underwater tanks while the octopuses hid in ornamental "Spongebob-style" dens with one eye facing outwards. The team then recorded in slow-motion each octopus lunging forward, entrapping and eating their prey.

The octopuses were found to use slightly different hunting tactics for crabs and shrimps, which move at different speeds. When hunting crabs, octopuses pounced on the prey from above with a cat-like movement, leading with the second arm. Yet for shrimps, which can flick their tails to escape quickly, the octopuses adopted a more stealthily approach. They led with their second arm and after making contact, they used their first and third arms to entrap the shrimps. The octopuses were also found to use their arms on the same side as the eye viewing the prey. Trevor Wardill, an assistant professor at the College of Biological Sciences, who studies

octopuses and other cephalopods, added: "Normally when you look at an octopus for a short while, nothing is repeatable. The surprising thing with octopuses that the general public may not understand is they hunt with just one eye. So there's one eye looking out into the world in one direction, and one eye looking in the other direction. And so the eye that spies the food item... will then be directing arms towards the prey. And they'll always, and I mean always, use arms on the side that the eye is pointing towards the food item."

Svalbard: The race to save the fastestwarming place on Earth

Deep inside the Arctic Circle, the Norwegian archipelago of Svalbard is home to the world's northernmost permanent settlement, Longyearbyen, which is estimated to be heating at six times the global average. So what is being done to save it?

You need a gun whenever you venture from the main road of Longyearbyen, the capital of this Norwegian archipelago, because of the risk of encountering polar bears. Diminishing ice has reduced their hunting ground which means it is harder for them to find seals. So more bears are exploring built-up areas in search of food and are now eating reindeer - not their usual prey. And with the rising temperature causing an unprecedented thawing of frozen ground, the growing risk of avalanche hangs over this Arctic community in winter. In summer, mudslides are more likely than ever to wipe out everything in their path. Since the 1980s, the amount of summer sea ice has halved and some scientists fear it will be gone altogether by 2035. This - combined with an avalanche that hit Longyearbyen in 2015 - focuses the mind. The avalanche claimed the lives of two people. They were Svalbard's first deaths from climate change.

Few understand the archipelago better than Kim Holmén, a special advisor at the Norwegian Polar Institute who has been studying Svalbard for more than 40 years. "We have already committed the planet to further warming," he says. "So we expect 20 years of further warming even if we, by magic, stopped every emission today. The fate of this place is inextricably linked to that of the world as a whole."

Despite its extremity, Svalbard is a geopolitical hotspot. Even here, the war in Ukraine is having an effect. The conflict has now halted cooperation between climate scientists in Russia and in the West, Holmén says. "One of the consequences is that the official exchange with Russian institutions is not possible at this time. And of course, half of the Arctic is Russian coastline." Already, this has weakened the fight against climate change, Holmén believes.

Turning sewage into fertiliser

Human sewage may need to be repurposed to fertilise crops as the world moves away from fossil fuels, scientists have warned.

University College London (UCL) has warned that a looming global sulphur shortage could dramatically cut the amount of phosphorus fertiliser available for farming, threatening global food supplies. Currently, more than 80 per cent of the world's sulphur supply comes as a by-product of oil and natural gas production, both of which need to be "de-sulphurised" before use.

Sulphur is not only required for the production of phosphorus fertilisers, but also for extracting rare metals from ores essential for the switch to a green economy, such as cobalt and nickel which are used in high-performance lithium batteries.

Researchers have found that as the world moves away from fossil fuels, the amount of sulphur produced will not keep up with fertiliser or green economy demand. It may be necessary in the future to harvest phosphorus from human wastewater to make up for the shortfall, they said.

Professor Mark Maslin, the study's lead author, from UCL's Geography department, said: "What we're predicting is that as supplies of this cheap, plentiful, and easily accessible form of sulphur dry up, demand may be met by a massive increase in direct mining of elemental sulphur. This, by contrast, will be dirty, toxic, destructive, and expensive."

Dr Simon Day, the study's co-author, from UCL's Institute for Risk & Disaster Reduction, said: "Our concern is that the dwindling supply could lead to a transition period when green tech outbids the fertiliser industry for the limited more expensive sulphur supply, creating an issue with food production particularly in developing countries."



More than just a chemical manufacturer...

OWN LABEL CHEMICALS

Extensive range of water treatment chemicals & toll blending options. All products labelled to your specification.

BESPOKE EQUIPMENT

Make use of our engineering expertise with innovative and bespoke dosing equipment to add value to your offering.



DELIVERED DISCRETELY

Save time & money by getting your chemicals delivered direct to site. With options for handsfree chemical pump-over into onsite tanks.

UNRIVALLED TECHNICAL ASSISTANCE

Here to help you succeed with expert assistance available from in-house chemists & microbiologists including access to our chemistry and UKAS accredited micro labs.

- Save Time
- Save Money
- Add Value
- Keep your Customers Compliant

Vacuum based CIO₂ generation - the safer way Legionella control / Process Water Disinfection





Lutz-Jesco GB Ltd., Unit C1 Loades Ecoparc, Blackhorse Road, Coventry CV7 9FW. T: 02477 103306 W: www.lutz-jesco.com/uk E: tosh.singh@lutz-jesco.com





Floating turbines – can they operate efficiently?

Ten miles off the coast of Aberdeen in Scotland, five turbines tower over the North Sea. Each is as tall as the giant towers of Canary Wharf in London's docklands.

Kincardine is the world's largest floating wind farm. It helps solve an engineering riddle. And its designers believe it shows how offshore wind can become a truly global energy source.

In much of the world, the seabed takes a sudden dive close offshore, ruling out the use of conventional offshore wind turbines. These are built up from the sea floor on concrete foundations and can only be deployed in relatively shallow water, up to about 60m.

The solution sounds obvious - installing turbines on floating platforms. However the turbines at the Kincardine wind farm must stand tall in the heaviest swells and fiercest storms the North Sea brings their way. The success of the technology draws on Britain's expertise in offshore engineering, honed as it developed the oil and gas resources in the North Sea.

Each tower sits atop three huge cylindrical floats. They are painted bright yellow and welded into a triangular platform each side of which is 67m long. This is not a passive structure, explains Greg Campbell-Smith, of Principle Power, the UK. The floats need to adapt to changes in the wind and sea conditions. In strong winds the tower "heels" or leans away from the wind, says Mr Campbell-Smith. A network of pumps and valves shift liquid ballast between the three floating cylinders to rebalance the platform and set the turbine at the ideal angle for the wind. Below the surface, weighted subsea cables attached to huge anchors make sure the platform is firmly secured to the seabed. Principle Power claims the Kincardine facility proves the potential of floating wind. It says it produces enough electricity each year to power 35,000 British homes. But it faces stiff competition. Companies around the world are producing their own designs for floating wind platforms. Last month the US government offered \$50m of new funding to encourage American companies to install 15GW of floating wind in US waters by 2035.

UK sewage spills into Channel could be breaching Brexit deal, says European Commission

Sewage spills in the English Channel could be breaching the UK's Brexit trade agreement deal the European Commission has said.

French European lawmakers have urged the European Union's executive to take measures to end British discharges of raw sewage into shared waters, part of what they say is an unacceptable lowering of environmental standards since Brexit. Three leading French members of the European Parliament said in a letter to EU Environment Commissioner Virginijus Sinkevicius that they feared harm to marine biodiversity and activities of the fish and shellfish sector.

British water treatment facilities temporarily discharge raw sewage into seas and rivers if they are inundated by heavy rainfall and risk flooding. Environmental campaigners say such discharges are becoming more common.

England and Wales regulator Ofwat and the Environment Agency have launched investigations over the past year into several water companies that admitted they might be making unpermitted sewage discharges.

Now, Brussels has shared its "deep concern" over the discharges, saying it could cause seafood to be contaminated. The commission claimed pollution of coastal waters could potentially breach commitments made on both sides that they would not weaken environmental standards.

There are fears that it could lead to another Brexit row.

Platypus populations impacted by large river dams

The platypus is possibly the most irreplaceable mammal existing today. They have a unique combination of characteristics, including egg-laying despite being mammals, venomous spurs in males, electroreception for locating prey, biofluorescent fur, multiple sex chromosomes, and the longest evolutionary history in mammals.

Platypuses are a threatened species in some Australian states and their conservation is of concern more broadly, due to known decline in their populations. A new study published in Communications Biology examined the genetic makeup of platypuses in free-flowing and nearby rivers with large dams in New South Wales. These included the free-flowing Ovens River, along with the dammed Mitta Mitta River, and the free-flowing Tenterfield Creek, along with the nearby Severn River regulated by a large dam.

The study found that large dams are significant barriers to platypus movements. This movement restriction of platypuses, separated by large dams, means that there is limited or no gene flow between groups, making these separate populations increasingly vulnerable to threats. There is increased possibility of inbreeding depression, loss of adaptive genetic variation, failure to recolonise areas where local extinctions have occurred, and failure to disperse to areas with more suitable conditions. The paper is titled *Fragmentation by major dams and implications for the future viability of platypus populations*. Communications Biology, 2022; 5 (1) DOI: 10.1038/s42003-022-04038-9

Swordfish sighted in Manx waters for the first time

A swordfish has been seen off the coast of the Isle of Man for the first time, a conservation charity has said. The 3m fish was spotted off Niarbyl in the west of the island at the end of August.

Volunteers from Manx Whale and Dolphin Watch captured images of the fish while carrying out a boat-based survey of marine life in Manx waters. Jen Adams, from the charity, said it was "really amazing" to see the fish in the Irish Sea for the first time.

Swordfish are usually found in the Northwest Atlantic and the Mediterranean Sea and are listed as near threatened on The International Union for Conservation of Nature Red List.

Ms Adams said the charity's research boat was about five miles (8km) off the coast of Niarbyl when they spotted it. "We saw a splash in the water and assumed it was a dolphin," she said. "When it looped out of the water again the two guys with binoculars said it was definitely a swordfish, because they have a very distinctive sword-shaped bill."

After the initial sighting, the boat's engine was turned off and the swordfish approached and spent about 15 minutes "just pottering about", Ms Adams said. "I couldn't believe it, I thought I was dreaming," she added.

It is not known why the migratory oceanic fish had ended up in Manx waters but it is unlikely that it is still in the area as the solitary predators can travel at speeds of up to 37mph (60km/h) when hunting, the charity said.

Scientists discover six new species of rain frog in Ecuador The new species were all found on the eastern slopes of the Ecuadorean Andes, in two national parks. However, the scientists who discovered them have warned that all six Pristimantis species were found within a 20km-radius of deforested areas. They recommended that they all be added to the International Union for Conservation of Nature's (IUCN) red list of threatened species. There is a huge diversity of Pristimantis frogs with more than 550 different species living in areas ranging from eastern Honduras through the Andes to northern Argentina and Brazil. Colombia and Ecuador have the biggest wealth of species of these little land-dwelling frogs and scientists think there are many more species yet to be discovered. This latest discovery was made by Ecuadorean herpetologists Jhael Ortega, Jorge Brito and Santiago Ron.

Mr Ron explained in a tweet that they had decided to name one of the species, resistencia, (resistance) in honour of all the environmental activists killed in Latin America.

According to a report by advocacy group Global Witness, more environmentalists were killed in Latin America than any other region in the world last year. "Alba Bermeo was assassinated on Friday 21st

October for opposing mining in Azuay, Ecuador, another victim," the tweet adds, referring to the killing of a 24-year old campaigner last week.

Pristimantis cruentus frog



North Sea 'Bounty'

TAX revenues from North Sea oil and gas have increased to almost £8 billion in the first nine months of 2022, according to research. Figures from the Aberdeen and Grampian Chamber of Commerce show the UK Government's tax take has increased nearly seven-fold from the same period last year.

A windfall tax for the energy sector was introduced in May, which brought in a 25% surcharge on extraordinary profits from energy companies. Chancellor Jeremy Hunt is understood to be considering raising this further in order to improve the UK's fiscal position.

The chamber of commerce analysed tax receipt data from between January and September this year, finding that offshore companies paid £7.9bn in tax. This would be a 692% increase on the same period in 2021.

Ryan Crighton, policy director at the chamber of commerce, said: "North Sea companies are contributing enormously to the financial help being offered to businesses and families, while at the same time working tirelessly to increase the UK's domestic energy production to keep the lights on this winter. The suggestion that their reward for this should be a second windfall tax is, frankly, outrageous. The case for a windfall tax on excess profits in the energy sector was always that the extra revenue wasn't planned for and was a consequence of the war in Ukraine."

He added: "However, that same conflict has sent inflation soaring in the UK, which in turn has driven up interest rates and therefore the cost of our mortgages. So, you could make the exact same case for a windfall on bank profits."



Reservoir levels still falling in parts of Wales

A hosepipe ban imposed on parts of Wales has been lifted - but Welsh Water warned some reservoir levels are "continuing to drop". They have called on customers to avoid wasting water so its 91 reservoirs have a chance to refill.

This year has had one of the warmest summers on record and the driest year since 1976. A two-month hosepipe ban covered parts of Pembrokeshire and Carmarthenshire served by Llys-y-Fran reservoir. Welsh Water said: "While rain is now falling and helping some reservoirs like Llys-y-Fran, the rain isn't heavy enough or lasting long enough to have a significant effect on levels at all reservoirs. This is particularly true of reservoirs in the south east of Wales where levels at some reservoirs are continuing to drop."

The ban, which was lifted in mid-October, had been introduced after the reservoir, near Haverfordwest, "fell into drought".

"We are not out of the woods yet," said Ian Christie, managing director of Welsh Water's water services. "Over the past six months, Wales has had one of the longest and driest periods on record and in September only saw 50% of the long term average rainfall," he said. "Our reservoir levels in some areas - particularly south east Wales - are far lower than they would normally be at this time of year. The forecast for a drier than average autumn, with only limited rain expected in the immediate future is a concern."

Mr Christie added: "While we always ask customers not to waste water, we're encouraging all customers to only use what they need over the autumn and winter to help ensure our reservoirs refill as quickly as possible and that there is sufficient water for all our customers next summer."

Lack of water blamed after Gower wedding venue destroyed by fire

A fire which destroyed a wedding venue because fire crews could not get enough water from the mains has sparked calls for pipes to be upgraded. Crews tried to tackle the blaze at Ocean View in Llanrhidian, on the Gower peninsula near Swansea, but a mains crack meant they had no water. Lynne and Vivian Pearce, who own the venue, said 12 years of work had been destroyed. They praised the fire crews who they said did their best but once their on-board water ran out they found the mains supply was giving no water due to the pipe break. Gower councillor Richard Lewis said the fire showed the ongoing danger to many homes and businesses in the area, due to an "archaic low pressure system". He understands improving the system would take years but believes a water bowser - a giant mobile tank of water - should be based in the area. He has already met Welsh Water and Mid and West Wales Fire and Rescue Service, but said he was not satisfied by responses which did nothing to improve matters. "I know of at least one other major fire recently where the lack of water meant a smaller fire could not be contained and a large fire caused major damage," he said. "If they are not going to renew the water system

- and that is going to take 20 years if they ever do it - the fire service could bring a water bowser to the Reynoldston fire station. The whole of Gower is affected. There are 3,000 houses in Gower and any one of those, including my own, could burn down at any time. I am very angry."

A fire service spokesman said "dealing with fires in rural areas can mean sufficient mains water supplies are not always easily accessible". Welsh Water said it had met the fire service following the concerns raised locally. But a spokesman added: "We can confirm there are no concerns relating to water capacity for firefighting purposes in this area."

Water meters should be compulsory says new Environment Agency chairman

Water meters should be made compulsory and bills should rise to help households cut their use and tackle looming supply shortages, the new chairman of the Environment Agency (EA) has said. Alan Lovell, who took up the role in September, said households use "too much water" and metering was necessary to encourage them to cut use by around a quarter.

"I think that metering should be mandatory where it can be," he told a parliamentary committee on water industry regulation. "It's not quite as simple as it sounds because in some apartment blocks it's difficult to do it. But where it can be, I think it should be."

The EA has warned that parts of England could run dry within 25 years because of a combination of climate change and population growth. Currently, only water companies in areas that are classed as being under serious water stress can roll out compulsory metering in their area, and they must show there is customer support, it is cost-effective to do so, and they have considered other options. In those areas, households cannot refuse to have a meter installed, although switching from a flat rate can increase bills in larger households, particularly if they have more people than bedrooms. Sir James Bevan, the EA chief executive, said legislation would be needed to have universal compulsory metering, but added that the agency supported water companies encouraging households to install them.

The National Infrastructure Commission, which advises the Government, has called for them to be introduced across the country by 2030.

Morning cuppa during pregnancy affects babies' height

Drinking just half a cup of coffee per day during pregnancy can knock nearly an inch off a child's height, an official study suggests. Minors born to women who consumed 50mg of caffeine each day were 2cm (0.8in) smaller than their peers by the age of eight. 50mg of caffeine is typically found in a half cup of coffee or a full cup of tea. The finding remained even after adjusting for other factors that affect a child's height — including their mother's age, smoking status and income. Researchers say the results — based on an analysis of 2,500 boys and girls across the US — show expectant mothers should abstain from coffee entirely. Current US guidelines recommend pregnant

women limit their daily intake to about 200mg. The average 8oz coffee contains about 100mg of caffeine. NHS guidance also recommends no more than 200mg per day, and states that over 300-350mg per day research links to lower birth-weight, premature births and in some cases miscarriage. Caffeine is thought to constrict blood vessels in the womb and placenta, which could reduce the blood supply to the fetus and stunt growth. The study is the first of its kind to use blood tests to measure pregnant women's caffeine intake rather than surveys. which are less reliable.



Ministers admit missing legally binding water and nature targets

Rishi Sunak's government has delayed legally binding targets aimed at curbing pollution and restoring nature. The government said its 31 October deadline for setting targets to improve water, air and wildlife would be missed. MPs and green groups said failing to hit the deadline ahead of the COP27 climate summit was embarrassing for the UK. The delay comes as the prime minister faced criticism for skipping COP27. Political opponents and environmental campaigners accused Mr Sunak of a "failure of leadership" for deciding not to attend the conference in Egypt in November. Mr Sunak later changed his mind and agreed to attend. The delay of environmental targets raises further guestions about Mr Sunak's commitment to prioritise green issues as his government grapples with economic turmoil at home. The government had planned for the targets to be ready before the COP27 summit, where the UK's delegation would have been able to present them to other nations. Environment Secretary Therese Coffey said the government would not be able to publish the targets by 31 October, "as required" by law. She cited the "significant public response" to a government consultation on the targets as the reason for the delay. She said the government received over 180,000 responses to the consultation, which asked for public feedback on its target proposals and closed on 27 June. Those responses "needed to be analysed and carefully considered", Ms Coffey said, but gave no new date for the publication of the targets. She said the government would "continue to work at pace" to publish the targets and bring them before Parliament, where they will need to be approved to come into force.

Broken bodyboards recovered from South West beaches falls by a third

Following the success of a hire scheme roll out, Keep Britain Tidy revealed that 1,011 bodyboards were collected this summer, down from 1,503 last year. Supported by community groups, beach owners and other organisations the charity collected boards from Croyde Bay, Saunton Sands, Bude, Newquay, Perranporth and Polzeath. Keep Britain Tidy first raised the issue in 2010, going on to educate visitors about the environmental impact of the cheap plastic boards, which are made up of harmful plastics. Supported by holiday resorts and leisure outlets, last summer the charity launched a £1 hire scheme for visitors to rent.

Neil Hembrow, from Keep Britain Tidy's Ocean Recovery Project, said: "Our hire scheme is helping as part of the bigger drive to eradicate these cheap boards. Since we started to raise awareness, some local shops are now refusing to sell them or are changing their stock to higher quality boards." The 'Wave of Waste' hire scheme has seen the charity supply resorts with quality bodyboards to rent to their guests in order to stop demand for cheap disposable boards.

Neil added: "We want to remind visitors to our beautiful coast that while some bodyboards may be 'cheap' to buy they are very costly for our environment." The poor quality of polystyrene bodyboards means many snap after just a few uses and are either left to pollute the marine environment or end up in landfill. The broken plastic boards have been transported to

Devon where they will be reused as insulation for an eco-barn construction.

Fishing contest cheats leave angling world 'gutted'

The county prosecutor's office in Cleveland has opened an investigation into a cheating scandal during a lucrative fishing tournament on Lake Erie. A video posted to Twitter shows Jason Fischer, tournament director for the Lake Erie Walleye Trail, cutting open the winning catch of five walleye on Friday and finding lead weights and prepared fish filets inside them.

The winning anglers, Jacob Runyan and Chase Cominsky – who were in line for a first prize of around \$30,000 – were immediately disqualified. The video shows Fischer urging Runyan to leave the area for his own safety as people hurled expletives at him. Runyan and Cominsky had won three previous tournaments at the Lake Erie Walleye Trail this year. Fischer said both men had passed polygraph tests after winning the earlier tournaments, a common practice in some fishing events.

Fischer said that he cut the fish open because they appeared a third heavier than typical walleye of that length. Ross Robertson, a fishing writer and professional angler, said that increased prizes had caused a surge in cheating. He was not surprised that Fischer had been suspicious of the catch. "You have to consider that in some of these tournaments, ounces can mean tens, or hundreds, of thousands of dollars," he said.



Raw sewage spill extends miles out to sea, say locals

Footage capturing a slick of what locals claimed was raw sewage floating in the sea at a picturesque Cornish beach has renewed concerns about levels of pollution in the seas.

The discharge took place on the 30th October at St Agnes beach, on the north coast of the county, after a storm overflow was triggered. Footage of the azure waters turning brown at Trevaunance Cove shows the slick extending for miles out to sea. South West Water, which is responsible for water services in the region, claimed it was "unlikely" the discolouration was caused by the storm overflow and said it was probably the result of mud. The clip was filmed by local surfer Nick Jones, who said the discharges were happening more often and that the impacts on both people and animals were "endless". Mr Jones told Sky News: "I'd just got back from walking the dogs. Sadly, it's a story that's happening increasingly frequently. I'm gutted for so many different reasons. The environment, the water users, the sea life. The repercussions are endless."

A spokesman for South West Water said: "While the storm overflow at St Agnes triggered briefly on Sunday following heavy rain, this was a short duration spill and is unlikely to have caused the level of discolouration shown in the video. "On this occasion, we believe there were other factors which contributed to the discolouration,

such as mud in the water dislodged by the heavy rain flowing into the area from a nearby stream and runoff from agricultural land."

Plastic pollution may have met its match: The saliva of wax worms

Two substances in the saliva of wax worms moth larvae that eat wax made by bees to build honeycombs — readily break down a common type of plastic, researchers said, in a potential advance in the global fight against plastic pollution. The researchers said the two enzymes identified in the caterpillar saliva were found to rapidly and at room temperature degrade polyethylene, the world's most widely used plastic and a major contributor to an environmental crisis extending from ocean trenches to mountaintops. The study builds on the researchers' 2017 findings that wax worms were capable of degrading polyethylene, though at that time it was unclear how these small insects did it. The answer was enzymes - substances produced by living organisms that trigger biochemical reactions. For plastic to degrade, oxygen must penetrate the polymer — or plastic molecule — in an important initial step called oxidation. The researchers found that the enzymes performed this step within hours without the need for pre-treatment such as applying heat or radiation.

This is "changing the paradigm of plastic biodegradation," said molecular biologist Federica Bertocchini of the Spanish National Research Council (CSIC), who led the study published in the journal *Nature Communications*.

Plastic is made of polymers designed to be hard to break down and contains additives that increase durability, meaning it can remain intact for years, decades or centuries. "The very same features that make plastic the unique and useful material it is are creating one of the most critical problems of this century," Bertocchini said.





Flash floods destroy villages on Crete

Flash floods on Crete have destroyed entire areas of the island while two persons lost their lives according to the Greek Fire Department and local media reports. The severe storms that struck the island Friday and Saturday (14th and 15th October) have led to severe flooding, with rivers of water overflowing into the roads and the closing of the Iraklion airport.

The floods took the island by surprise, washing cars out to sea and sending its residents scurrying for protection. Terrifying images of submerged fishing boats, overturned vehicles and flooded houses had made their rounds in the news and on social media since the storm began.

Amongst the worst hit areas was the northeast coast of the island, bringing a deluge of rain and destruction to Agia Pelagia, a village in the region of Heraklion. Cars were tossed into the sea, and at least 15 shops and restaurants were badly damaged. One resident said: "It all happened within seconds. I don't know how long it was happening. We just manged to get everyone out when the water reached up to their shoulders. Everyone was sleeping and they had no idea what was happening."

Houses in Chania, on the Western side of the island, were also hit.

The storm which brought the rain is thought to be the worst storm in a century to hit the island.



Please don't 'lick the toxic toad'

The US National Park Service has warned hikers to refrain from licking the Sonoran desert toad, also known as the Colorado River toad.

The amphibian is one of the largest toads found in North America, measuring up to 7 inches, with a distinctive "low-pitched toot," call. Found across the American southwest, these toads also boast another unique feature: They "have prominent parotid glands that secrete a potent toxin," according to the NPS. The parotid glands are located just behind the toad's eyes. These toxins can make humans sick if they touch the toad or put one in their mouth.

Among humans, the toxins have been exploited towards other ends. When smoked, the toxins are a powerful psychedelic, according to the Oakland Zoo, also accredited by the Association of Zoos and Aquariums. Smoking the Sonoran desert toad's secretions causes euphoria and strong auditory hallucinations, says the Zoo.

It may be amongst the more unusual ways to secure a high, but the Banyan drug treatment centre has documented cases of people licking the frogs for hallucinogenic purposes.



Sea spray - the origin of life on earth?

Life may have started in sea spray, scientists believe, after discovering that the building blocks for all living things emerge spontaneously when water droplets meet air.

For more than a century, scientists have puzzled over how simple molecules and amino acids found throughout the universe could have sparked into life. Charles Darwin suggested early chemicals were knitted together in "warm little ponds" while other researchers speculated that lightning strikes could have triggered life-inducing chemical reactions.

Now, experts at Purdue University in the US have found a simpler explanation. Where perturbed water droplets meet air, rapid reactions can take place, transforming amino acids into peptides, the precursors of proteins that evolve to form living cells. Places where sea spray flies into the air and waves pound the land, or where fresh water burbles down a slope, were all fertile landscapes for the evolution of life, the scientists believe.

"This is essentially the chemistry behind the origin of life," said Prof Graham Cooks, of Purdue's College of Science. "This is the first demonstration that primordial molecules, simple amino acids, spontaneously form peptides, the building blocks of life, in droplets of pure water. This is a dramatic discovery."

Most scientists now agree that the chemicals needed for life were brought to Earth on asteroids and comets, which also deposited water. It has always been likely that life first evolved in the oceans, yet in order for amino acids to react and latch together to form proteins they must lose a water molecule - something very tricky when in the water. Scientists have now found that the process happens spontaneously in marginal areas, where water meets air.

Mississippi State accused of racialism for lack of investment in drinking water supplies to Jackson

The National Association for the Advancement of Coloured People (NAACP) filed a federal complaint in September accusing Mississippi state officials of violating civil rights law by repeatedly diverting federal funds meant for ensuring safe drinking water away from the state's predominantly Black capital, Jackson, to smaller, white communities. It is claimed that the State's conduct amounted to racial discrimination and a devastating loss of access to drinking water for more than a month for residents in Jackson, where more than 80% of residents are Black and a quarter are in poverty. Residents allege in the complaint "Nearly all of the residents of Jackson have watched brackish, dirty, impure, and undrinkable water trickle from their taps. At times, some have had no water at all." The complaint, filed to the Environmental Protection Agency, amplifies pressure on officials in Mississippi and Jackson to address longstanding water infrastructure woes that recently forced Jackson to shut down its water supply in late August and maintain a boil water notice for weeks. During this time residents were told to keep their mouths firmly shut if bathing or showering. A group of Jackson residents also filed a federal class-action lawsuit against current and former city and state officials as well as an engineering firm seeking monetary damages for neglect by officials. The NAACP's complaint to the EPA notes that Jackson's leaders have "repeatedly requested" aid from officials in the Republican-controlled state to "provide funding solutions". Instead, "Jackson's majority-Black population has been repeatedly ignored, spurned, or ridiculed," the complaint states.

Kilimanjaro's and Africa's last glaciers to go by 2050, says UN

Glaciers across the globe - including the last ones in Africa - will be unavoidably lost by 2050 due to climate change, the UN says in a report. Glaciers in a third of UN World Heritage sites will melt within three decades, a UNESCO report found.

Mount Kilimanjaro's last glaciers will vanish as will glaciers in the Alps and Yosemite National Park in the US. They will melt regardless of the world's actions to combat climate change, the authors say.

The report, which makes projections based on satellite data, was published as world leaders prepared to meet in Egypt for the COP27 climate change conference. About 18,600 glaciers have been identified across 50 UN World Heritage sites. They represent almost 10% of the Earth's glacierised area and include renowned tourist spots and places sacred to local populations. The retreat and disappearance of glaciers was "among the most dramatic evidence that Earth's climate is warming", the report said. "We hope we might be wrong, but this is the hard science," said UNESCO project officer Tales Carvalho Resende, one of the authors. "Glaciers are one of the valuable indicators of climate change, because they're visible. This is something we can really see happening."

The remaining glaciers in the other two thirds of UN World Heritage sites could be saved, but only if the world limits global warming to 1.5C, the authors say. Another UN report issued the previous week found that the world currently had "no credible pathway" to achieve that.





Duncan Bannatyne turns the swimming pool heating down 'one degree' at his health clubs

Duncan Bannatyne has sparked a backlash after turning the swimming pool heating down by 'one degree' at his health clubs in a bid to survive the cost-of-living crisis. The Dragon's Den star, 73, revealed online that he and his company Bannatyne Group have told staff to turn down pool temperatures amid soaring energy prices - and said some of his running costs had at least quadrupled. Twitter users alleged some of the 69 pools currently operated by the group were 'freezing' One member of a Bannatyne Health Club, which can cost up to £70-per-month to join, claimed: 'Plenty of people have complained yet no change.' Mr Bannatyne responded: 'My swimming pool temperatures are set at 28C which is certainly not too cold to use. They were turned down 1 degree to help us combat the energy crisis. Some other clubs have closed pools or hot tubs. Many clubs & leisure centres will close during the next few months.' He added: 'The cost of energy to heat pools has quadrupled in costs. Sometimes more.' After one person told him to ignore the 'malcontents', the entrepreneur added: 'Thank you. Many members have offered support of our temperatures.' And following another comment suggesting it was 'motivation to get swimming if people think it's too cold' he replied: 'Yep.'

Hundreds of ancient human footprints found at Formby Beach

Hundreds of ancient human footprints dating back as far as 9,000 years have been found alongside prehistoric animal tracks on Formby Beach over the past few years, with more discovered this summer. A hub for coastal wildlife and home to prehistoric walking trials, this isn't the first time mystery footprints have been spotted on the beach. The earlier prints date back almost 9,000 years and the most recent are about 1,000 years old, according to researchers from the University of Manchester.

Their findings, published in the journal *Nature Ecology and Evolution*, reveal how the coastal environment transformed over thousands of years, as sea levels rapidly rose and humans settled permanently by the water.

The sandy stretch of coast is already known to be home to one of the largest collections of prehistoric animal tracks on Earth.

Dubbed the 'Serengeti of Europe,' scientists say the newly-discovered footprints show wolves, lynx and wild boar roamed the area alongside humans before a major decline in biodiversity 5,500 years ago.

How King John lost the Crown Jewels – new theory

King John infamously lost the Crown Jewels while trying to cross The Wash estuary in 1216, and a scientist, Professor Donald Olson, an astronomer from Texas State University, has now discovered that the maligned monarch's treasure was seized by the sea as a result of a freakishly large and powerful tide.

Analysis of historical astronomy records revealed that the king's convoy and riches fell victim to a double whammy: the alignment of the Sun and Moon in a new moon, as well as the Moon being at its closest to Earth, which created a powerful 22fthigh wave.

John was King of England from 1199 to 1216, and history remembers him as a poor king who pales in comparison to Henry II, his father, and Richard the Lionheart, his brother.

On Oct 12 1216, a week before he died of dysentery, John tried to avoid enemy forces by crossing The Wash from King's Lynn to Swineshead Abbey in Lincolnshire as the country feuded in the wake of the Magna Carta signing a year earlier. However, the king's convoy was unexpectedly submerged by water after powerful waves destroyed and sank wagons carrying food, valuables and, purportedly, the Crown Jewels.

A REMINDER, THE WATER MANAGEMENT SOCIETY HAS MOVED PREMISES Our new address is <u>5/6 Fairway Court, Amber Close, Tamworth B77 4RP</u>.

We encourage anyone visiting to use What3words, link below:

https://w3w.co/olive.scouts.boom

Telephone: 01827 289 558



Thermal disinfection made easy with the Mixcal Careflo Plus®



Let us deliver your chemistry whilst you focus on your business

Providing high quality 'own label' water treatment chemicals



Boilers



Closed Systems



Open Cooling



Silver Peroxide: Geosil



Reverse Osmosis



Cleaning Products











Tel: 01344 959901. Email: contact@treatment4water.co.uk www.treatment4water.co.uk



FIELD TESTING TIME OPTIMIZATION

Catherine Allen, Catherine.allen@lovibond.uk, Tintometer Inc.

Abstract

Monitoring water quality in closed circuits, evaporative cooling systems and boiler systems is an essential part of any water treatment engineer's daily tasks.

It has been proven that testing industrial water on a regular basis can mitigate risks and system issues before they become problematic; including early detection of corrosion, scale and biofouling. This early detection allows water treatment professionals to make assessments of system efficacy and integrity in a timely manner, enabling decisions on treatment programs to achieve optimal system performance. Testing, however, is time-consuming with each required test adding to the time spent on-site. That additional time

Testing, however, is time-consuming with each required test adding to the time spent on-site. That additional time on-site is costly, with engineers' hourly rates being one of the most expensive parts of a service contract. How should we balance the need to monitor multiple parameters with the need to perform the tests as efficiently as possible? Can any 'corners be cut' on testing and still provide valid results to maintain systems safety? In this paper, we will investigate how Field Testing Optimization can save engineers time on-site while maintaining reliable, repeatable results. Simple method adaptation, knowledge of the chemistry and equipment being used, test order and organization of reagents/equipment all impact the time needed on-site performing tests. We will also touch on areas where engineers' knowledge and level/experience of interpreting results can lead to decisions in testing regimes that will save precious time and resources.

Introduction

Water treatment professionals are skilled engineers whose roles include the undertaking of all necessary servicing, disinfection, sampling and analysis using the latest on-site testing equipment. These tasks ensure the water system is always in good condition and that treatment levels are adjusted to ensure biological contamination, corrosion and scaling are minimized.

This all-encompassing service gives clients peace-of-mind and confidence that they are always compliant and acting responsibly in accordance with current legislative requirements and that the system is running as efficiently and effectively as it can. Therefore, it is critical that on-site monitoring is performed regularly and produces consistent, reliable results with an accuracy level suitable for the application.

Service engineers and representatives allocate a certain amount of time for an on-site visit in which they have to complete a number of vitally important tasks. One of those tasks is performing tests critical for monitoring and / or for legislative compliance. Testing requirements differ from site to site with some requiring one or two parameters while other, more complicated systems may require up to a dozen or more parameters to be performed. Each of these tests takes time and as time on-site is costly engineers are often looking for ways in which they can work optimally on-site – to get the most out of their time there. This is beneficial to both the client and the engineer.

There are several ways a water treatment engineer can save time on testing procedures without compromising integrity of the results and in this paper, we will discuss a few specific strategies that can be employed. However, before we delve into some specifics there are some basics where engineers often make "rookie" mistakes and can end up costing time later on:

• Get organized - Organization in its many forms is the key to ensuring reliable results from your monitoring program. Label everything - your marker is your best friend. Ensure you know which sample is which. Check your test kit – are the reagents nonexpired? Do you have everything you need to perform the test? Are the batteries in your colorimeter still working? All these checks can be performed simply and quickly to allow for smooth testing procedures.

• Keep everything clean – At the end of your testing you just want to get out of there as quickly as possible – right? However, all you are doing is adding to the time it will take you to get started on the next visit. By cleaning your work surface, test vials, sample bottles and ensuring your test kit is put back together correctly - next time you open it you will not have to spend time sorting it out or cleaning containers that have become stained from leaving them dirty. Yes - you will have to rinse the sample containers and vials with your new sample water - but as long as you have cleaned them thoroughly after use you won't have to scrub them.

• Take enough sample in the first place! - This one sounds really obvious, but so often engineers run out of sample and have to go back and resample - or skips tests – neither of which is optimal. Therefore, you should work out how much sample you need per test and add an amount for a buffer in case things do not go right - and believe me, they often do not go right!

Using a Colorimeter

Many of the traditional tests needed to complete a water treatment-testing regime are colorimetric and over the last 20 years or so, visual tests have been replaced with electronic instruments such as colorimeters. These colorimeters are usually programmed with tens or even hundreds of different test methods, most of which even the most thorough site visit will not require. (What you have to remember is that the suite of tests on the colorimeters are made for multiple applications and that each parameter may have several programs available dependent on test reagent, test method and test range). It is vitally important that you choose the correct method and reagents for your given application and that you use the correct program that matches those features.



Navigating those tens or hundreds of tests to find the one or ones that you require can be time consuming. Sure, colorimeters come with features that help you navigate to the test you need such as:

 Scroll features - but these are tedious and involve multiple button presses.



ii. Program numbers for each test - but what if you do not know the program number you need?

A time saving feature of some colorimeters is the "Favorites" list OR "User Method Lists" and a few minutes spent setting this up when you first receive your colorimeter can save valuable minutes later on. Set up is easy and an example is shown below:

User-method list, adaptation

Mode 6 0	Press [MODE], [Shift] + [6][0] keys.
()	Confirm with [4] key.
<method list=""> selected: •</method>	The display shows:
save: ↔ cancel: ESC	Start with [🗲] key.
<method list=""></method>	The complete method list
>> 30 • Alkalinity-tot 40 • Aluminium 50 • Ammonium 	Methods with a point [•] behind the method number will be displayed in the method selection list. Methods without a point will not be displayed in the method selection list.
>> 30 • Alkalinity-tot	
(F2)	Press key [▼] or [▲] to select the required method from the displayed list.
>> 30 · Alkalinity-tot	
F 2	Switch with [F2] key between "active" [•] and "inactive" [].
>> 30 • Alkalinity-tot	Select next method, activate or inactivate it and continue.
\sim	Confirm with [4] key.
(J)	Cancel without storing by pressing [ESC] key.

Once this is completed, when you turn on your colorimeter, only the tests you have selected and perform regularly will be at the top of the screen making navigation much easier and quicker.

For water treatment engineers these colorimetric tests would normally be:

Bromine, Chlorine, Chlorine Dioxide, Copper, DEHA, Hydrazine, Iron, Molybdate, Phosphate and Zinc.

Testing in the real world

There are multiple scenarios when testing on-site:

• One sample point with a single test to run (Lucky you, this does not happen often!).

• One sample point with multiple tests to run.

• Multiple sample points from the same system with multiple tests.

• Multiple sample points from multiple systems with a single test to run on each (As my earlier point above – lucky you!).

• Multiple sample points from multiple systems with multiple tests.

Picture the scene, you are on site and you have multiple samples lined up:





This is where you have to be the most organized version of yourself and write everything down. Now, there are different schools of thought about what is the correct method, which method is the least time consuming and that is a question each water treatment engineer will have to answer for him/herself. Do you test each sample point with multiple parameters one by one OR do you test all the same parameter together no matter which sample point they came from? No matter which way you try, there are a couple of lesser-known things colorimeters can do that may save you time.



As water treatment engineers you will be familiar with the way the tests work and the fact that you have to have a sample blank - i.e. a Zero, in order to make the test as accurate as possible as this zero compensates for any color in your system water, but are you aware that

many Colorimeters are programmed with a feature called "One Time Zero"?

This feature allows you to blank once in a series of test saving time having to switch back and forth from the zero to the sample. This feature does come with a warning though! – If you are testing the same system and the zero would be the same for all the tests this shortcut is perfect for you. If, however, you are testing multiple different systems and the zeros look different – you need a new zero for each of those systems.







It is all very well and good giving engineers ways of saving time and manufacturers do their best to ensure these features are standard on their instrumentation. Unfortunately, Chemical reactions take time and some take longer than others. Reagent and equipment manufacturers

are continually looking for ways to minimize the test time for each parameter and in many cases these have been optimized over many decades.

However, there are still a number of tests where reaction times are upwards of 10 minutes - for example – Phosphate HR and with reagent addition steps, these tests can feel like they are taking an eternity and the bain of any engineer's site visits. A word of warning! - You cannot run the tests without this reaction time - the test procedures and calibration curves on the colorimeter are designed to ensure the most accurate results possible and deviation from this reaction time could provide inconsistent and inaccurate results.

The colorimeters have in built timers in all the programs, which should be used to help engineers stick to the reaction time(s). In practice and with knowledge of the test parameters being performed, engineers that are more senior can run tests simultaneously as there is a feature on the colorimeters that allows you to "skip" the reaction times.

The only way to do this is to run a timer independently on the test that has the longer reaction time (e.g. Phosphate or Iron) while performing test or tests that have small or no reaction times (e.g. Chlorine).



That way the shorter tests can be performed and results recorded while the reaction period for the longer tests is occurring. Remember the warning though, the samples should be read on the colorimeter as soon as possible when the timer is up.



Knowledge is power

The more you know about the water system you are testing the more you will be able to run through the necessary monitoring program quickly and efficiently.

pH is one of the most critical factors in a complex water system and the pH level can have an effect not just on the water system but also on the test methods that you run. For example, if you know the pH level is below 8.3 why, would you run a P alkalinity test?

If your pH is >10 you may need to add additional buffer to some tests for the result to be accurate - knowing this BEFORE you start your other method can prevent time costly reruns of tests. Have a good idea of the results – if you know that when you visit a particular site your results are in a certain range, when performing a titrimetric test by either drop, digital titration or burette use a suitable sample size and titrant for the test. For example, on the hardness method, the table may look similar to this:

Expected Range (mg/l)	Titrant Used	Sample Size (ml)	Factor
5 - 15	Hardness LR Titrant TH3	40	0.5
10 - 30	Hardness LR Titrant TH3	20	1
20 - 60	Hardness LR Titrant TH3	10	2
50 - 150	Hardness HR Titrant TH4	40	5
100 - 300	Hardness HR Titrant TH4	20	10
200 - 600	Hardness HR Titrant TH4	10	20

If you know that usually your results are 200mg/l then you should take a 20ml sample size and use Titrant Hardness HR Titrant TH4.

If you do not know the test range that is usually observed on a particular system the smallest sample size should be taken initially, end point reached and if the end point arrives too soon (i.e. within 5 drops) you can continue the titration on the same sample in most cases by adding 10ml more sample, continuing to titrate with the same titrant. This works on most tests with exceptions being Phosphonate and Nitrite.

Another time saving factor is the ability to run tests straight through after each other. For example:

P Alkalinity into M Alkalinity (Titration via drop test, titration or burette).

In this example, the end point needs to be reached in the first



test (P Alkalinity) before continuing on to the second test (M Alkalinity), once the indicator for the second test has been added you continue to count drops of the titrant from where you left off for P Alkalinity. The total number of drops of titrant used is taken into account in the calculation.



Molybdate into Iron (Colorimetric using thioglycolate liquid reagents).

Molybdate is one of the most common corrosion inhibitors used in cooling water treatment. There are several methods for testing Molybdate at the levels usually dosed. However, one of the best performing methods involves a colorimetric method based on thioglycolate chemistry to form a yellow colored complex which is proportional to the concentration of Molybdate present. Similarly measuring Iron in systems is common to ensure that levels of corrosion are monitored. There are many field tests for Iron. However, only a couple of methods allow testing up to 10mg/l. The recommended method for testing High Range (0-10mg/l) Iron (Total & Soluble) involves a colorimetric method based on the same thioglycolate chemistry used for testing Molybdate to form an initial 'colorless' complex which is proportional to the concentration of iron present.

To complete the Iron test, a second alkali reagent is added to take the iron sample to an alkali pH condition, sufficient to allow the iron-thioglycolate complex to change to purple in color and therefore the Iron test can follow on from the Molybdate test, thus saving time on a second period of development.

Conclusion

On-site testing regimes provide system critical information for water treatment engineers. It is clear that those results must be performed accurately and repeatedly, and that each parameter has a reaction time that must be adhered to in order to achieve correct results.

There are some practices and method adaptations that can be utilized by engineers that save time while on-site testing. However, in order to benefit from these time optimization techniques the engineer must set up and maintain their testing equipment in the correct order, be organized in sample collection and content of test kits and adhere to strict rules when taking steps to optimize their time on-site.





Call Cavendish now on 01245 422 800

email: info@cavendishlaboratories.com www.cavendishlaboratories.com

UKAS accredited microbiological testing Participants in external QA schemes Members of the LCA

- Legionella Testing
- Potable Water Analysis
- Monthly Swimming Pool/Spa Analysis
- Surface/Ductwork Hygiene Swabs
- Microbiological Air Sampling
- Site Visits
- Courier Service







Water Quality - It's all Hanging in the Balance? Thursday 1st December 2022, CoSLA Conference Centre, Edinburgh

The latest WMSoc live event was held at the CoSLA Conference Centre in Edinburgh on Thursday 1st December 2022. Over 70 delegates attended the event to hear the presentations from our impressive line-up of industry experts, speak to our trade stand sponsors and network with colleagues.

Jonathan Waggott started the day by welcoming everyone to the event and introducing our four speakers.

Warren Bradshaw, Strategic Compliance Manager (Legionella). Warren gave a very interesting presentation on remote monitoring. During Warren's time at Highland Council he described the many challenges he faced with managing manual monitoring across a large geographical area. These challenges included costs, resources, security, infection control as well as monotony for the technicians. He talked about the decision making involved to move to remote monitoring and the challenges, both external and internal, that were presented during the implementation stages. The presentation discussed remote monitoring technologies, the devices, the software and connectivity. There were a few case studies where the benefits of remote monitoring were clear, also reminding us that the applications and uses do not stop at temperature monitoring, but can be used for monitoring water quality, biofilms, and water use. An insightful talk with a very clear message that the future for remote monitoring is bright - as long as it is implemented correctly and communicated concisely.

Bjorn Nielsen, Principal Scientist (Microbiology) for ALS Environmental gave an informative presentation on Microbiology testing methods, sampling techniques and what we should look for in a UKAS accredited laboratory. He highlighted the importance of sampling storage and transport to the laboratory and talked about variation and how to minimise the effects. He continued with Legionella culture methods and other detection methods including lateral flow devices, quantitative polymerase chain reaction (qPCR) and matrix-assisted laser desorption/ionization (MALDI-ToF). Bjorn continued with a discussion around an accredited laboratory and why it is important that a laboratory has accreditation, the reasons being: staff competence, fully documented test methods, traceability, quality control, method performance validation, external verification through proficiency testing, these all contribute to ensure the laboratory you are using is suitable. He discussed what to consider when interpreting a laboratory report, such as, was the sample and analysis represented correctly? Was the analysis conducted correctly? Also, do the results meet requirements for compliance? Bjorn concluded his presentation with a useful summary of standards, reference methods, guidance and codes of practice. A multitude of useful information for the audience to take away and highlighted the importance of using an accredited laboratory

for analysis.

Ian Storrar - Assistant Director for Engineering and Assurance - NHS Scotland Assure was the next speaker. He gave us an overview of Scotland Assure which was launched in June 2021. The purpose of the service is to provide engineering support for NHS Boards to cover a range of areas, including water. This is to ensure patient safety by strengthening infection prevention and control. The service doesn't just have oversight for the design, construction and maintenance of major infrastructure developments within the UK, but it will play a crucial policy and guidance role regarding incidents and outbreaks across health and social care. They provide Authorising Engineers and Subject Matter Experts to the NHS Board IMT (Incident Management Team). Ian discussed why the service was developed, what the service provides and an overview of the last 18 months since the service was launched, including lessons learned and challenges faced. This presentation was a positive example of recent advancements in the industry to offer advice and expertise at every stage in the process, from design and commissioning to day to day management. It was reassuring to hear.

George McCracken – Head of Risk and Environment Belfast NHS Trust completed the speaker's session giving an interesting presentation on the Guidance of the Principles of Scald Risk Assessment in Domestic Water Systems. He covered why Scald Risk Assessments are needed and what the risks are. He discussed thermostatic mixing valves (TMVs) and the challenges faced with installation, use and maintenance. The maintenance discussion was of particular interest – Why are we carrying out 6 monthly maintenances? Is it for maintenance or legionella control? A very interesting and thought provoking presentation and no doubt we will hear more about Scald Risk Assessments in the future. WMSoc will be publishing a guidance document for members in early 2023.

There was a short break for lunch, then continued with our Round Table Q & A discussions. The purpose was to allow group participation and open conversations. Some lively discussions were had, mainly around the day to day challenges faced when managing water systems.

The delegates were split into two groups. Group 1 with Bjorn Nielsen, Warren Bradshaw, together with Current WMSoc Chair, Ian Penney and Matt Morse (LCA manager) as moderators. Warren was asked questions about the reliability of remote monitoring and practical questions such as battery life and maintenance and what happens when things go wrong. There was quite a lot of interest in the costs of implementing as well! Bjorn was asked many questions around MALDI-ToF as this seemed to invoke much interest. Sampling techniques and ensuring a sample was representative of the system was also discussed.



Group 2, Ian Storrar and George McCracken hosted the other Round Table with WMSoc council and technical committee members, Susanne Lee and Jemma Tennant, as moderators. Ian and George were quizzed about some of the challenges the audience had with managing buildings that had been handed over with little consideration to legionella prevention and infection control, for example, TMVs that had been installed that couldn't be accessed. Communication was a big topic in the discussions and lack of awareness and training and how this can be improved in the future. The speakers were asked how we can move towards net zero when we are continuously having to flush water down the drain and how we can deal with the aftermath of covid where we have more and more little used outlets to manage.

The groups re-joined at the end of the sessions, Matt Morse and Jonathan Waggott gave a summary to the group of the discussions that were held in each of the Round Tables.

Jonathan Waggott closed the event by thanking everyone for attending, especially the speakers and sponsors.

The day was highly informative and thoroughly enjoyable. A varied number of topics were covered and each speaker brought something unique and different to the table.

WMSoc would like to extend a big thank you to the speakers, the delegates and the sponsors who all contributed to make the day a great success. We hope you enjoyed the day, we certainly did!



In-line Thermal Disinfection Unit (ILTDU) **HORNE**

DISINFECTING

The KEY to Pathogen Control

Horne TSV1 shower with integral ILTDU: regular thermal disinfection enhances patient safety against retrograde* contaminants

* e.g. Pseudomonas Aeruginosa

http://b.link/Pathogen-Control



Does ongoing remote monitoring of subordinate and tertiary loops highlight a hidden and significant risk of Legionella proliferation?

Authors: Ian Mein, MSc, FRSPH, MWMSoc, MCSC, Citritek and Samuel Liddell, Ba (Hons), Citritek

Abstract

The study outlined in this report indicates that, on average, 46.9% of subordinate and/or tertiary hot water return loops were found to be faulty across ten buildings that provided the basis of the analysis. The faulty hot water return loops are highly likely to create the conditions for biofilm growth and the proliferation of Legionella bacteria due to low hot water temperatures and a lack of circulation. The solution for remediating these issues can often be as simple as tracing the pipework to a localised valve that have been inadvertently left closed and reopening them or replacing valves that have seized shut.

Introduction

Using temperature is the primary control measure in domestic water systems for the control of Legionella bacteria. Ensuring that the temperatures within the systems are, in the main, below 20°C in the cold water system and above 50°C within the hot water system (55°C at healthcare premises) is key in the prevention of Legionella proliferation throughout the system.

The second key control measure is the prevention of stagnation in the system whereby water should not remain motionless in the pipes for any longer than a week (less in healthcare where risks are generally higher). To ensure this, low use areas of the system are identified and will be manually flushed to prevent stagnation and hot water systems are often designed with constantly circulating hot water from the storage vessel through to the outlets and then returned to the storage vessel for reheating.

To ensure the system is operating as required, the guidance documents of HSG274 Part 2: 2014 and Health Technical Memorandum 04-01: 2016 recommend regular planned service that incorporates manual temperature monitoring of the water outlets and assets to be undertaken on a monthly basis. This is often conducted by specialist water hygiene technicians or maintenance engineers and frequently involves calibrated thermometers being used to read the hot and cold temperatures from the water system's sentinel points and a selection of other representative outlets. In practice, it is uncommon for the hot water return pipework at the outlet, let alone the furthest points of the primary/principal loop of the circulating system to be

tested. Often, the principal return loop will be tested only at the hot water vessel as access can often be difficult across other points in the building.

In this study we have investigated the prevalence of faulty hot return pipework within subordinate and tertiary loops. Ten sites were selected from a variety of industries and building type. From these buildings, wireless devices incorporating a minimum of three sensors were selected that monitor, as a minimum, the hot and cold water feed to an outlet as well as the hot water return.

Results

The results displayed in **Figure 1** demonstrate that of the ten sites evaluated, 90% had multiple outlets operating with hot return water that did not retain the required temperature 50°C. The proportion of outlets from these sites that exhibited this type of failure was, on average, 46.9%.

Data shows that faulty valves can cause poorly flowing hot water returns; **Figure 2** shows the impact of replacing a faulty valve where the tertiary return connects to the subordinate loop. Which then can be seen to be operating from the 7th May correctly and subsequently the systems alarms cease.





Figure 2: Example of improved circulation following replacement of faulty valve; data provided by Citritek remote monitoring devices





Conclusion

The remote monitoring sensors clearly identify when there is an issue associated to the hot water return loops. By visualising the consistent flow of data, wireless monitoring evidences how the temperature will increase with the hot flow when the faucet is opened but fail to retain the temperature after the flushing event. Often declining completely to the original ambient temperature until the outlet is used again.

Discussion

The high proportion of non-circulating hot return pipework from subordinate loops is of significant concern. The temperature of the hot water return pipework often rises in parallel with the hot supply as the outlet is activated however, the temperature then rapidly decreases, returning to an ambient level. This indicates that there is minimal flow or a complete lack of circulation. The water system therefore, creates conditions that will be ideal for biofilm formation and Legionella proliferation. It is arguable that this is of higher risk than visible "dead legs" which are often a focus of Legionella risk assessments. Biofilm formation in poorly flowing tertiary loops; in particular, will likely slough off and be syphoned through the outlet during the operation of the outlet. Furthermore, unless the valve connecting the loop to the rest of the system is completely closed the formation of biofilm and proliferation within the loop will provide a seed for contaminating other parts of the overall water system.

The problem of non-circulating hot water return loops has largely gone unnoticed prior to the advent of remote monitoring systems due to the limitations of traditional manual monitoring.

Firstly, it is extremely difficult to incorporate the correct monitoring of circulating loops of a water system in routine manual monitoring due to most commercial tenders and contracts for temperature monitoring being successfully obtained based on proposals of exceptionally low cost. Rarely is enough time allocated to the task to undertake temperature monitoring of the outlets effectively let alone gain access to concealed pipework that will involve the removal of access panels or gaining access at height through ceiling tiles. In addition to the above, water temperature readings taken from an outlet are often only providing an indication of scald risk rather than the control of Legionella bacteria due to the faucet incorporating a thermostatic mixing valve (TMV). This is especially true in healthcare premises. As TMVs tend to be widespread in their use if present within a building, site personnel and water hygiene technicians often resort to monitoring the water temperatures of easy-access outlets such as sinks that are located in sluice rooms, kitchens and cleaners cupboards to record non-mixed water temperatures. Unfortunately, these outlets are frequently not the nearest or furthest points of a water system and so do not give the evidence of data intended. Rather, they provide data of representative outlets. Not sentinel points.

The cause for the lack of circulation through tertiary return loops can be caused by a number of issues including isolation valves being left

closed following maintenance work. This was observed at Site C where an on-site audit to trace the hot return pipework of three subordinate loops for a particular portion of the site was undertaken by the site facilities team. Two isolation valves were found to be closed. Once opened, all three of the areas began to circulate effectively. This improvement was proven via the data being captured by the remote monitoring system. The data now visualises the hot return pipework of all outlets associated with each of the three loops consistently operating in-specification since the valves were reopened.

Further to closed valves, analysis of the buildings and water systems involved in this study has shown the following possible reason for inadequate circulation and low returning hot water temperatures:

- Unbalanced water systems
- Poorly specified pumps
- Faulty pumps

All of the above causes can be due to modifications of the overall water system or poor initial commissioning.

Following on from this initial study, additional work is required to monitor outlets and water systems microbiologically to understand the extent of the effect on outlet contamination and systemic risk.

Further study and analysis into the success of remedial actions targeted at balancing water systems and pump replacement and repair will also be valuable.

NEW GUIDANCE DOCUMENT: SCALD RISK ASSESSMENT

Guidance on the Principles of Scald Risk Assessment in Domestic Water Systems The technical committee along with key contacts have created a document to help in assessing and managing scald risk in commercial properties. This guidance document is part of a series produced by the Water Management Society. It concerns the control of scalding risks arising from domestic water systems in any workplace, with particular emphasis on those industry sectors where scalding risks are likely to be greatest, such as health and social care, and education. It does not cover private dwellings.

This guidance is for those who have responsibility for managing the water risks, a Water Safety Group (WSG) or a Responsible Person (RP) and is not solely healthcare focused. BS 8680:2020 Water quality — Water safety plans — Code of practice⁷ notes that a key element of control is "the appointment of a competent person or persons or a WSG with responsibility for developing and implementing a Water Safety Plan (WSP). In a small business with simple systems this could be the person who takes overall responsibility for health and safety and could be the owner or manager of the premises if they have the competency and skills required."



This guidance does not cover risks from exposure to hot surfaces, steam, hot drink vending, chemical burns or risks from appliances such as kettles, tea urns or microwave ovens etc. which might require separate risk assessments.

The full guidance document can be downloaded from the member's portal.



WINTER 2022-23

ENJOYING OUR NEW PREMISES

As reported in the Autumn edition of Waterline, the Water Management Society have moved to a new location, hosted by TC Media, after 17 years at the mill.

Ged and Ade at Enviroteam moved the cooling towers to their new location with Tom and Sam of TGP Services completing the plumbing, both removing from the mill and installing in the new location. A huge thanks to Wycombe Water for donating the water softeners and to Tower Systems for their help with everything cooling towers.

The PTA has had a complete rebuild and now includes more equipment, with two mirrored systems, to help expand the knowledge of our students. This includes cross sectioned cooling towers for increased accessibility and thermal balancing valves and healthcare installations amongst other equipment.

The TC Media team quickly setup the offices on moving day, with the first training course running on the second day in the building! The feeling so far is that the new location is much better for students and staff alike, with step free access for our courses for those with limited mobility and a disabled parking space right outside the

door. Located just 10 minutes from junction 10 of the M42 with links to all central motorways and local hotels this training centre really is easy for all to use.

Our students are enjoying the new practical room, with comments on our training of:

'Lovely training office, food was great, tutors very good, very knowledgeable and fun!' and 'Was a pleasant place to learn and the trainer was great!'

In addition to WMSoc training, the new PTA is available for rent for external use via TC Media, along with other various office spaces. Talk to the admin team if you would like more info.

> We encourage everyone visiting us to use What3words: OLIVE.SCOUTS.BOOM https://w3w.co/olive.scouts.boom

We hope to see you soon.



WWW.VEXOINT.com

vaterlin

mun

HAVE YOU BOOKED YOUR ADVERT !

> Reserve your spot for the next issuel

> > Call us TODAY:

01827 289 558

THE UK'S MOST **Solid**Tek **ECO-FRIENDLY** They're really this compact! CHEMICAL **SYSTEM Solid**Teksticks DosaFil





GREENER



RECYCLABLE

Lightweight and compact, solid paste chemicals are safer to transport, handle and store No plastic drums to dispose of and send to landfill

SolidTek[®] sticks come in fully recyclable packaging

Combine the DosaFil[®] smart conditioning device (which treats commercial/industrial HVAC systems, and keeps them treated!) with solid chemical sticks from SolidTek[®], and you've got yourself some serious eco-credentials.

Need biocides? Solid and liquid THPS biocides from SolidTek[®] - developed in partnership with Solvay - are fully biodegradable and can be used in DosaFil[®] devices too.





BG50 Case studies

Poor water quality leading to blockages

Building: LTHW system in large office block.

Manifestation: Loss of flow due to fan coil unit strainers repeatedly becoming blocked.

Cause: Loss of control of water quality and corrosion leading to high levels of circulating solids and pseudomonad bacteria.

Solution: The main plant and risers were cleaned using system pumps, followed by side stream filtration to maintain physical cleanliness of recirculating water. Each floor was then individually cleaned, off-line, using a temporary pump (one floor per weekend). Full building and system operation was maintained through all working hours.

Case study from BSRIA BG50/2021

Second case study can be found on the next page





IHEEM's Healthcare Estates Conference 2022 4th & 5th October 2022, Manchester Central

Water Management Society's prominent trade stand at IHEEM's Healthcare Estates conference on 4th and 5th October 2022 was perfectly situated in the middle of the many *water* exhibitors and WMSoc were delighted to sponsor and help to assemble some eminent speakers for the Infection Control Theatre presentations. Ian E Kershaw, Immediate Past Chairman of Water Management Society, led the programme with his talk on WMSoc membership and CPD roadmap with other presentations from industry specialists on remote monitoring, reducing HCAI's, pseudomonas species, positive sample results in healthcare, Legionella monitoring and WMSoc Council member David Harper, gave an outstanding talk on Authorising Engineers (Water).

Water Management Society are already looking forward to

attending next year's Healthcare Estates show on 10th and 11th October 2023 also at Manchester Central.



Photo: Ian E Kershaw presenting in Infection Control Water Theatre



Monitoring oxygen and corrosion in an LTHW system

Building: Hospital.

Manifestation: The LTHW system was suffering from excessive corrosion of steel and brass components.

Cause: Dissolved oxygen levels were significantly higher than recommended for a closed system and analysis showed that this was mainly due to the intake of fresh aerated water which in turn was due to a series of leaks.

Solution: Investigations identified a source of the leak which was subsequently fixed. Continued corrosion was therefore prevented (evidenced by galvanic currents returning to near zero) although the onset of localised crevice corrosion was detected after 41 days, using a specialist sensor (fine steel wire showing sudden increase in resistance) when the oxygen levels peaked.



Figure 29: Corrosion levels

500

0

0

10

20



40

50

Davs

60

30



LCA Sitting on the (Of)Fence 11th October in London and 1st November in Newcastle

The star speaker of the LCA Autumn events in London and Newcastle was Duncan Smith of HSE. Duncan gave examples of real events and observations, and it was great to know what the HSE regard as enforceable. The one-day event ran in two different venues 3 weeks apart and started with an explanation of the LCA complaints procedure by Chair Nick Barsby. Updates on LCA statistics from the LCA Manager, Matt Morse, including terminations and suspensions of LCA members followed. Interesting insights into non-compliance with L8 from Dr Tom Laffey and clarification on what the Written Scheme is from Vice Chair John Smith kept the audience absorbed. We heard about what remote monitoring can provide. LCA assessors Simon Hughes and Colin Shekleton talked to us about Risk Assessment templates and Mike Hunter went back to basics presenting on the history of Legionella outbreaks. An informative presentation regarding

Respiratory Protective Equipment added to the enlightening event.

70

80

90

100

Great venues in both London and Newcastle offered plenty of trade stands and networking opportunities to catch up with industry contacts. It was really good to speak to so many contacts who visited the Water Management Society trade stand at both events.

Photo: WMSoc Chairman lan Penney at the LCA event Autumn 2022







IDEXX Seminars - Take control of Pseudomonas aeruginosa and improve patient safety Manchester, November 15th and London, November 29th

Healthcare-associated infections caused by *Pseudomonas aeruginosa* can impact significantly on clinical outcomes for patients and lead to avoidable deaths. *P. aeruginosa* is becoming increasingly resistant to a range of antibiotics, a trait that can be passed to other harmful waterborne bacteria within biofilms, exacerbating problems of antimicrobial resistance in hospitals. As well as the human costs, this places a significant burden on already stretched healthcare budgets.

In November 2022, IDEXX Water, the global leader in rapid microbiology testing for water, hosted two workshops to highlight the importance of monitoring *P. aeruginosa* by healthcare professionals, and demonstrated how monitoring and controlling the bacteria can improve patient safety.

The seminars were chaired by Elise Maynard, a director of the Water Management Society and included presentations by three leading industry experts on water microbiology, with decades of experience within public health organisations:

• Dr Jimmy Walker described why *P. aeruginosa* is such a difficult and dangerous pathogen;

• Dr Susanne Lee introduced the new BS 8580-2 Standard for risk assessing *P. aeruginosa* and spoke about the need for implementation of water safety plans;

• Dr Paul McDermott reviewed how on-site water testing can be a cost-effective method to reduce hospital acquired infections and anti-microbial resistance, enhancing patient safety.

The workshops concluded with a demonstration of the IDEXX Pseudalert[®] on-site water testing system and a Q&A session with the experts, where attendees had the opportunity to discuss specific issues around contamination, implementing water safety plans and risk assessments, and testing procedures for the *P. aeruginosa*.

To find out more about IDEXX Water, visit: https://www.idexx.co.uk/water

Surevent

We are Surevent UK, an industry-leading independent water management & legionella control specialist. We deliver the highest standard of service direct to commercial & industrial organisations nationwide.

- National coverage
- Live compliance tracker
- Client portal
- Accredited training & E-learning

"Let us take care of your water while you focus on your business"

SERVICES OFFERED:

- Water management & PPM
- Cooling towers management
- Legionella risk assessments
- Closed system management
- Remedial works

Call us: 0800 345 7529

Alcumus' 😪 Legionella

Visit us: www.sureventuk.com

Email us: Enquiresesureventuk.com



INDUSTRY UPDATES

The law for biocidal products in GB is changing Temporary changes to GB biocides statutory application processing times

Following the end of the EU exit transition period on 31 December 2020, businesses needed to resubmit product applications to HSE by various deadlines.

Due to the large number of resubmissions received, a new law is being introduced in GB to temporarily extend the statutory deadlines for processing product applications under the GB Biocidal Products Regulation for a period of up to 5 years.

The new law will allow biocidal products on the market in GB awaiting decision on their application to remain there legally until they are processed by HSE. After 5 years the statutory deadline will revert to the existing length.

The new law is planned to come into force on 31 December 2022, subject to parliamentary procedures.





The Institute of Corrosion is a Registered Charity, run by professionals and volunteers from Industry and Academia

Wherever you are in your career we can help you develop the latest skills and gain industry relevant qualifications. You will be part of the UK's biggest community of corrosion professionals, with an increasing global presence. Find out more about the changes and the applications that may be affected, visit: <u>https://www.hse.gov.uk/biocides/temporary-changes-application-processing-time.htm</u>

HSE Biocides updates

The HSE recently distributed an ebulletin containing information on regulating biocides in Great Britain: <u>https://www.hse.gov.uk/biocides/index.htm</u>

The GB Biocidal Products Regulation (GB BPR) operates independently from the EU Biocidal Products Regulation (EU BPR), which applies in Northern Ireland.

Separate ebulletins containing information specific to regulating biocides in Northern Ireland are issued as appropriate.

This article can also be found on the WMS website News page: <u>https://www.wmsoc.org.uk/knowledge/news</u>.

The Institute of Corrosion is very pleased to announce the successful election of Stephen Tate as its New President and Dr Yunnan Gao as its New Vice President. Bill Hedges has become the Immediate Past President and along side Tony Collins, Honorary Treasurer and Jane Lomas Honorary Secretary complete the leadership team.

course in brief W259

Temperature Monitoring, Sampling & Inspection of Hot & Cold Water Systems for Technicians

This City & Guilds accredited training course is aimed at those who carry out temperature monitoring inspection and control of water systems, e.g. technicians, building caretakers and operators. Also beneficial to supervisors and responsible persons who have little knowledge of how the work is done or why it is necessary.

The course gives students understanding in the background to Legionella control, the legislation and reasons why systems need to be monitored and controlled. It also gives instruction and practical guidance in temperature monitoring, chemical testing e.g. chlorine/chlorine dioxide, bacterial sampling (Legionella, pseudomonads, and general bacteria) and inspection of hot and cold water services in buildings.

The day includes hands-on time in the Practical Training Area where the student's work will count towards 25% of the exam result for this course.

This course forms part of the Water Treatment qualification and Risk Assessment qualification routes.

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



WINTER 2022-23

Case Study of Using the Strengite Process to Clean a Heavily Rusted Glycol System Without Creating Discharge

Introduction

Antifreeze water mixtures containing monoethylene or propylene glycols are widely used to prevent freezing in closed loop systems. These mixtures are not corrosive to system metals provided that a suitable corrosion inhibitor package is maintained and bacteria growth is prevented. Typically, a minimum concentration of glycol above 25% is maintained to prevent the growth of bacteria. In the event that the glycol concentration falls below 25% or biocide levels are not maintained, bacteria growth can rapidly occur and acidify the glycol. When this happens, corrosion rates approaching a thousand times above previous corrosion rates can occur. Severe damage to pipework can occur in short periods of time.

In most regions, waste antifreeze is not allowed to be discharged to drain. Additionally, acidified glycol dissolves copper. In most regions, the discharge limit of copper is 3 ppm. Very little copper has to be dissolved before the system glycol mixture violates copper discharge rules. System copper levels many times above the discharge limit are not unusual. Expensive tankering way of the system water to disposal is required. The lost glycol has to be replaced at the end of the cleaning. This is both costly and has a carbon foot print of three kilos of CO2 released per kilo of antifreeze added.

To make matters worse, the disposed glycol/water mixture often still has most of the original glycol present and represents a loss of resources. Current closed loop methods require the flushing out of systems with fresh water that is approximately ten times the system volume at the end of chemical cleaning. This is to remove all traces of the released corrosion products and cleaners. The total loss of the glycol is unavoidable.

Cleaning of corroded closed loops suffering from degraded antifreezes is expensive, more difficult, and has a much greater negative environmental impact than cleaning standard closed loops systems.

The Strengite Process

The Strengite Process was developed to enable the cleaning of corroded closed loop systems without discharge. The process is a significant departure from current cleaning technologies. The Strengite Process, like current chemical based cleaning chemistry, first dissolves corrosion deposits, but instead of discharging the resulting mixture to drain, the new process is able to modify the chemistry to precipitate the dissolved contaminants. The precipitation and filtration out of the contaminants takes places within specially designed equipment to prevent the release of solids throughout the system. The large numbers of fine particles created during precipitation have a vast surface area, absorb oils and greases, and lead to their removal from the system water. The system water at the end of the Strengite Process has exceedingly low levels of dissolved metals such as iron and copper - often below 0.1 ppm. The cleaned up water still contains some cleaner residuals but by addition of specially formulated corrosion inhibitor products, fully functional

By David Sevier Director of Aqueous Logic Ltd and Strengite Ltd.

corrosion inhibitor packages that offer excellent corrosion protection are assembled.



The cleaning system uses the same physical and operational approaches that standard closed loop cleaning uses except water is not discharged to drain but rather cleaned up and returned to the system.

The Strengite Process's chemistry is targeted towards dissolving and then precipitating dissolved corrosion deposits. It does not effect ions such as molybdate. This is highly useful. Molybdate represents most of the chemical cost of many corrosion inhibitors and also has a finite supply. By leaving molybdate untouched, the Strengite Process opens the door to infinite cycling of molybdate within closed loop systems even if they are repeatedly cleaned.



The Strengite Process chemistry creates conditions that cause the solubility of ions such as copper and iron to fall to near zero even if corrosion inhibitors such as molybdate/ nitrite are present within the system. Many will be familiar with the problem of installers doing further work on systems after what was supposed to be completion. The resulting contamination often raises copper and iron levels beyond specification limits. Up to now, the only solution has been to dump the system and start again. The Strengite Process



enables the removal of the unwanted copper and iron ions, avoids discharge, and leaves the corrosion inhibitor system intact. There is no need to retreat the system with corrosion inhibitors.

A System with Extreme Fouling

At a company's headquarters in the north of England, the chilled water system contained four percent monoethylene glycol. It had become acidified and serious corrosion had occurred. The system volume was 2350 litres. Only the risers of the three story building were iron piping with the rest of the pipework largely plastic pipe. All of the 141 fan coil units were heavily fouled to the point that little cooling of the building was possible in spite of a new chiller being installed only a few months previously.

The system water carried a heavy load of rust with a total iron level of 4500 ppm. Filtering through 1 micron bag filters did little to reduce the iron load.

A New Way Forward: Cleaning the Impossible with No Discharge

The Strengite Process was used to clean this system without discharge. The antifreeze within the system was not lost. The cleaned up system water was pH adjusted to between 8.5 to 9.0 and had a iron level of below 1 ppm.

Approximately 38.7 kg of rusts were removed by the cleaning. This equates to an iron level of 11,914 ppm iron released during the clean. Traditional cleaning methods rarely go above 1000 ppm iron and would have required twelve cleanings to achieve this result. The Strengite Process achieved this in a single clean. 282,000 litres of water consumption and pollution were avoided.

X-ray analysis of the pipework indicated that approximately 43 kg of iron had corroded from the pipework. Sixty five percent of the rust was removed by the cleaning. Spalding from incompletely cleaned surfaces usually leads to problematic high dissolved iron levels. This did not occur because the Strengite chemistry surpresses iron solubility. Iron levels remained below 1 ppm even when sediment remained in the system water.

The entire cleaning and removal of contaminants took aproximately three weeks and included cleaning and flushing all the fan coil units and strainers which were very heavily fouled. A by-pass filter was installed on the system to remove corrosion deposits as they erode from pipe walls over time. The iron level continues to remain low months after the cleaning.

The Fate of the Collected Waste

The contaminants removed from the system were collected on filter bags. These bags could have been simply disposed of to the normal rubbish, but the decision was made to clean them up. The bags were washed and made available for reuse in future cleanings. This created a few hundred litres of water waste which contained all the removed system contaminants. The water waste was allowed to settle. This produced a large layer of clear water that was drawn off and pH adjusted prior to discharge. The mucky bottom water was mixed with cement and allowed to further settle. The result was clear water on the top of the hard settled solids. The clear water was drawn off and pH adjusted prior to discharge. All the discharge water was tested for copper and found to have below 0.1 ppm total and soluble copper. The resulting dry solids were disposed of as cement waste at the local tip. Overall, compared to the volume of discharge water that standard chemical cleaning would have created, a reduction of greater than 99.99% in waste volume was achieved.

New Tools for Our Industry

The Whitely fouled glycol system was one of the most fouled closed loop systems that any of us had ever encountered. It represents an extreme example of closed loop cleaning. If current chemical cleaning methods had been used, the works would have failed. The level of fouling would have been too much to clean in any practical way. Iron transport and return to high levels of soluble iron would have fouled the newly installed chillers. There would have been little alternative but to re-pipe all or part of the system at considerable cost. Instead the Strengite Technology enabled the system cleanup in a straightforward manner while avoiding the creation of large amounts of costly to dispose of waste. All the original system glycol was preserved and able to be reused. The Strengite technology has been used on other less difficult systems such as large buffer vessels and other building closed loop systems. Millions of litres of polluted water waste have already been avoided by use of the technology.





Editor: Corrosionpedia Explains Strengite

Strengite often serves as a passivation layer when used as a protective coating on metal substrates. Spectroscopy studies have shown that the passivation layer of strengite is made up of newberyite, struvite-K and other composites. Rust components may also be present in strengite when it is used as a protective coating on iron. This rust component is in the form of ironchromium oxide.





How to use a field test kit - what is a field test kit?

This Toolbox Talk is designed to give a brief overview to the range of different testing methods that are available in many field test kits for industrial water applications. A field test kit is designed to enable a user with little chemistry experience to provide accurate, portable and affordable onsite testing for a range of industrial water applications. Onsite testing can give instantaneous feedback on system conditions which allows for real time decision making. Some test kits will vary between suppliers, but most of the methodologies used are contained in this document.

HOW TO USE A FIELD TEST KIT CO

Health & Safety/Compliance?

Prior to using your field test kit, it's important to address the following:

- Know the reagents and understand their hazards (See MSDS Sheets)
- Best practice would include a

COSHH

- assessment
- Keep all reagents inside 'Use-By' date
- Keep electronic equipment calibrated (with certificate) at least annually
- Store out of direct light and at room temperature where possible
- Do not reuse chemicals such as pH and conductivity standards, contamination will decrease accuracy

Titration Methods

We can calculate the concentration of a parameter in water by titrating a measured volume of the water sample against a titrant to an end point. The end point refers to a colour change caused by an indicator reagent.

By using the titrant volume that was added until the colour change the concentration of the parameter in the sample water can be calculated. For most tests, it is important that the pH of the sample is within a set range for the titrant, parameter and indicator to react.

Commonly a buffer/buffering reagent is added or may be built in to one of the other test reagents so the test performs correctly.

A classic example of a titration test is alkalinity, where sulphuric acid is titrated against the alkaline species (alkalinity) present in the water sample. One of the indicators used for testing alkalinity is Phenolphthalein used for P-Alkalinity testing which is pink in alkaline solutions but turns clear at approximately 8.2 pH, when the end point is reached. The titrant can be added to the sample by using:

- A dropper bottle with dropper tip (number of drops of titrant are counted by the user).
- Syringe or pipette (user reads a scale for titrant used).
- Mechanical or electronic titration gun (User reads a scale or titrant volume dispensed is displayed).

Common parameters measured using titration chemistry are:

- Hardness (Total/Calcium)
- Chloride
- Alkalinity (M, P & OH)
- Organophosphonate
- Nitrite
- Tannin
- Sulphite

Tips:

The volume of chemical added with each drop is fixed by the aperture size in the tip. It is therefore important to exercise good technique when adding drops of chemicals to get accurate and consistent results

- Keep dropper tip clear from blockages and in good condition.
- Do not insert any object into the tip opening. Inserting objects may change the aperture size

• Do not continuously reuse dropper tips and bottles by refilling the contents as plastic degrades.

• When titrating the bottle should be fully inverted and slight pressure applied until the droplet falls freely.

• Mix sample by swirling after each drop. Use your dominant hand to achieve better control.

• Every so often revert the bottle back to an upright position, reduce

your pressure to allow air to enter.

Colourimetric methods

A colourimetric method works by adding a fixed volume of reagent to a water sample to form a coloured complex with the parameter being tested for. The concentration of the parameter is proportional to the strength of the colour complex produced. The concentration can therefore be worked out by comparing the strength of the developed colour complex either by eye against a comparator disc or electronically by using a photometer. Colourimetric methods are typically easier to complete than titration tests as fixed volumes of reagents are added. The time taken for the colour complex to develop differs between the test methods. It is important that this time for the colour complex to develop is timed and followed strictly, as the colour may continue to develop after the time has expired or begin to fade. DPD chemistries for example which are used for oxidising species (e.g. chlorine or bromine) will see the colour increase in strength, peak and then begin to fade.

Comparator Test

The developed colour complex is compared against a comparator disc/wheel in good light. Simpler methods will use a colour card. The main disadvantage with comparator methods is that the end colour comparison to the colour wheel can be ambiguous and will vary depending on the user's eye and the lighting available.

Tip: Colour is easier to observe if you hold the sample between a light source and your eye. This can be used for reading comparator methods or seeing if your sample has reached its end point for titration methods.

HOW TO USE A FIELD TEST KIT





Photometer

A photometer detects the amount of light absorbed when shined through the sample cell at a particular wavelength. The results from a photometer method are much more accurate and definitive than a comparator method as it removes the variance between different user's eyes and removes the reliance on good ambient lighting.

Tip: A calibration curve will have been created for the photometer using the reagents for the test. Tablet reagents often leave behind undissolved solids which will increase absorption. The calibration curve for a tablet method will factor in the undissolved solids where a liquid method will not. For this reason do not use liquid reagents on a tablet test or vice versa as doing so will impact the accuracy. Keep all glassware clean and in good condition as dirt and scratches will also affect results. Do not clean glassware using a detergent as detergent leaves behind residue.

Common parameters measured using colourimetric chemistry are:

• Oxidising species (Chlorine, Bromine, Chlorine Dioxide, Ozone etc.)

• Metals testing (Iron, Aluminium,

- Copper, Zinc etc.)
- Molybdate
- Phosphate
- Silica
- Ammonia
- DEHA



рΗ

pH is temperature dependent, as such readings should be taken around 25 °C unless you can compensate for temperature. As temperature decreases the pH increases. At 100 °C, pure water has a pH of 6.14 while at 0 °C it is as high as 7.47 °C. Pure water is pH 7.0 at 25 °C. pH can be measured in a number of ways:

pH meters

The most popular way to test pH of industrial water is using a pH meter. pH meters can be a pocket or stick type or a professional hand held style meter with a separate probe. Keep in mind pH probes have a limited life span and as the probe deteriorates it will lose sensitivity.

It is therefore important to calibrate meters to their corresponding probes periodically. The period of calibration depends on frequency of usage. Calibration checks your probe still functions and the unit will read pH accurately.

If the unit has a separate temperature probe (sometimes referred to as an automatic temperature compensating probe or ATC probe) the 2 probes must be used alongside each other. Measuring pH with a meter can give the highest accuracy but only if used and maintained correctly.

Tip: Store pH probes in a fit for purpose probe storage solution or pH4 buffer to maximise life span. DO NOT store in deionised/distilled water as this will permanently damage the probe.

For an accurate reading with a pH meter, first wash the probe with the sample water and discard the sample. Take a fresh sample and insert the probe plus separate temperature probe (meter dependent). Swirl the probes to remove any trapped air bubbles then allow the probe and sample to settle. The pH value will change over time as the probe warms/cools to the temperature of the sample. Record the reading once the pH value is stable.

pH Test Strips

pH can be tested using litmus paper where the resulting colour is compared to a chart to give an approximate pH value. Improved pH test strips available use 2 or 3 unique bands with different colours, these can give greater resolution than standard litmus paper.

Using test strips is favourable to some users as there is no need for calibration and the simplicity is more reliable compared to using an electronic device. Care must be taken to keep the test strips dry if they are being stored inside a test kit.

pH by photometer

A photometer can be used to measure pH however the ranges available are limited and photometer testing for industrial water applications is not recommended.

Conductivity/TDS

When chemical species are dissolved in water they exist as charged particles (+ charges & - charges). Conductivity is measured by reading the resistance of an electric current passed through a water sample from a cathode to an electrode. The more charged species in a water sample the higher the conductivity of the sample. The cathode and electrode are usually 2 separate metal contacts on a single probe. Hand held pocket or stick type meters and professional hand held meters with detachable probes are available. Similar to pH, a conductivity/TDS meter requires regular calibration.

Most conductivity meters calibrate using 2 or 3 known conductivity standards which are typically 84 μ S, 1413 μ S or 12880 μ S (12.88 mS). For these meters you should select the closest standard to your samples expected reading (i.e. when wanting to test deionised water samples, calibrate using an 84 μ S standard). Many users working in industrial water treatment will only calibrate to 1413 μ S as it is the most common for most industrial water applications.

True Total Dissolved Solids (TDS) can only accurately be measured by a gravimetric method where a known volume of water is evaporated and the chemical solids contained in that water are left behind and accurately weighed to 4 decimal places. However the TDS can be estimated from the conductivity measurement by using a factor called a TDS factor (Conductivity reading x TDS Factor = TDS Reading).

The most common TDS Factor is 0.7 and was derived by looking at the TDS & Conductivity relationship of a solution of 40% Sodium Sulphate, 40% Sodium bicarbonate and 20% Sodium Chloride (known as TDS 442). Older meters may have an inbuilt TDS Factor of 0.5 which is based on the same 'TDS & Conductivity' relationship but for a sodium chloride (NaCl) solution.

Results for conductivity are in micro Siemens (μ S) and milli Siemens (mS). Results for TDS are in parts per million (ppm) and parts per thousand (ppt).

Conductivity to TDS Factors	Factor
NaCl	0.5
4.4.2	0.7

Unit Conversions		
Conductivity	1000 µS = 1 mS	
TDS	1000 ppm = 1 ppt	

Figure 1. TDS Factors and Unit Conversions.





Your **#1** Choice for Biofilm removal



Adhesion of microorganisms to the substrate 2 Formation of small colonies 3 Maturation with the production of extracellular matrix 4 Dispersal of cells

HUWA-SAN TR-50 FOR BOTH SHOCK AND CONSTANT DOSING (PT 4 & 5)





Superior stability



Biodegradable

J. S.





Proven efficacy against biofilms

No-rinse surface disinfection



No odour, no colour, no taste

Contact the UK Huwa-San Technical Team today for all your support, training and guidance: Tel: 0330 332 5222 or info-uk@roamtechnology.com









kiwa 💐





www.roamtechnology.com



INDUSTRY UPDATES CSCA

CSCA Management Committee welcomed Tim Carter of Water Treatment Products to the December 2022 meeting. Tim replaces Matt Morse as a representative of BCA (British Chemicals Association - Water Treatment Group) on the Closed Systems Control Association management committee. Technical discussions at the meeting included microbial growth, corrosion inhibitors, fill-water type and SRB detection.

The new CSCA website launches in early 2023 and auditing of service provider members continues.

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 tel: 01827 219508

Legionella Control Association



A highly successful event was held in London on the 11th October 2022 at the Cavendish Conference Centre and in Newcastle on the 1st November 2022 at the Royal Station Hotel. The autumn conferences allowed the LCA to raise awareness of challenges our members may face and was attended by over 200 delegates across London and Newcastle. With the success of the Roadshows in the Spring and the London & Newcastle events in the Autumn we have now made a commitment to cover Scotland, the North of England, Midlands and London on a rotational basis. We are exploring the ability to run an event in Northern Ireland in 2023 too; although this is at the conception stage and we will be seeking interest from members on this event before committing further at this stage.

The Autumn events gave a platform to Respiratory Protective Equipment (RPE); and the feedback we have had is that this was seen as the showpiece presentation of the day. The Spring events will be focussed on "Managing Positives" and looking at what constitutes a positive / failure, the escalation procedure and how it can be deployed and a look at some good and less good case studies of a range of positive results and their implications. Further details on this event will be announced in 2023; with the conferences taking place in April in the Midlands and Scotland.

Speaking of events, the LCA were present at the University and Healthcare Estates held in Solihull in November, with our Chairman Nick Barsby taking part in the panel discussions on Water Hygiene, he was joined by some fellow LCA Members. The event helped raise the profile and importance of using LCA Members, especially for their competence, in highly complex Healthcare environments. Additionally, LCA Manager Matt Morse presented via teams to RHEIS, a group of Scottish Environmental Health Officers on the risks posed by Legionella and what the LCA do to encourage best practice from our members. We are always looking for opportunities to speak to end users; if you are aware of any upcoming events please do let the Secretariat know via email so we can engage with the organisers.

A change on the LCA management committee has seen Colin Shekleton step down as a representative from the WMSoc to take up a role as an Independent Consultant and LCA Assessor, he has been replaced on the committee as a representative for WMSoc by Colin Brown. Our other newly appointed assessors are Alan Watson, Ian Wall and Ian Kershaw.

We are well into this year's annual audit schedule where the focus is on Service Delivery Standards. We expect members to be working to the current standards. We have terminated five members in the last quarter, two of which lapsed and failed to re-register in time, the other three terminations were down to poor performance and failures to close out actions, one of which was still working to the old service standards. This is a marked increase in terminations and comes on the back of the poor performing members notifications sent out in September 2022.

On behalf of the LCA, we wish all our members a safe and happy 2023!



Protection from counterfeit certificates and fraudulent claims of UKAS accreditation

Independently checking the authenticity of an organisation's management systems certification is an integral part of the business procurement process. To support businesses in this process, UKAS launched its CertCheck service in June 2022, to provide a quick and easy mechanism to independently check the authenticity of claims regarding accredited management systems certifications.

Since launching CertCheck, UKAS has become aware of several counterfeit certificates in circulation and/or organisations falsely claiming accreditation or affiliation with UKAS. Such practices pose a risk to procurement bodies and end-users of accredited certification services, as well as reduced confidence in claims of accreditation.

You can find out more information on the steps you can take to validate management systems certification on our "How to differentiate the fake from the valid" guidance. This page also highlights potential signs of counterfeit certificates not issued by UKASs or by an accreditation body that is a signatory of an IAF or EA MLA.

The TIC Council has also launched an Anti-counterfeiting Action Centre to provide additional visibility and awareness around counterfeit certifications. You can access the TIC Council Anti-counterfeiting Action Centre here: https://www.tic-council.org/regions/americas/anti-counterfeiting-action-center

UKAS has also taken the decision to publish details of those organisations known to be falsely claiming UKAS accreditation for management systems certification, and who may have issued counterfeit certificates under the guise of UKAS accreditation. This information can be found on our website: <u>https://www.ukas.com/accreditation/counterfeit-certificates/</u>

You can protect your own supply chain and proactively monitor the accreditation status of certifications held by your suppliers by signing up for a free account with UKAS CertCheck now!

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.



Aliaxis GPS PE Blue - The Solution of Choice for Pipeline Renewal Programme – Press Release

The latest phase of work on the renewal of a large diameter water main feeding homes and businesses on the edge of the Cotswolds is progressing well, with Aliaxis' GPS PE Blue, large diameter pipeline solution being installed by one of the water industry's largest framework contractors.

By the end of next year, Kier Infrastructure is expected to have installed a total of 13.5km of Aliaxis' high performance potable polyethylene pipe in a project that had its origins back in 2016, and is upgrading the connection from a pumping station to a major reservoir serving multiple communities. The work is being undertaken due to unexpected long-term problems with the existing glass-reinforced pipes (GRP), which had tended to rupture. Falling under an 'Infrastructure Capital Delivery Framework', the works will serve to reduce leaks and improve reliability of supply, in line with Government targets for the water industry.

Recognised under a number of the water company's framework agreements, Aliaxis UK was involved in some of the initial appraisal and design work as far back as 2014, before Kier Infrastructure opted to install its GPS PE Blue pipe on the project.

Within the early design work, it was necessary to consider issues like localised ground contamination and obstructions; then connections at various points onto an existing 700mm diameter main which is being retained.

Andy Muncer, Project Director at Kier, commented: "The strategic importance of this design and build pipeline classifies it as a high consequence scheme requiring enhanced levels of quality assurance. Pipe quality and a rigidly controlled butt-fusion welding process are key factors in achieving this, and this has been realised through a collaborative approach between Kier, our client and our key suppliers. The project also includes six no dig tunnelled sections to mitigate stakeholder and environmental impacts.

"Aliaxis is a framework provider for PE material, but not for this large pipe diameter. However, whilst we did have some flexibility to go to other manufacturers and also considered a steel pipe alternative, we selected the GPS PE Blue as a proven and economic solution."

Nigel Gascoyne, Key Account Manager at Aliaxis UK, added: "Our 1200mm PE100 pipe is replacing a GRP pipe, which was originally installed in the late 90s /early 2000s and has consistently failed. The design of this pipeline started around eight years ago where we helped with a number of technical support meetings, offering advice on the installation and benefits of PE100. It was decided to lay the majority of this replacement pipeline in PE due to its flexibility and speed of installation. Not only did Aliaxis UK have the Framework Agreement in place, we're also the only company in the UK that can produce PE100 pipe to 1200mm sizes."

For the full Press Release or more information, please visit www.aliaxis.co.uk/GPSBlue

How digital technologies contribute to

universal drinking water – Press Release Digital water technologies have an important role in ensuring universal access to safe drinking water by 2030, according to a new report from the World Health Organisation. Johnny Alexander Gunneng, chief executive of InfoTiles shares his insights.

Two billion more people have gained access to safe drinking water in the past two decades. However, a new report from the World Health Organisation (WHO), UNICEF and the World Bank also reveals that the same number are still without access, and an increasingly volatile climate will only heighten water insecurity, disrupt supplies, and devastate communities. The State of the World's Drinking Water details the links between water, health and development, and gives achievable recommendations for implementation. It states that to achieve universal access to safe drinking water by 2030, "Governments should ensure they have relevant data and information to be better informed, understand gaps and inequalities in drinking water services, and make evidence-based decisions."

Digital water technologies have a key role to play in achieving the shared goal of realising the United Nation's Sustainable Development Goal 6 of ensuring availability and sustainable management of water and sanitation for all, and the report says governments should work "towards ensuring digital water technologies are supported and prioritised to realise their full potential." As a technology company operating in the water sector, InfoTiles shares this goal in the work undertaken with water utility clients. The report also recommends "building capacity within the water sector by developing a capable and motivated workforce through a range of capacity-development approaches based on innovation and collaboration." The real strength in leveraging digital water technologies lies in the usability of a central data platform and its capacity to model, visualise, and present data across all assets and operations, accessible to all relevant personnel to develop the capacity to work smarter. The InfoTiles platform, for example, can capture existing and new data that shows the likelihood of critical failures in water and wastewater infrastructure and resources, including treatment failures, sewage overflows, equipment breakdowns, and infrastructure damage.

By capturing data that is continually assessing the health and effectiveness of assets, water managers can anticipate, detect, and resolve potential problems before they happen, and maintenance teams and investment can be deployed much more efficiently. Additionally, it is possible to carry out these actions remotely though handheld devices such as tablets or mobile phones so water managers and other users can physically see what the data is telling them, wherever they are.

The full press release can be Read at: https://envirotecmagazine.com/2022/11/09/ how-digital-technologies-contribute-touniversal-drinking-water/

Press enquiries to: Nancy Smith M: +44 (0)7385 197421 E: nancy@wiseonwater.com



Güntner's commitment to natural refrigerants receives stamp of approval from ATMOsphere - Press Release

Fürstenfeldbruck, Germany - September, 2022. Güntner has received the Natural Refrigerants Label from ATMOsphere, a global market accelerator of clean cooling and heating solutions. Launched in June 2022, the label represents a global gold standard highlighting best-in-class manufacturers of natural refrigerant systems and components. The recently launched Natural Refrigerants Label is designed to help manufacturers to market products to new customers in the natural refrigerants marketplace and to help end-users identify best-in-class suppliers. "The label proves that our efforts towards a sustainable world are bearing fruit," said Michael Freiherr, Managing Director at Güntner, noting that natural refrigerants have been part of Güntner's business for nearly a century, and that the company has played a key role in spreading awareness of their benefits.

Güntner believes that solutions such as carbon dioxide, ammonia, hydrocarbons, air and water offer viable alternatives to synthetic refrigerants, which produce significant greenhouse gas emissions and are a risk to people and the environment. The company continues to test and explore their use in a state-of-the-art lab, and strives to ensure that all of its clients have the option to use them. The process of qualifying for the label is based on a unique methodology developed by ATMOsphere, and manufacturers need to demonstrate excellence across three pillars: company vision, customer satisfaction, and measurable impact.

A typical testimonial came from Katsuhiko Harada, President of OEM Nihon Netsugen Systems in Japan, who commented: "We installed 350 CO2 units with Güntner Gas Coolers. They achieved promised efficiencies. Of course, we are very much satisfied with the products. We continuously buy from Güntner." For more information about Güntner brand, visit GUNTNER.COM or contact us: Güntner Group Europe GmbH, Attention Veronika Britzelmair, Mobile: +49 160 913 569 16, E-Mail: veronika.britzelmair@guntner.com

PN 32/22 11 water companies to reduce bills by almost £150m because of missed targets

Most water companies will be hit by financial penalties because of missed targets, the regulator Ofwat announced 3rd October 2022. Overall, for those 11 companies, almost £150m is planned to be taken off customers' bills in the next financial year because of missed targets on areas such as water supply interruptions, pollution incidents and internal sewer flooding.

Not all water companies have significantly missed their targets. Better performers such as Severn Trent Water have exceeded their targets in areas like biodiversity and are able to recover more money from customers, whereas poorer performing companies such as Thames Water and Southern Water face a financial hit because of missed targets on water treatment works compliance, pollution incidents and internal sewer flooding across 2021/22 and will have to reduce customer bills accordingly. These decisions will impact customer bills in 2023-24.

These yearly targets, called performance commitments, are a combination of shared targets across the sector and bespoke individual targets on a wide range of issues. They were set in 2019 at the last price review. These are in place up until 2025, when the next price review, PR24, will come into place. The automatic payments and financial penalties announced today are based on whether companies have hit their targets and are known as outcome delivery incentives. David Black, Ofwat CEO, said: "When it comes to delivering for their customers, too many water companies are falling short, and we are requiring them to return around £150m to their customers. We expect companies to improve their performance every year; where they fail to do so, we will hold them to account. The poorest performers, Southern Water and Thames Water, will have to return almost £80m to their customers. All water companies need to earn back the trust of customers and the public and we will continue to challenge the sector to improve."

Ofwat announcement in full:

https://www.ofwat.gov.uk/11-water-companiesto-reduce-bills-by-almost-150m-because-ofmissed-targets/

Anglian Water fined £1.2m for causing pollution

Anglian Water has been fined more than £1.2m after admitting causing pollution in three counties. System and maintenance failures led to incidents in Cambridgeshire, Buckinghamshire and Northamptonshire in 2019, the Environment Agency (EA) said. In a separate case, a pumped sewer in Cambridgeshire burst in 2019, the sixth time in several years.

Anglian Water pleaded guilty to charges in both cases, brought by EA. The company was fined £870,000 by Loughborough magistrates in October after a series of process failures "caused damaging blockages and pollution" between May and September, EA said. After one particular incident, a subsequent biological survey showed dead aquatic invertebrates for 1,500m, the agency added. At another site, an unchecked build-up of cotton buds and sanitary pads caused a blockage, resulting in discharge of "settled sludge" into the treated sewage, EA said. The company admitted failing to comply with an environment permit condition in Steeple Claydon, near Buckingham. It also pleaded guilty to failing to comply with permit conditions over final effluent discharges into the River Lark in Cambridgeshire and over water discharge activity into the River

Tove in Northamptonshire.

The company also admitted causing poisonous, noxious, or polluting matter to enter inland freshwaters without an environmental permit and was fined £350,000 by Cambridge magistrates the following day. The Environment Agency said officers visiting a pumped sewer at Bourn Brook in Caldecote, near Cambridge, found ammonia and low oxygen levels in the water, posing a potential risk to wildlife at the site. Anglian Water's methods of preventing pollution spreading "proved insufficient", the agency added, and 4km of the watercourse was affected for at least five days. The company only located air valves, designed to reduce stress on the sewer, after the incident took place. The valves had been in place for at least 25 years, EA said.

VWT UK'S Actiflo® Turbo delivers water supply security in a major upgrade scheme – Press Release

As part of a scheme to improve local drinking water supply resilience, Veolia Water Technologies UK (VWT UK) has worked with one of the largest English water companies to design and implement three Actiflo® Turbo high performance water clarifiers for treating various types of raw water.

The water treatment works, which serves a large urban population, had been using Dissolved Air Flotation (DAF) and a Rapid Gravity Filter plant to treat relatively clean and soft water sourced from a reservoir. However, it became clear that the reservoir, which was built over 100 years ago, would now require regular maintenance and the intention was to source raw water from a major river nearby during these times. As the existing water treatment solutions were not suitable for river water, the water company required an alternative clarification solution to maintain its high-quality drinking water supply. VWT UK was approached by an independent consultant to propose a solution. Following an evaluation of the requirements, including the limited space on site for a new plant. VWT UK recommended its Actiflo® Turbo clarifier technology. This utilises a polymer coagulant with microsand to ballast the chemical flocs, significantly increasing the settling velocity of the particles. This delivers very short retention times and a more compact design. In fact, the footprint of an Actiflo® system is as much as 40 times smaller than conventional clarifier systems

The Actiflo® Turbo is the latest development of the technology and incorporates a turbomix shroud for enhanced flocculation. This also removes the requirement for a separate microsand injection and flash mixing tank to reduce the footprint further and deliver savings in both capital expenditure (CAPEX) and operational expenditure (OPEX). The resultant water needed to achieve strict turbidity, total and soluble iron, UV absorbance, true colour and dissolved organic carbon (DOC) levels to meet the drinking water requirements. To meet the water companies risk management governance, a long-term trial was established to demonstrate the capabilities of the system, including its effectiveness in treating different raw water types and contaminants. Following a successful 10-month, 2.5 million litres per day pilot study, the water company selected Actiflo® for the upgrade.

Three Actiflo® Turbo streams were designed and implemented, which provided the capacity to process up to 312 million litres of water per day. As the flow range varies significantly between approximately 20 and 104 MLD per stream, VWT proposed three smaller coagulation tanks with variable speed mixers per stream to ensure the stability of the flocc formation under all flow and operational conditions. The Actiflo® system has been fully operational since January 2020. To find out more about the VWT UK range of water treatment solutions, including Actiflo®, visit www.veoliawatertechnologies.co.uk.





North Sea shellfish deaths: Government to examine toxic chemical study

A minister has said he will "seriously" consider a study that claimed a toxic chemical was more likely to have caused mass shellfish deaths than algae. Fishermen on the North East coast have said their industry has been devastated by large wash-ups of dead crustaceans.

A study by several universities commissioned by the fishing industry said pyridine, which could have been released by dredging, was more likely.

Mark Spencer MP said any evidence "should be examined properly".

The £30,000 study was commissioned by the North East Fishing Collective following a crowdfunding appeal and carried out by academics at Newcastle, Durham, York and Hull universities. It found pyridine, which is used as an anti-corrosion treatment in marine infrastructure, was "highly toxic" to crabs "even at low levels". The chemical was observed to cause twitching, paralysis and then death, which was similar to witness reports made at the time of the mass wash-ups.

It said a source of pyridine "remained to be identified" but it was a "common industrial chemical and at least one Teesside industrial plant is known to have handled large amounts of it before 2019".

Marine pollution expert Tim Deere-Jones had also previously used Environment Agency data to conclude pyridine levels in some of the crab samples from the wash-ups were 70 times higher than in crabs from other areas. Mr Spencer said his department would work with the Centre for Environment, Fisheries and Aquaculture (Cefas) - the government's scientific arm - which did the previous examination work.

A Defra spokesperson previously said: "A comprehensive investigation last year... concluded a naturally occurring algal bloom was the most likely cause."

"We recognise the concerns in regards to dredging, but we found no evidence to suggest this was a likely cause."

DO YOU HAVE A PRESS RELEASE, PRODUCT OR SERVICE NEWS

TO SHARE? SEND IN YOUR

CONTRACTS, PRODUCTS & PUBLICATIONS

NEWS TO: waterline@wmsoc.org.uk

Cistermiser's rEVOlutionary flushing control, EasyflushEVO, wins big at BMA Sustainability Awards – Press Release

Cistermiser, the UK's leading provider of commercial washroom water management solutions, is delighted to announce their win at the Bathroom Manufacturers Association (BMA) Sustainability Awards 2022 where EasyflushEVO won the Water Efficiency category. Judges praised EasyflushEVO for its "new and novel approach" to tackling water loss and eradicating the #leakyloo issue. Richard Braid, Managing Director of Cistermiser, commented: "Cistermiser has spent more than a decade innovating and providing products that help FMs, local authorities, health trusts and building owners and it is so rewarding to have the team's hard work on EasyflushEVO to be recognised by a panel of independent judges.

"We all know as an industry how much water is wasted through leaking toilets. According to experts Waterwise, a leaking toilet wastes between 215 and 400 litres of clean drinking water on average every day. Between 5 and 8% of toilets are estimated to be leaking, adding up to around 400 million litres of water leaking from UK toilets every day. Against a backdrop of the climate crisis and the Road to Net Zero, losses like these are clearly unsustainable.

"The EasyflushEVO is our latest addition to the Cistermiser product range, and its revolutionary flushing valve solves the problem of leaking toilet cisterns and saves 78,475 litres of water per unit per year. This was a huge inspiration for the development of the EasyflushEVO and although it might not single handily solve the 'leaky loos' problem we have in this country, it goes a long way to raising standards and awareness.

"The EasyflushEVO has revolutionised WC flushing by bringing together the previously unattainable benefits of non-touch and leakfree flushing. The patented flush design means there is no flushing seal below the waterline, so unlike traditional flush valves, it will not leak due to debris, scale, or seal degradation. We are, as a company, so proud to be contributing to the positive shift towards making this industry more sustainable."

Tom Reynolds, CEO of the BMA, praises the work Cistermiser is doing: "Cistermiser has been committed to reducing water wastage and it is so exciting to see how far they are willing to push themselves through innovation to take product performance sustainability to the next level. It's a tough ask, but with products like the EasyflushEVO, we can all contribute to transitioning this industry to do its bit for the planet, here at the BMA, we look forward to seeing what Cistermiser does next." *For more information or to request technical information, call 0118 969 1611, or email sales@cistermiser.co.uk.*

www.cistermiser.co.uk



VWT UK supports Green Hydrogen Production – Press Release

Veolia Water Technologies UK (VWT UK) is supplying water treatment systems to global water electrolyser manufacturers as part of the water treatment specialist's movement into the Hydrogen production market. VWT UK's systems can be fed with reservoir, river, borehole or saline feed water to produce water suitable for feeding PEM electrolysers. Water electrolysis has a key role to play in the production of hydrogen. To ensure efficient water electrolysis, only high purity deionised feed water must be used to prevent impurities from concentrating inside the electrolyser, which can adversely affect the performance of the electrode and diaphragm surfaces. Failure to meet deionised water requirements not only leads to faster system deterioration, but also a reduction in system performance. The global water electrolyser manufacturer

in question, wanted to expand its offer and provide water purification systems to customers as part of an overall package. To support this objective, the manufacturer approached VWT UK to supply water purification solutions, due to VWT's previous experience with similar companies and knowledge of the water requirements for efficient hydrogen production.

VWT UK's solution is a modular system that can effectively treat feed water to the required quality to feed PEM electrolysers. It has been specifically designed to manage inlet water with high hardness and salinity, as well as ensure a variable flow rate to suit any requirement. The plant also includes softening and reverse osmosis (RO) systems to meet the electrolysers required conductivity of < 3 μ S/cm.

This initial solution was developed for the manufacturer's European-based customers. However, the partnership now also includes the supply of water deionisation plants to the manufacturer's customers operating in the USA. VWT's global presence, service support capability and structure was a key benefit. The organisation's local delivery business units will adapt VWT UK's systems in order to meet all USA standards (ASME, UL).

"We are delighted to support green hydrogen production, a source of energy that will undoubtedly play a key role in reducing greenhouse gas emissions," commented Derek McIntyre, Business Development Director at Veolia Water Technologies UK. "By working with VWT UK, hydrogen producers can benefit from our extensive series of treatment technologies, as well as our deep understanding of the treatment requirements for various feed water sources, to ensure the treated water is suitable for use in electrolysers. Our global service presence also ensures we can support water treatment systems for electrolysers wherever they are installed.'

For more information on Veolia Water Technologies UK, please visit: www.veoliawatertechnologies.co.uk.





Water bills to rise as firms pass cost of sewage crisis on to their customers

Water bills will rise to give firms money to stop sewage flowing into rivers, the Department for Environment, Food and Rural Affairs (Defra) said on 26th August. New targets to stop untreated sewage being dumped in rivers and the sea are expected to cost the public an average £42 a year extra by 2050, according to plans announced by the Government. Bill rises will begin in 2025 and will average an extra £12 between 2025 and 2030, as water companies begin to pass on the cost of investing in the network to their customers. Campaigners called for firms to fund the work from bonuses and dividends rather than customer bills.

Storm overflows are mixed rainwater and sewage systems that discharge into rivers and the sea - something that is supposed to only happen when the sewer is overwhelmed by "exceptional" rainfall.

The government storm overflow discharge reduction plan sets out targets for water companies to improve all overflows discharging into bathing waters and 75 per cent of those discharging into high-priority natural sites by 2035.

By 2050, no storm overflows will be permitted to operate outside of unusually heavy rainfall, or to cause ecological damage, the plan stated. Water companies are expected to fund these infrastructure improvements by adding the cost to consumer bills. Regulator Ofwat must give them permission to do this, in a process overseen by the Government. *To view full details of the "government storm overflow discharge reduction plan" please go to: https://www.gov.uk/government/ publications/storm-overflows-dischargereduction-plan*

Algae-powered computing: scientists create reliable and renewable biological photovoltaic cell

Researchers have used a widespread species of blue-green algae to power a microprocessor continuously for a year – and counting – using nothing but ambient light and water. Their system has potential as a reliable and renewable way to power small devices. The system, comparable in size to an AA battery, contains a type of non-toxic algae called Synechocystis that naturally harvests energy from the sun through photosynthesis. The tiny electrical current this generates then interacts with an aluminium electrode and is used to power a microprocessor.

The system is made of common, inexpensive and largely recyclable materials. This means it could easily be replicated hundreds of thousands of times to power large numbers of small devices as part of the Internet of Things. The researchers say it is likely to be most useful in off-grid situations or remote locations, where small amounts of power can be very beneficial.

"The growing Internet of Things needs an increasing amount of power, and we think this will have to come from systems that can generate energy, rather than simply store it like batteries," said Professor Christopher Howe in the University of Cambridge's Department of Biochemistry, joint senior author of the paper. He added: "Our photosynthetic device doesn't run down the way a battery does because it's continually using light as the energy source." *The study has been published in the journal Energy & Environmental Science. Further information at:*

https://www.cam.ac.uk/research/news/ scientists-create-reliable-biologicalphotovoltaic-cell-using-algae

South West Water money off bills if reservoir in Cornwall returns to 30% full

South West Water has said it would give customers £30 off their bills if they can hit the target at Colliford Reservoir, which currently is only 17% full. It is asking customers to make changes to their water habits and reduce usage to achieve the improved level, with Cornwall still under a hosepipe ban. The water company wants to see people aiming to save ten litres of water every day, with suggestions including reducing the amount of time they shower for, and turning off taps when they are brushing their teeth.

The "Stop the Drop" incentive is only available for customers within Cornwall, as reservoir levels remain low here.

Devon has seen water levels return much more quickly, with average levels across the border said to be almost three times higher than at Colliford.

South West Water is hoping the "collective might" of Cornwall will be able to achieve the target by the end of the year. Laura Flowerdew, from the water company, said engineers had been working "around the clock" to get new supplies set up, find and fix leaks, and help customers and businesses reduce how much water they use. She told the BBC: "However, in Cornwall reservoir levels remain low. That is why we are asking everyone to help Stop The Drop, so we can restore reservoir reserves, ensuring we have enough water today and into next year." The incentive scheme will cost South-West Water around £10m if the target is reached. The reservoir serves some 255,000 customers and it is predicted that 4.5m litres per day of water can be saved if residents cut their shower times by one minute.

Rare behind-the-scenes tours at canal open days this winter

This news is from the Canal & River Trust web-site.

Every winter we replace lock gates, dredge to ensure the water is deep enough for boats, undertake maintenance on our mechanical structures, and carry out a host of other heritage repairs and tasks to keep the network open and help ensure its resilience to climate change. This winter 172 large-scale works are taking place across 48 waterways, with six specially chosen projects opened-up to give boaters and the canal-loving public free behind-the-scenes face-to-face tours. Heritage works and repairs at a number of sites will also be filmed to give online audiences a tour of the works programme.

The face-to-face open days start on the Hanwell Lock Flight on the Grand Union Canal in London on 26 and 27 November, where we are replacing the lock gates at Lock 94.

On 3 December, we will be hosting tours at our lock gate workshop at Stanley Ferry, where many of the 120 locks leaves being replaced across the network this winter have been handcrafted. There will also be a 30-minute guided walk from the workshop to Lock 3 on the Wakefield Branch of the Aire & Calder Navigation where the 200-foot-long lock, one of the larger locks on our network, will have been drained for important maintenance works.

In the new year, open days showcasing locks drained for gate replacements will also take place at Gallows Inn Lock on the Erewash Canal (28 & 29 January), Greenham Lock on the Kennet & Avon Canal at Newbury (11 February), and the Rochdale Canal in Manchester (4 March). Other open days still to be confirmed for the new-year include an event in Kidderminster on the Staffordshire & Worcestershire Canal.

The programme of online 'behind the scenes' tours will give people who aren't local, or who would prefer to join online, the opportunity to see the breadth of works taking place. These will include filming of works on the Grand Union Canal at Hanwell and the Grand Union Canal Leicester Line, Wolverley Lock on the Staffordshire & Worcestershire Canal, Crofton on the Kennet & Avon Canal, the Rochdale Canal in Manchester, and at Stanley Ferry/Lock 3 on the Aire & Calder Navigation.

More information and news at: https://canalrivertrust.org.uk/news-and-views/news/rare-behind-the-scenes-tours-at-canal-open-days-this-winter





Smart standpipes close leakage reporting gaps – Press Release

More precise monitoring of water supply networks via smart standpipes is making evidence-based data readily available, closing reporting gaps and giving a clearer picture of network activity, says Kevin Brook, director of Orbis.

UK water companies saw a sharp increase in water usage during the record temperatures in summer 2022, but newly available data shows that much of that can be attributed to third parties abstracting water from hydrants.

Orbis's innovative SmartStandpipes, which are hired by organisations such as councils, drainage specialists, construction companies and event organisers, recorded a 24% overall increase in water usage from 1 April 2022 to 1 October 2022, compared to same period last year. Smart standpipe water usage peaked in August 2022, doubling in some regions, according to Orbis data.

The period from January to August 2022 was the driest in the UK since 1976, with water companies seeing an inevitable surge in demand for water during prolonged dry spells. While much of this can be attributed to domestic use, Orbis data confirms large volumes of water, up to 20ml per day, were taken from the network by third parties who had hired smart standpipes during this period. The increased demand for water has been driven by the dry ground which requires frequent watering, sports and training pitches, construction sites to reduce dust, watering of groundworks, newly-laid landscaping and outdoor festivals. A standpipe is a means of connecting to a water distribution network for a temporary water supply, with UK utilities typically outsourcing the hiring of standpipes to a partner, such as Orbis's sister company Aquam Water Services. Typical uses may be construction, landscape gardening, drain cleaning and outdoor events, such as festivals. Orbis's unique smart standpipe technology can calculate in real time the precise volume of water extracted from the network and assign it to an authorised user. A built-in multi-sensor measures water extractions and pipeline flow data, provides GPS location data and records the time the water was taken. Data is uploaded to a cloud-based portal where scheduled reports and real-time alerts can be accessed by operators. All water company clients have access to the portal, where they can view and analyse real-time data from their networks.

Orbis, through Aquam Water Services, has 12.5k smart standpipes in operation across the UK, monitoring significant volumes of water that may not otherwise be accurately accounted for in water company calculations.

This new insight could have a positive impact on reportable leakage numbers, as water being used by licensed third parties may have been wrongly attributed to leaking pipes in the past. Similarly, it may positively impact per capita consumption targets, if volumes used by third parties were previously attributed to domestic households. Now water companies can eliminate third party usage from their calculations which will help them get a more accurate picture of what is happening on their network and capture data that could help them make informed predictions for future consumption patterns. Knowing who is abstracting water is useful when tracking down illegal use – those who are taking water without a permit from the relevant water company. *Further information:*

https://www.orbis-smart-networks.com/products/smart-standpipe-technology

Introducing the new Zip HydroTap UltraCare system that is proven to deliver a 99.9% reduction in Legionella*

This is a multi-barrier system for the prevention and reduction of Legionella. Helping health and aged care professionals meet their obligations to combat the risks associated with a wide range of waterborne organisms and pathogens including Legionella within their facilities is of utmost importance for Zip Water.

Zip HyroTap UltraCare uses a combination of localised treatments and barriers that are proven as the most effective method of reducing waterborne organisms and pathogens including Legionella. These barriers have been outlined in the enHealth (2015) guidelines for Legionella control in operation and maintenance of water distribution systems in health and aged care facilities.

The 1st barrier incorporates a MicroPurity UV-C LED module on the outlet of the chilled water tank. UV-C photons penetrate cells and damage the nucleic acid, rendering them microbiologically inactive or incapable of reproduction. The MicroPurity UV-C LED module has been tested individually and certified to the relevant NSF and WaterMark performance standards. (WQA NSF55 Class B test report and NSF55 Class B listing). The 2nd barrier incorporates a MicroPurity™ carbon-free filter, whilst the 3rd barrier SteriTouch[®] is impregnated inside materials in contact with key water paths in HydroTap UltraCare reducing surface bacteria levels to provide protection effective against a huge range of bacteria including salmonella, VRE (vancomycin-resistant Enterococcus), CPE (carbapenems producing Enterobacteriaceae) and Legionella.

Zip HydroTap UltraCare system comes with a lifecycle maintenance plan to ensure scheduled regular maintenance which is recommended in enHealth Guidelines. There are 3 service kits available for purchase and



includes consumables e.g. filters and sanitisation kits through to preventative maintenance components. For more information:

https://www.zipwater.com/ ultracare

Photo: HydroTap Classic Plus

*ALS Pty Ltd Testing of the Zip HydroTap UltraCare system efficacy tests.

Don't miss our updates:



Waterline Journal linkedin.com/in/waterline-journal-0b1645170/





IDEXX acquires Tecta-PDS to expand Water Microbiology Testing Capabilities

IDEXX, the global leader in rapid microbiology testing for water, has acquired Tecta-PDS, an innovative Canadian company that has introduced automation to water microbiology testing for parameters including E. coli and total coliforms. The acquisition allows IDEXX to expand its range of water microbiology testing options for both laboratory-based and in-field testing.

Founded in 2003, Tecta-PDS has developed an effective and reliable automated water testing solution and has grown to expand its customer base in more than 50 countries. The Tecta B16 and B4 instruments automate important steps in water microbiology testing, allowing results to be delivered to laboratories in real-time. Full automation of incubation and test interpretation eliminates the need for a visual read of the test. Results are sent anytime, anywhere by email with positive results available within hours. The Tecta method is U.S. EPA approved for detecting total coliforms and E. coli in drinking water. "Tecta-PDS offers an innovative automated microbiology testing platform that advances the provision of safe and clean water worldwide," said Chun-Ming Chen, Vice President and General Manager of IDEXX Water and OPTI Medical Systems. "We admire the ingenuity and customer satisfaction track record that Tecta-PDS has cultivated over the course of nearly twenty years. We look forward to introducing this platform to water testing laboratories globally and welcoming Tecta-PDS to IDEXX." IDEXX water testing solutions are approved or accepted by regulatory agencies in over 40 countries, protecting billions of people daily, delivering easy, rapid, accurate and cost-effective information on water quality to laboratories, public utilities, and facility managers. In addition to Tecta, IDEXX products include Colilert®-18 (ISO 9308-2) for 18-hour detection of coliforms and E. coli in water, Pseudalert® (ISO 16266-2) for 24-hour detection of Pseudomonas aeruginosa in facilities, hospitals, pools and spas, and Legiolert®, which detects Legionella pneumophila in 7 days.

To learn more about IDEXX Tecta, please visit: https://www.idexx.com/tecta.

Rare heritage skills boost given for Burnley's successful Finsley Gate Wharf restoration

This news is from the Canal & River Trust web-site.

Located on the Leeds & Liverpool Canal, the 220-year-old former boat yard and canal office have recently been renovated and transformed into a successful restaurant and café bar, function room, guest house, community heritage learning hub, working forge and waterside gardens. The £2.9 million restoration was reopened in July 2021, but Covid and rising material costs delayed work on the final piece of the jigsaw - a small, stone-built wash house and outdoor toilet, which would once have served the canal supervisor's house. Constructed in local gritstone, the 160-year-old outhouse, like the rest of the site, was in a poor state of repair, with only five original roofing slates still in place.

Our colleagues, who care for 2,000 miles of waterways, came up with an innovative plan to complete the Finsley Gate re-development by using the project as a training opportunity for four new specialist stone masons. The young craft apprentices, all from Burnley, were originally taken on by the charity under the Kick Start scheme after Covid and are now being formally trained as apprentices in the rare, specialist skill of stone masonry. Dominic Lafrenz, Tyler Williams, Mason Macari and Luke Haywood spend a fortnight every two months at York College, one of very few in England offering courses in stone masonry. The rest of the time they are learning practical skills on the job with the Trust. Now under the guidance of our North West heritage adviser Bill Froggatt, project manager Mark Wigley, apprentice supervisor Graham Mitchell and craft operative James Archer, they are helping to repair the building and convert it into a new storehouse for the site's

volunteer gardeners. More information: https://canalrivertrust.org. uk/news-and-views/news/rare-heritage-skillsboost-given-for-burnleys-successful-finsleygate-wharf-restoration

Leakage Reduces thanks to Sprint led by Morrison Water Services at Northumbrian Water Innovation Festival

A ground-breaking solution to tackling the challenges of water scarcity and demand identified by Morrison Water Services and Northumbrian Water has reduced leakage in two pilot areas by at least a quarter. Morrison Water Services, a part of M Group Services' Water Division, and Northumbrian Water have been successfully trialling groundbreaking new leak-detection technology, VariSim Delta, since March in a bid to reduce leakage from the clean water network. Leakage in the pilot areas, Newcastle and Dagenham, has reduced by 25% using the software system that uses flow meters, pressure sensors, high-frequency sampling and acoustic loggers to help identify leakages and bursts before they happen.

Trialling VariSim Delta came out of a sprint held at the Northumbrian Water Innovation Festival last October. Innovators from across the world came together to look at creating a proactive approach to avoid leakage from a clean water network.

Morrison Water Services is the exclusive UK supplier of VariSim Delta, a groundbreaking technology which can help to minimise disruption to customers' homes and businesses, keep water flowing and reduce the amount of water lost from the network through leakage.

VariSim Delta has already been implemented successfully in Qatar and Dubai, two of the most water-stressed countries in the world. By using millions of calculations per second, VariSim Delta creates an identical digital replica of a water network, known as a digital twin or pipeline simulator. This real-time virtual recreation of the network can also help water companies understand why bursts happen, assess the condition of network assets and pipes and the profile of customer demand to help make informed decisions about asset optimisation. Driven by Artificial Intelligence (AI), VariSim Delta software can also be taught to spot new leaks and bursts, identify changes in customers' water consumption and create alerts for malfunctioning assets.

For further information: https://reveela. com/2022/09/20/leakage-reduces-thanksto-sprint-led-by-morrison-water-services-atnorthumbrian-water-innovation-festival/

waterline Research Papers SCIENTIFIC PUBLICATIONS NOW AVAILABLE ONLINE!

Research papers can now be found on the Waterline website on the Research page.

Follow the weblink here: https://bit.ly/WaterlineRP





- ISO 5667 -3 Preservation, handling, and transport of samples Start work in Jan
- ISO 5667 -27 Sampling for microplastics in water looking for comments
- ISO 5667-10 Sampling of wastewater
- ISO 5667-12 Sampling of suspended solids
- ISO 5667-17 Sampling of suspended solids in freshwater



TECHNICAL 08A

SENT INTO WMSoc. TECHNICAL:

'When carrying out the disinfection of new and/or altered hot and cold-water services in all premises (including healthcare) which code of practice do we state the work is in accordance with?'

HTM 04-01 makes reference to HSG274 part B, which in turn makes reference to BS8558. We have always used BS8558 and now PD855468 as guidance but had difficulty with an independent consultant getting a method statement approved.

He works on behalf of the NHS and his approach is focused on HTM 04-01, so his primary concern is Legionella, and has stated that HTM 04-01 says not to take samples for TVC, E.Coli, Coliforms etc. which we believe to be incorrect.

In summary, if our method of disinfection matches that of PD855458 shouldn't this be considered acceptable for all new systems including Healthcare?

$\textcircled{0}_{\$}$

Ag

ANSWERED BY THE WMSOC. TECHNICAL COMMITTEE

To answer your main query regarding whether a full suite of microbiological analyses is required after system disinfection; HTM 04-01 and HSG274 don't advise that TVC (22°C and 37°C), *Escherichia coli*, coliforms and *Pseudomonas aeruginosa* testing is required in a sampling plan following system disinfection, whereas PD 855468 does.

It may be that the independent consultant is perhaps mixing up routine and reactive microbiological testing (i.e. from HTM 04-01 Part B) and sampling and testing following disinfection. Both HTM 04-01 and HSG274 provide advice on when to sample after disinfection, rather than what to sample for. Although extensive sampling won't do any harm it probably unnecessary and costly. However, if the disinfection procedure claims to follow PD 855468: 2015, then it should realistically follow the guidance in it, or make it clear where there are departures from the guidance and explain the reasons for them.

To answer your question in a nutshell, if your method of disinfection matches that of PD 855468: 2015, it would be considered to be acceptable for all new water systems, including those within healthcare premises. The disinfection protocol should be submitted to the WSG for review and approval and they should decide on the type of testing used to validate disinfection, which could include those microbiological parameters described in PD 855468: 2015. TVCs can be useful both pre and post disinfection (2-7 days after the system is treated), particularly when recommissioning a system or equipment, to assess the effectiveness of a disinfection.

DO YOU HAVE A QUESTION FOR OUR TECHNICAL COMMITTEE?

Sendin your question viaemailto: admin@wmsoc.org.uk





waterline



1997 - March Markane, Y. HOREE Records with an and much a wide wange of water deducty professionals. CMI 4 july security term for only CPB - ORE juer month ARE YOU HIRING? Recruit *with* waterline

List a vacancy for ONLY £75 (+vat) per month!

Call us <u>TODA</u>?: D1827 289 558



WMSoc NEW QUALIFICATIONS

30th November saw the first cohort of students sit our new Legionella Risk Assessment of Hot & Cold Water Systems qualification exam.

The morning started with a recap and group discussion of the various elements which make up this qualification pathway with the attendees enjoying a lively discussion with the tutor. The rest of the day was dedicated to the exam with 3 hours allocated to complete all scenario based questions, with the exam being split into two 90 minute sessions. The exam was based around not only knowledge learnt during classroom and online courses, but also experience in Legionella Risk Assessing which the candidates had gained over their normal working days.

Of the three delegates meeting the requirements to sit the qualification exam, Robert Turner was the only person to achieve the required pass mark. He is now WMSoc Certified and his name is viewable on our website.

Robert of Leviathan Water Treatment told us that "the wrap up session was a useful forum in which to discuss some of the issues and problems you encounter when carrying out risk assessments. The exam itself, being scenario based, put you in the sorts of positions you find yourself in whist on the job and although challenging I felt it was a fair test of the knowledge and experience that should be required to be considered a fully competent risk assessor. Having achieved the qualification, I believe this will be useful to me, enabling me to demonstrate and evidence competency to my clients."

Those students who did not pass were given a post exam debrief by the tutor of the areas they need to improve on to potentially allow them to pass any future exam. Both candidates expressed a desire to retake the exam.

Students attending and passing future qualification exams will join Robert online. Names will be posted for 3 years after which time requalification will be required.

The Water Management Society remains committed to improving knowledge and understanding in the water industry and offers a number of technical courses and qualifications alongside member communications and events to enable this.

SEE OUR WEBSITE FOR DETAILS ON HOW YOU CAN GET INVOLVED:

https://www.wmsoc.org.uk/learning/pathways



WE ARE RECRUITING!

LCA ASSESSORS, UK AND IRELAND

To bolster our current team of LCA Assessors, we are looking for new Assessors across the UK and Ireland.

As an industry professional, with a high degree of relevant experience, you should be professionally competent in the areas of Legionella risk assessment, water treatment, hot & cold water monitoring, cleaning & disinfection, legionella monitoring and plant & equipment. Ideally with an auditing background or experience of auditing, you must be fully aware of current legislation & guidance and possess an awareness or experience of the Legionella Control Association and its requirements.

The role is offered on a self-employed basis and would provide approximately one day a week of work.

Interested: Forward your CV and covering letter outlining how you meet the requirements to admin@legionellacontrol.org.uk or call Liz on 01827 269063 to discuss further.



A discussion with... WMSoc Directors



Mike Hunter

lan E Kershaw

In this edition we are speaking with the directors of the Water Management Society to understand their backgrounds and views for the future. Our current directors are Mike Hunter, Colin Shekleton, Ian Kershaw and Elise Maynard.

The Water Management Society journey for our directors has been a long and happy one with Mike joining as a member in the mid 80s, then leaving briefly at the turn of the century before re-joining in 2004 and becoming a member of council in 2007. Ian joined the society in 2006 and joined the ranks of council in 2015 and is now our immediate past chair. Elise was a group member for many years, with her previous employer and became a full member in 2011, becoming the first female chair in 2014 taking over from Mike, and at the time she "joined every working group to get an idea of how they all worked", which she is still a part of today. Colin joined the society in 2004 and "somehow got elected" to council in 2010. Colin became chairman following Elise and notes that he "wanted to get involved to ensure proportionality and reasonable practicality are considered" in our advice and Ian cites the "highlight of his career would be either chairmanship or fellowship of the society".

Our first question to the group was, **describe your career journey so far**. Mike, as the longest serving of our directors, started his career journey in 1974 when he studied chemistry at Salford university. He then joined Houseman in 1977 as a trainee sales service engineer in the North West where he worked until



Elise Maynard

1982. Moving from the sales division to the technical division he become a technical executive working for N.D. John Lindeman who was the division chief. He worked there for 2 years, and it was here where he first came across legionella at the Hesham power station. He recalls "people were refusing to work on building the site as the temporary cooling systems had legionella, 6 people were infected, 1 person died and 1 was crippled." Mike was heavily involved in treating the towers every day for weeks with a new biocide that Houseman had been developing with the CDSC, continuing to sample the water in 25 litre drums "for what seemed an eternity". Following this he was also involved in dosing the identical power station at Torness in Scotland. He learnt a lot during this time as all the legionella information was now coming to him and found this fascinating, but he also "learnt the power of legionella from a sales and fear perspective."

In 1984 Mike moved to the South and became the sales manager, then general manager for the South of England with 200 staff of technicians and water treatment people working for him. He was promoted to UK sales manager at Houseman, then sales director and moved to the business development side when the company was purchased by Suez Lyonnaise. Here he was head of technical, marketing, publishing, product development, labs and manufacturing and noted "it was interesting to see how other companies did it".

Mike moved to Helox, a company making chlorine dioxide, in 1999 and worked there



Colin Shekleton

until 2004 when it was sold to NALCO. He had put money into WaterChem and worked there with 3 others to grow the business from a few hundred thousand pounds to £11 million turnover before poor health refocused his mind and he and the team decided to sell. In 2013 Mike was offered a job with AP Tech Solids Ltd, a former supplier, on a part time basis, and he is still working there today.

Ian started in 1983 working for Houseman water treatment, based in the North East of England, working on steam boilers, cooling towers and closed systems. He then moved to Devon and Cornwall for a while, before moving to the M4 corridor to work for Mike doing the major account work including Heathrow airport and Mars. He noted "Legionella really kicked off in around 1985 with the Stafford hospital outbreak and Houseman got involved with the water hygiene business".

Ian then moved to Ramsbottom and water hygiene became his main focus, before later moving to the North East and out of water hygiene, as he got involved with chemical waste management working to disinfect farms following the foot and mouth cull which "was not fun". Ian moved back into water hygiene in 2003 and joined Hartlepool Borough Council in 2004. He worked briefly with Gateshead council before moving back to Hartlepool in 2013 where he worked until 2022. Ian has now launched the Kershaw Consultancy Limited and is working as an assessor for the Legionella Control Association.

Our other two directors had more varied



starts to their careers with Elise starting her career during her A-Levels when she chose to do an "after school class in microbiology" which she enjoyed. She noted that "at school the options were secretary or nursing for girls" but she wanted something different and she "found out about a career in hospital labs" which she applied for and was awarded an apprenticeship. Unfortunately, she failed all her A-levels except Geology, but she turned up on the first day anyway "expecting them to send me home", they didn't and Elise completed an ONC and HNC in the 6 years she worked there. In 1987 she moved to Pall Europe working on laboratory research. At the time the company was looking for a degree gualified person and Elise remembers having to convince them that with a HNC and 6 years' experience she was just as good. She stayed with the company for 26 years working in the labs, and technical support visiting client sites. She was covering filters from intravenous, breathing, blood and finally water and notes that "all filters work in a similar way it is just the fluid that changes!". During the last few years, she moved into marketing which she enjoyed as she had the technical background to help clients, but when the company was being taken over in 2014 Elise decided to take redundancy rather than move abroad.

Upon leaving Pall Elise started her own company, Elise Maynard Associates, where she does consultancy work advising Water Safety Groups for healthcare. She also works for other industry partners doing technical consultancy, is an LCA assessor, WMSoc tutor and is heavily involved in BSi and ISO committees.

Colin on the other hand worked as an apprentice at a heating, ventilation and air conditioning company dealing with Royal parks and palaces including Windsor Castle and Buckingham Palace. He remembers it as being "lots of fun" visiting "these amazing places". After five years, at the end of his apprenticeship, he moved to a heating and ventilating building contractor and was working on the design side of the business learning CAD before moving to a company that designed air handling units, he remembers "I was using the computers whilst the rest of the office were still using slide rules". This embrace of technology meant that Colin could quote in an hour what his colleagues were doing in a week and within a few months he was running the department.

Colin was approached to join a water hygiene consultancy with a friend and noted that the work was different, but he understood the design as he had a HND in Environmental Building Services. He understood tanks, calorifiers, pipes, pumps etc. He found looking at the systems from the other angle of Health & Safety interesting, and "fairly quickly he was running a team of 3". In his mid 20s Colin's previous employer approached him after a chance meeting on site. He was charged with starting the consultancy department, asked to carry out risk assessments "utilising his air quality knowledge". He built the team up over time and it was at this point in 2001 that he was introduced to the WMSoc training courses. He noted that "much of his knowledge on the water side has come from the WMSoc" and he has found the presenters and tutors to be inspiring and passionate. Colin was with his previous employer for almost 21 years before branching out on his own and is now offering his services as an independent water hygiene consultant.

Our next question was what is your main focus at the moment and why do you see that as important?

lan's main focus is "delivering a quality service to clients, ensuring affordability and making sure they get what is required, and not what the industry says that they need". He is focused on sticking to the requirements in HSG274 to give the correct service to his customers, getting it right for the client and his team.

Colin tells us that he "quite likes learning new things" and feels that "every day is a school day!" He is a self-confessed geek and often can be found reading up on new technology or pathogens to see how they work. He notes that "it's easier to assess the risk when you understand how things work". And for new pathogens or technology he will try to understand "what do we need to look at, and what things do I not need to worry about?" This helps him to focus on what is important.

For Elise, she will be handing the baton of chair of the Training and Accreditation

Committee over to Colin Shekleton in 2023. She notes "we have made great steps forward with online courses and qualifications, and we now have new trainers onboarded for a strong continuity plan". The next challenges are to provide WMSoc members with good value for money for their membership fee and to make sure surplus funds are invested for member benefit, as we move into less certain financial times.

Mike on the other hand has a more personal focus and notes that he is "probably fitter than he has ever been". He is trying to change the balance away from work to his private life and although WMSoc has taken more time over the years, he "is trying to take a step back to let the younger members of council take more control".

Next we asked What improvements could be made to the industry that you are allied with?

Ian has been heavily involved with the North East Councils Legionella Focus Group and is passionate about "educating the customer so that they can challenge their contractors". He believes that "honesty" is really needed in the industry, "delivering what is needed and not charging customers for unnecessary work". Elise agrees noting that "the industry can't survive without the end user and the user can't survive without the industry." She would also "like to see a much more informed end user that can have a very open and honest conversation with suppliers". She feels that this would "bring business to suppliers and a good service for the users" and urges better communication to make everything work for everyone.

Mike feels that more training is needed for the professionals in the industry noting that for expert water treatment you would need knowledge of chemistry, physics, engineering etc. In the past the big companies ran extensive training programmes, but this isn't happening any more perhaps due to high staff turnover, but he feels passionately about getting "people trained to do the job". He also notes that "people don't analyse a situation now" and muses that this may be a generational change as information is so freely available online now. Whilst

this is useful it does mean that the way of accessing knowledge has changed and notes "you can get data onsite but if you don't know how to use the data to get the solutions then you're are no better off". For Colin, his focus is on "improving diversity by letting more people in to do things". He feels strongly that "we were all new once" and notes that "sometimes it's terrifying asking a question" so he would like to see youngsters having "more confidence in themselves to ask the guestion". He refers to well-run Water Safety Groups where the "large diversity of specialist skills give you a better rounded view on the situation". And feels that everyone has a view and should be heard.

Our final question was to ask the directors where they think **WMSoc can make a** difference?

All the directors really felt that it was information and training where WMSoc makes the difference. Ian noted that "If we can get plumbers to install correctly and get designers to design out the issues, such as concurrent pipework and long pipe runs, we can get a building which is right from the start". Colin noted that "we were all new once" and felt that even basic information and training have a place in providing a way for self-improvement. Elise felt that our independence was a key and that the committees "strive to get the best knowledge out to everyone interested in water and provide a balanced view". She felt that it was really important that WMSoc had "no hidden agenda, it was just about getting the knowledge out there". Colin agreed noting that "WMSoc is a great conduit for all of the other experts and organisations and societies and has the potential to be a one stop shop" of information. He noted that "the training is also important and goes hand in hand with this". He is a key advocate along with Ian of diversity and noted "the more diverse the membership, the more different experts in different fields we will have".

Elise agrees and notes that in the past "we needed to get new members into Council with a wider skill set, with younger people" and people with time available to help, and she is happy that this is now happening.

I think you will agree that our directors all have different experiences within the industry which provides a rounded and diverse view for the society, and we thank them for their time and effort in helping to maintain and improve the society, and also for taking the time to talk to us this month.

Quick fire round

Beer or wine? Ian went for Beer, Mike and Elise opted for Wine, but Colin would prefer a vodka and tonic

Pizza or curry? Mike and Colin opted for pizza, Ian prefers curry and Elise would like both please!

Cheese or dessert? Ian, Mike and Elise would choose cheese with Colin opting for a chocolate dessert

What's your favourite vehicle? Ian and Mike both chose their current cars, Elise chose a Tuktuk and Colin was the most environmental with his choice of a bicycle

What three things would you take if deserted on a tropical island? Elise would take sunglasses, a sarong and a book for some good downtime. While Ian would take his whiskey collection and his Clarkson book collection for his downtime.

Colin was much more practical with a desalination plant, bicycle and a telescope for the uninterrupted view of the stars. And Mike would take his wife Liz, and plenty of cheese and wine.



Since the last edition of Waterline was printed the WMSoc has approved 33 new membership applications, 2 upgrade requests and 2 group memberships. We welcome members from the following sectors of the industry:

Water Hygiene – 15, Water Treatment – 5, Consultancy – 8, Facilities Management – 3, Building Services – 1, Healthcare – 1.

The following new members have given permission for their names to be printed: Matthew Aizlewood, Ismail Alkaya, Luke Baldry, Terri-Ann Boyle, Michael Brannon, Marc Chackett, John Cooke, Paul Harper, Parsa Hemmat, Christian Hill, Christopher Hunt, Haroon Abbas Ikram, Mohammad Iqbal, Kieran Irving, Wendy Liston, Scott McCarthy, Edwin McConnachie, Daniel McGowan, Dan McIntyre, Paul Mercer, Andrew Merrill, Andrew Muscroft, Rana Nazir, Anita Prosser, Colin Pugh, Benjamin Rouse, Neil Scaysbrook, Damian Thomas, David Whitbread, Stephen Wilkie, Ashley Wood.



KEEP UP-TO-DATE by following the society social media channels:



water management society instagram.com/water_management_society/



WMSoc Secretariat linkedin.com/in/wmsoc-secretariat/





Water Management Society Chair People



- Cooling Water Association (21st July 1970) June 1971 – Chair Mr Geoffrey M. Beresford Hartwell 1973 – 1975 – Mr K K McKelvey 1976 – Mr Tom B. Fielden
 - 1978 Mr D Anderson
 - 1979 1981 Mr N. D. John Lindeman
 - 1982 1983 Mr Eddie J. Pring



- Industrial Water Society (8th November 1983)
 - 1984 1985 Mr Ted Stafford
 - 1988 1989 Mr Derek P Barlow
 - 1990 1991 Mr Tom B. Fielden
 - 1992 1993 Mr N. D. John Lindeman
 - 1994 1995 Mr Mike H. Iddon



Water Management Society (6th June 1996) 1996 – 1997 – Mr David Harper

- 1998 1999 Mr J. Fuller
- 2000 2003 Dr P. John Alvey
- 2004 2005 Mr N. D. John Lindeman
- 2006 2007 Dr Alan Pomfret
- 2008 2009 Mr David Bebbington
- 2010 2011 Mr Stuart Wilton
- 2012 2013 Mr Mike Hunter
- 2014 2015 Mrs Elise Maynard
- 2016 2017 Mr Colin Shekleton
- 2018 2019 Mr Colin Brown
- 2020 2021 Mr Ian E Kershaw
- 2022 Mr Ian Penney

The Water Management Society, and its predecessors the Cooling Water Association and Industrial Water Society, is led by a council of volunteers. Leading this council, and elected from its members, is the chairperson who is responsible for leading council meetings in an orderly and efficient manner. We present here a list of those who have taken this role over the years. Many of you will recognise these names, of people who have been active in the water industry for a number of years and who have given their advice and knowledge eagerly and freely. They really are the bedrock of the Society we know today.

Committee roundup – Autumn 2022

Events Committee

The events committee have been working hard to produce the event in Edinburgh in December which was a great success, see event report on page 34.

Looking to 2023 we are working to deliver some webinars on scald risk assessment and harvested rainwater which will be very exciting. We will also be returning with a face to face event in the June timeframe, watch this space for further news.

The team are keen to understand member interest and are looking for your feedback on topics and also locations for future events, please let us know.

Finally, we can report that Ian E Kershaw has taken the reins of this committee from Emma Jorgenson following her departure from Council.

Membership Committee

We have been reviewing the video clip promoting the benefits of becoming or upgrading to a new membership grade. When members apply sometimes they request a grade but sometimes they fit into a higher category so the membership team will grant this.

The video has plenty of useful information but as a voice over, it has been suggested to update this with better visuals perhaps like Youtube.

Another suggest was to add more information on the CPD roadmap to help new members understand how they can progress.

A new member already known to WMSoc will be contacted to write an article for Waterline as she has done work for charity and minorities. If any one else would like to contribute to Waterline if they feel they have good article to write about please contact us.

There was some discussion on the grades awarded to new members based on relevant qualifications. The WMSoc CPD road map has emphasis based on points where keeping up to date with industry developments like legislation which is favored to encourage more members who don't have higher formal education. Just to make our group have broader skills and knowledge and of more interest.

Finally, there have been discussion on a slight increase to membership fees from January. This was approved at the recent council meeting.

Technical Committee

It's been a busy couple of months again for the Technical Committee.

We have been finalising the Scald Risk Assessment guidance and it should be ready for publishing by the end of the year.

We have also been working with the HSE on producing an initial guidance document for systems that monitor and report on temperatures in domestic water systems remotely. The proliferation of these systems in the last few years has prompted the need for some guidance. We hope to publish by the end of the year and there has been a member consultation period. The first guidance is designed to help the end user procure the right solution for their individual circumstances. It is also recognised that remote monitoring systems will produce a lot more data than more traditional methods and a second guidance in the new year will be aimed at helping duty holders decide on appropriate actions in response to the data generated.

We have also engaged with the CIBSE heat pump group and will be joining a sub committee to assist in the safe selection and operation of heat pump systems for domestic water services in commercial premises.

A toolbox talk on water features has been produced and is being peer reviewed prior to publication at the moment. We are also forming a small group to examine current guidance on metal working fluids with a view to making some recommendations to the regulator early in the new year. So lots going on and we also continue to respond to member questions. We welcome these questions. It's an opportunity to get advice from some very experienced minds for free so please do use the service.

Finally a reminder that we are here to serve the membership and help to raise standards through education and engagement with key industry stakeholders. If you want to be involved please do get in touch. You only need to be able to commit to giving some of your time and experience freely and without any thought of commercial gain.

My heartfelt thanks to the current members of the committee and those others that already give their time and expertise freely. It is truly humbling to see such talented and experienced individuals fully engaged in the work we do. Thank you and we look forward to hearing from you.

Training & Accreditation Committee

We are delighted to announce that we have another new independent tutor joining WMSoc, Colin Shekleton (Wave Tech Resources Ltd), who is also one of the WMSoc directors. Colin will also be taking over from Elise Maynard as chair of the Training and Accreditation committee in January 2023, as part of the regular committee chair elections.

The course updates are well underway to ensure that they are representative of current best practice and are relevant to the industry requirements. New courses will be announced next year.

The first exam for the WMSoc Qualification Pathways, leading to WMSoc Cert designation, has been undertaken for the risk assessor pathway and we can announce the first successful delegate: Robert Turner.

WMS has moved to Water House, Fairway Court, Amber Close, Tamworth, B77 4RP and courses are now being run in the new suite of training rooms and a brand new and completely revamped Practical Training Area with many new pieces of equipment to assist the delegates. See page 38 for more information. Please take note and don't go to the old building by mistake!

The Cooling Tower Specialists

Stay cool, we're on top of it.



What we do: Products and Services







Tower Systems Ltd • Unit 4 Sandown Road • Watford • Herts WD24 7UB Tel: 01923 238603 • Fax: 01923 239093 • E-mail: info@towersystems.co.uk





Book online: bit.ly/WMSoc-Learning Call: 01827 289 558 or email: training@wmsoc.org.u

The Water Management Society, Water House, Office 6, Fairway Court, Amber Close, Tamworth, B77 4RP