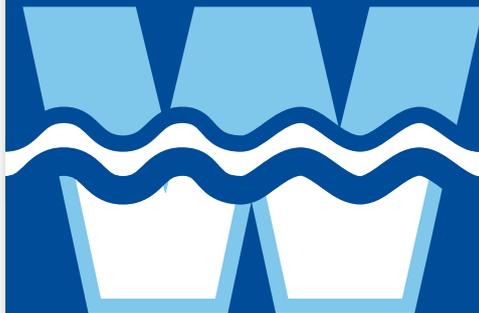


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DIGITAL EDITION

Practical Advice on Performing and Confirming Successful Clean and Disinfection of Water Systems Post Shutdown or Low Use (including due to COVID-19)

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

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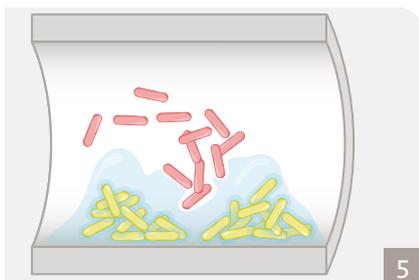
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Water Management Society

- ✉ 6, Sir Robert Peel Mill, Hoye Walk, Fazeley, Tamworth, Staffordshire. B78 3QD
- ☎ Telephone: 01827 289 558 | Fax: 01827 250 408
- ✉ Email: admin@wmsoc.org.uk
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Practical Advice on Performing and Confirming Successful Clean and Disinfection of Water Systems Post Shutdown or Low Use (including due to COVID-19)

Stuart Nixon, Managing Director, Trident Water Solutions Limited

Summary

A lot has been written about water systems regarding assuring their safety coming out of COVID-19 related shutdowns or reduced usage patterns. Hardly a day goes by without another paper, webinar or offer of help. I'm sure that most water treatment industry professionals who read the guidance will be keen to do the right thing to ensure that their customers' water systems are safe for those that use them.

Every client's system and circumstances are unique and must be individually risk assessed by a competent person and the right solution to the particular set of circumstances designed and implemented. Nothing in the form of an article or advice from one source is going to replace the combination of experience and knowledge that is needed to make the right decisions and the right calls.

The purpose of this article is to provide some practical guidance that might assist service providers with making the right calls when deciding how to approach helping a customer to reduce their risks of bacterial infections when coming out of the COVID-19 shutdown. Service providers will know that the Duty Holder has ultimate responsibility but, in practice, many Duty Holders follow the advice from their water treatment specialist so it's vital that this advice is informed and appropriate to the risk and that works are delivered in a manner that addresses the requirements of the risk assessment.

"If you define the problem correctly, you almost have the solution."

Steve Jobs

In order to put some structure on the article we're going to talk through a number of keywords and concepts as listed in the information box below (thank you Google for the definitions).

Competence - having the necessary ability, knowledge, or skill to do something successfully
Biofilm - a thin but robust layer of mucilage adhering to a solid surface and containing a community of bacteria and other microorganisms
Risk Assessment - a systematic process of evaluating the potential risks that may be involved in a projected activity or undertaking
Bespoke - made for a particular customer or user
Solution - a means of solving a problem or dealing with a difficult situation
Compliance - the state or fact of according with or meeting rules or standards
Disinfection - the process of cleaning something, especially with a chemical, in order to destroy bacteria (or reduce to an acceptable level)
Validation - the action of making or declaring something legally or officially acceptable (the control measure taken was effective)

This article does not list all the various laws, Codes of Practice, guidelines, British Standards and other documentation that professionals should be aware of. Any person who is not aware of all these documents cannot be regarded as competent to provide client advice either in a post COVID-19 situation or, in fact, at any other time. So, if you are reading this article and are not sufficiently knowledgeable in, for example, PD855468:2015, HTM 04-01 (2017) or BS 7592:2018 then you are probably not in a position to advise end user clients on how to safely recommission their water systems and will need to seek further advice. If you are really at the top of your game you will have already read BS 8680:2020! Competence is everything and every day is a school day!!

Competence

Competence - having the necessary ability, knowledge, or skill to do something successfully

Extract from LCA Competence statement

The HSE places great emphasis on competence (Approved Code of Practice, L8, paragraphs 48 to 52). The LCA Code of Conduct also emphasises the need for employers to ensure that their staff and contractors are competent to carry out each task assigned to them (Service Provider Commitment 2. Training and Competence of Personnel).

Extract from BS 8580-1:2019

3.11.2 competent person
Individual appointed with, and who has accepted, responsibility under the authority of the duty holder for ensuring that the organization's responsibilities for the control of Legionella are met and that individuals and organisations assigned to carry out tasks in the scheme of Legionella control are competent to do so.

Note 1 Also referred to as the "nominated responsible person". This role can be taken by more than one individual, for example, in a water safety group.

Note 2 In a large undertaking there may be more than one competent person, each responsible for a part of the undertaking, e.g. each block of a large teaching hospital.

It is mandatory that those providing advice to clients on how to keep their water system safe and in compliance with the law are legally competent to do so.

Much has been written about competence assessment and the competence of those writing the procedures! The flow chart on the next page summarises an approach to delivering a competent service.

The consultant is key and most of the guidance focuses on this. Clearly they must have the right attitude, experience, knowledge and skills to design the right solution for the individual set of circumstances.

It is equally important that the company providing the service has the right expertise to ensure that competence is assessed adequately, and that their written procedures are in line with the requirements of the various guidelines and regulations relating to the control of Legionella. The service provider must also have the right ethical values about the way that they deliver service. In practise this often means proposing the right solution rather than, necessarily, the solution that will be most popular with the customer or makes the service provider the most money. It's also important that the service provider proposes a solution appropriate to the level of risk that does not involve excessive cost to the end user client.

Finally the service provider must be competent to deliver the solution proposed:- in practise this means effective communication with the client to ensure that the job can be organised and completed safely and properly in accordance with the Method Statement, secondly having adequate resources to ensure that works can be carried out in a timely manner by appropriate, competent staff, and thirdly the ability to follow up on any further works required in a prompt fashion. In many high risk environments the actions taken will be decided by the Water Safety Group and it is important that this group is made up of the right individuals to make competent, risk based



Flow chart summarising an approach to delivering a competent service.

and reasonably practicable decisions on how best to minimise health risks associated with water systems.

Biofilm - a thin but robust layer of mucilage adhering to a solid surface and containing a community of bacteria and other microorganisms

Biofilms

Biofilms build up on the internal surfaces of pipework, tanks, outlets and many other components in a water system.

If the risk assessment considers that biofilm may have built up or is at risk of building up during a period of full or partial shutdown then the control scheme should reflect this. Regular system flushing may help to control biofilm formation by minimising water stagnation and maintaining water temperatures. The written scheme may well need to consider the elimination of biofilm so here is a brief explanation of exactly what biofilms are.

Biofilms

- Aggregates of bacteria encased in a structured polysaccharide matrix that they synthesize and that attaches the community to the surface
- Biofilms are bacteria's natural and preferred habitat
- Resistant to antibiotics, some shear forces created by water flow, certain levels of disinfectants, and temperature

Biofilms can cause issues in process water systems:

- Insulation against heat transfer
- Drag reduces water flow and increases pumping demand
- Reduced oxygen flow can lead to reducing conditions which promote the formation of certain types of bacteria which may increase the risk of corrosion. Nitrite reducing bacteria (NRBs) will deplete nitrite based corrosion inhibitors and sulphate reducing bacteria (SRBs) can lead to pitting corrosion and the characteristic rotten egg (hydrogen sulphite) smell
- If well established, biofilms can cause blockages in drains, strainers or even pipework

Risk Assessment

Risk Assessment - a systematic process of evaluating the potential risks that may be involved in a projected activity or undertaking

(and don't forget the written scheme and Water Safety Plan!!)

BS 8580-1:2019 and HSE ACoP L8:2013 (and the guidance notes HSG274 Parts 1-3 and HSG282) give practical advice on how to conduct a Legionella Risk Assessment. L8 paragraph 47 lists the circumstances where the risk assessment should be reviewed, and these include, when there are changes to the water system or its use or changes to the use of the building in which the

water system is installed. Unless full or partial shutdown has been considered by the previous risk assessment and written scheme a review will be required to account for any change in the use of the system. Appropriate start-up procedures are important, particularly after unusual patterns of system use, or no use whatsoever, and these must take account of changing circumstances and be appropriate to the risk.

Extract from HSE ACoP L8:2013

47 The record of the assessment is a living document that must be reviewed to ensure it remains up-to-date. Arrange to review the assessment regularly and specifically whenever there is reason to suspect it is no longer valid. An indication of when to review the assessment and what to consider should be recorded. This may result from, eg:

- (a) changes to the water system or its use;
- (b) changes to the use of the building in which the water system is installed;
- (c) the availability of new information about risks or control measures;
- (d) the results of checks indicating that control measures are no longer effective;
- (e) changes to key personnel;
- (f) a case of legionnaires' disease/ legionellosis associated with the system.

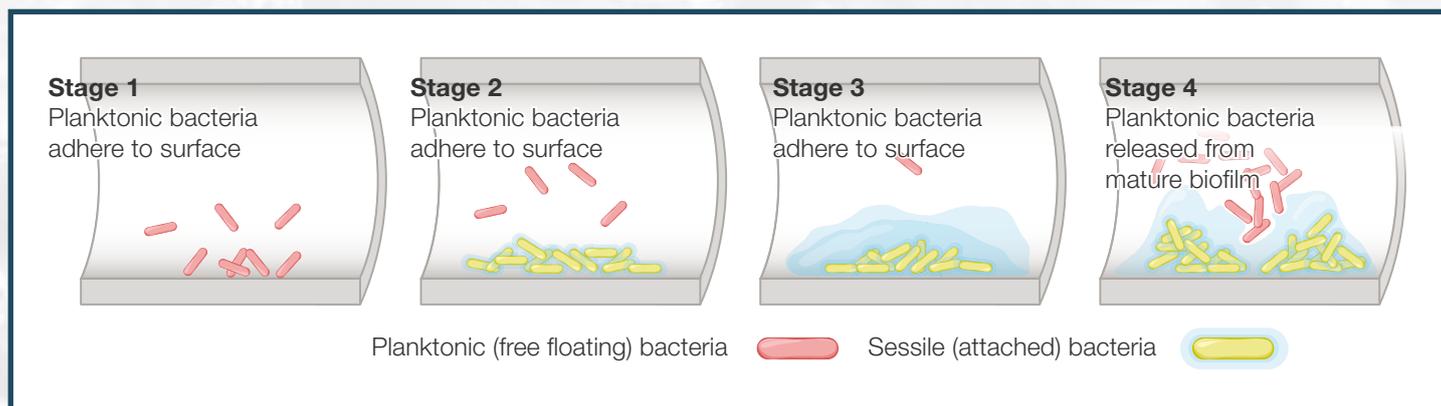
End user clients should ensure that the process is carried out by competent person(s) and organisation. Look for registration or membership of relevant industry bodies such as The Water Management Society or The Legionella Control Association.

As ever, the first considerations should be elimination or substitution with a less hazardous method rather than control.

Bespoke Solutions

Bespoke - made for a particular customer or user

Solution - a means of solving a problem or dealing with a difficult situation



Biofilm formation diagram



Specialist service providers, Duty Holders and Water Safety Groups have a particular responsibility at a time such as the COVID-19 pandemic to guide end users in the operation of their water systems and propose compliant, safe and cost effective solutions. Every situation is unique and requires a bespoke solution.

It is important that all parties recognise that the water systems that have been shutdown for a period of time may have undergone mechanical degradation, and that they work closely together to ensure that the Legionella control scheme can be effectively implemented and is not hindered by mechanical degradation or failure of the water system. It is also crucial to understand that the revised control scheme may have an impact on the mechanical performance of the system, this needs to be considered when selecting biocide programmes and monitoring schemes. It is suggested that the specialist provider and end user should work together to perform a process risk assessment on the water system in its entirety. A process risk assessment will involve the full consideration of the mechanical impact on the operation of the water system of any revisions to the water treatment programme. In particular it is likely the new or different levels of biocide products will be used, either in a continuous or offline mode, and this needs to be considered in regard to the mechanical performance and integrity of the water system. Such a process system assessment should also consider the overall safety implications on staff and others affected by operating the water system in a different way.

In addition, the COSHH assessment may require updating where new chemicals are being used or chemical concentrations are changed.

The new written scheme should take account of all the requirements of ACoP L8 starting with, but not limited to, paragraph 60. Service providers and Duty Holders should review the new written scheme against the requirements of the ACOP and confirm to themselves that it is suitable and sufficient.

Extract from L8:

60 The written scheme should include, where appropriate, and with reference to the risk assessment:

- (a) an up-to-date plan showing the layout of the plant or water system, including parts temporarily out of use (a schematic diagram is sufficient);
- (b) a description of the correct and safe operation of the system;
- (c) the precautions to take;
- (d) checks to carry out to ensure the written scheme is effective and the frequency of such checks;
- (e) the remedial action to take if the written scheme is shown to be not effective.

Compliance

Compliance - the state or fact of according with or meeting rules or standards

Service providers and Duty Holders must ensure that they design and operate their water systems in line with all applicable laws, regulations and guidelines. As stated previously, competence to offer advice mandates a thorough knowledge of all of the above! Service providers and Duty Holders must never lose sight that the goal is to make water systems safer for the users of the system in line with the law and this should always be the main focus.

To assist in the development of compliant solutions to problems, service providers may wish to refer to BS8680:2020 Water Quality. Water Safety Plans. Code of Practice issued in June 2020 just after this paper was drafted. All works should be carried out under local Terms of Reference and Policies.

Disinfection

Disinfection - the process of cleaning something, especially with a chemical, in order to destroy bacteria (or reduce to an acceptable level)

Considerations:

This article considers offline clean and disinfection of water systems including all down services only. It is felt that a "tank only" disinfection will not be adequate if the **whole system** has sat idle for a period of time. As always, this needs to be considered by a competent person on a case by case basis. It could be that measures undertaken during a building or system shutdown (such as flushing, temperature monitoring and sampling) may be determined to be sufficient and, hence, an offline system disinfection is not required.

There is a lot of guidance in literature about what disinfectant to use at what concentration, at what contact time and under what circumstances.

Before we consider the type and method of disinfection of the water system we should remember one very important fact. **Water treatment will only have a chance of being successful if the treated water gets to the part of the system it needs to treat.** This is particularly important if the water system contains biofilm which is more likely to be the case after a full or partial shutdown of the water system due to COVID-19. Outlets that have not been used for a period of time may also be infected and they should be individually cleaned and disinfected with any flow straighteners, spray heads or aerators removed and disinfected separately. TMVs may also require cleaning according to HTM 04-01 D08 for Healthcare. This is critical and should be the first point of remediation.

It is crucial that the disinfection process plant

survey and consequent method statement are both sufficiently detailed such that all dead-ends and dead-legs are fully flushed and then soaked with the disinfecting solution. The method statement should also ensure that parts of the system temporarily out of use are included within the disinfection process and that complete access to all outlets and parts of the system are included. Account also needs to be taken of materials in the system that may harbour biofilms such as EPDM rubber linings of flexible hoses. Sensitive equipment will need to be disconnected from the system as normal and disinfected in accordance with manufacturer's instructions.

The disinfection process may also need to consider the make up to the building or system. If this has stood idle for any period of time it may be prudent to thoroughly flush and drain before pulling treated water through to the outlets as part of the disinfection process.

It is also important when proposing a disinfectant programme to set the right level of client expectation. It is practically impossible to completely guarantee that a single disinfection of a water system will be effective and achieve the result desired. It may be that more than one disinfection or other invasive methods are required to remove harmful bacteria from the water system. The vast majority of bacteria in a water system live in protective environments such as biofilms (referred to as sessile bacteria) rather than in the water itself (referred to as planktonic bacteria). It is well known that water stagnation, such as may be expected with a full or partial shutdown due to COVID-19 will promote the formation of biofilm. With a disinfecting solution in water under the right conditions it is a relatively straightforward process to kill the planktonic bacteria. Killing and safely removing the sessile bacteria is much more challenging.

The amount of sessile bacteria in a system is, in practice, almost impossible to be precise about as most of the water system surfaces will be inaccessible. A competent consultant should be able to reach an educated opinion (deliberately not using the word guess here!!). This opinion will be based on previous test results, and an understanding of how the system operates. It may also include testing of some of the accessible surfaces for the presence of biofilm and water sampling as part of the risk assessment. As ever a number of different techniques are available, and the method selection, results and consequent actions should be interpreted by a competent person. Where there are pressing factors to recommission a water system as quickly as safely possible then rapid testing methods such as ATP biofilm luminescence and PCR based bacterial testing may also assist.

To be successful physical cleaning of the system accessible parts may be required prior to disinfection and, depending on the risk assessment. A pre clean disinfection may be required to protect the operators performing the work on higher risk systems that have sat idle for a prolonged period of time and/or the system has not been flushed regularly and satisfactory



temperatures maintained.

Service providers discharging water containing disinfectants to the environment have a responsibility to ensure that disinfecting chemicals are neutralised and that water is discharged to the correct drain. A short term discharge consent ('Discharge License') may well be required before the process can take place and further advice should be sought from the Utility provider. It may also be necessary to schedule system flushing with the utility provider to protect the water pressure in the mains system. This consent may take some time to obtain so don't leave it till the last minute!

It is important to manage expectations in that the initial disinfection may not be successful and may need to be repeated more than once as the extent of biofilm and water flow in the system will be very difficult to predict.

Chemical Selection (Off Line Disinfection)

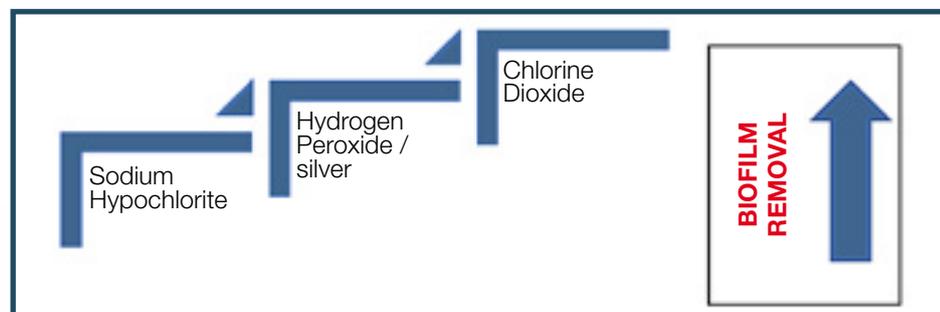
In practice, the biocide programme selected will often be a choice between sodium hypochlorite, chlorine dioxide or hydrogen peroxide (normally with silver as part of the formulation). Peracetic acid is used in some circumstances and can be an attractive option with stainless steel pipework. Other options such as bromine, ozone, non-oxidising biocides or pasteurisation may also be considered but these are not considered in this paper, either because use is not widespread or, in the case of pasteurisation, there is no disinfection of cold water or thermostatically blended components. Biodispersants are used in process systems such as cooling towers to assist with biofilm removal but they should not be used in drinking water systems.

When considering which chemical to use following a system shutdown for any period of time the primary consideration is most likely to be the effectiveness of the removal of biofilm. This requirement needs to be balanced against the risk to operators and building occupiers of the disinfectant selected. Every situation is different, and the success of a disinfection programme will depend on a number of factors including, but not limited to:

- ✓ Current system bacterial levels (both sessile and planktonic but particularly the former in biofilms)
- ✓ Presence of other protective environments such as scale, EPDM lined hoses, sediment and deposits
- ✓ Presence of dead-legs or blind ends or other areas where the biocide treated water cannot reach (vital that this is sorted out prior to disinfection)
- ✓ Water chemistry e.g. pH, hardness, suspended solids
- ✓ Disinfectant concentration and contact time
- ✓ Effectiveness of any mechanical cleaning performed and the flushing process post completion of disinfection
- ✓ Constraints due to the construction and condition of the water system

The disinfection process needs to ensure, as far as possible, that all the disinfectant and bacteria released are flushed from the system. Apart from chemical residuals, there will be organic matter which, if not removed, can act as a nutrient source for future biofilm build-up.

A review of the literature, anecdotal evidence and results of previous off-line disinfections indicates the following:



All of these chemicals are hazardous if not prepared, handled, dosed and flushed correctly but experience shows that chlorine dioxide, whilst being the best at biofilm removal is also the most hazardous to use. A comprehensive risk assessment (COSHH assessment) and method statement is required whichever disinfectant is selected to protect service provider staff, users of the building, visitors and others who may come into contact with treated water and the environment.

Sodium hypochlorite will not generally penetrate biofilms effectively. Often pH adjustment or supplementary bromide/bromine dosing may be required to ensure the efficacy of the biocide but this does not improve biofilm removal. It may remove the surface or be successful with very slight biofilms but sodium hypochlorite on its own would not be the biocide of choice if biofilms are known, or suspected, to be present. Systems that are dirty may have a very high "chlorine demand". Chlorine is known to not be a particularly selective disinfectant and much of the active biocide will be absorbed by non bacterial deposits and materials and hence not be available for disinfection.

Next is hydrogen peroxide containing silver. This product has the advantage of being odour and taste free, but it is still a powerful oxidant and needs to be applied safely and accordingly. It is often used at considerably higher concentrations than chlorine containing biocides. Manufacturer's literature suggests that the hydrogen peroxide breaks down at the surface of the biofilm liberating gaseous oxygen. This has a bubbling, almost mechanical effect on the biofilm and helps to destabilise and breakdown the deposit. This allows the silver to penetrate the biofilm.

Based on experience, chlorine dioxide (ClO₂) is the best biocide at penetrating and removing biofilms –

Benefits of Chlorine Dioxide:

- ✓ Remains as a gas in water
- ✓ Gas effectively penetrates biofilm
- ✓ More selective to biofilm than chlorine
- ✓ Does not form chloramines
- ✓ Not as pH sensitive as chlorine
- ✓ Longer residual activity – better for extensive systems

Chlorine dioxide for one off disinfection is discussed very briefly in HSG274 part 2 - it simply says 'chlorine or chlorine dioxide' and then reverts to chlorine for the rest of the document. Para 2.136 talks about 'other disinfectants' but nothing specific. The use of the wording 'chlorine or.....' needs to be very carefully considered. Simply substituting one chemical for the other will get people hurt. There are many differences to chlorine and it's far more hazardous.

First of all you need to make the chlorine dioxide - sometimes very low concentrations can be delivered in a drum but more often than not this involves mixing an acid and a chlorite on site. Powders and tablets with solid chlorite and acid can be used but they often have an inert binder that tends to add debris to a tank or tower. Limited use in a tank but not bad for a spa pool where the filtration will take care of the sediment and a chlorine dioxide tablet seems to help with clarity and persistent contamination. Another issue with chlorine dioxide is that if it is still reacting (acid/chlorite) the pressure will still be building. This is a huge issue if trying to inject it or spray it.

If the chlorine dioxide is generated from chlorite and acid the common practice is to over acidify the mix to drive the reaction to completion. This results in a very acidic disinfectant concentrate which can be detrimental to system components.



With chlorine dioxide there is also the issue of "gassing off" which can present a challenge in maintaining the right levels during an offline disinfection process. Above approximately 2ppm as a continual dose the gas produced becomes irritating to eyes and throat when the water is aerosolised - especially in showers. When dosing at higher levels for one off disinfection masks are essential and these need to be full face including the eyes with filters that will remove chlorine dioxide. The building/area would need to be an exclusion zone and everybody going in would need to wear a mask. **COMPETENCE OF ALL INVOLVED IS CRITICAL.**

Chlorine dioxide is prone to "gassing off" at typical domestic hot water temperatures, so the hot water calorifier should be, where practicable, switched off and the system water cooled prior to a disinfection. Also, heavily fouled systems may have a biocide demand such that more chlorine dioxide than expected may need to be added to achieve the required reserve.

KEY POINTS – SYSTEM DISINFECTIONS: COMPETENCE IS VITAL

BALANCE DISINFECTANT EFFICACY VS PROCESS HAZARDS

RISK ASSESSMENT BASED DISINFECTION

ENSURE TREATED WATER REACHES ALL PARTS OF THE SYSTEM AT THE TARGET CONCENTRATION FOR THE REQUIRED CONTACT TIME

GET A DISCHARGE LICENSE

MANAGE CLIENT EXPECTATIONS – MORE THAN ONE APPLICATION MAY BE REQUIRED

CLEARLY DEFINE SUCCESS CRITERION

Validation

Validation - the action of making or declaring something legally or officially acceptable (the control measure taken was effective)

BS 8680:2020 has a couple of very helpful definitions:

3.30 validation

Written evidence of the checks and monitoring required to establish that a new system (e.g. of control) behaves as intended

3.31 verification

Documented programmes of monitoring, tests and checks to establish ongoing compliance with the WSP (see 3.33)

Once the disinfection has been completed it is necessary to establish whether it has been successful in meeting the requirements of the risk assessment and reduced the risk to an acceptable level.

It is vital that the risk assessment and control scheme have described the safe operation of the system and defined what constitutes an

acceptable outcome from the disinfection process.

A number of methods may be used to validate and verify the disinfecting process. These may include plant inspection and water chemistry. Most likely, it will also include monitoring water and surfaces for the presence of harmful bacteria. The sample plan will be risk assessment based and appropriate to the level of risk. The commentary below refers to Legionella but general levels of bacteria total viable counts (TVC) and other harmful types of bacteria such as *Pseudomonas aeruginosa* may also be included where appropriate.

Sampling for Legionella may include a combination of traditional 10 day culture tests or rapid PCR tests where required – but the culture test is typically regarded as the standard reference method for the purpose of validation and ongoing trending.

Extract from HSE Website – Rapid Legionella Testing:

There are currently three key areas where HSE recognises the benefits and one key limitation of the use of the qPCR assay conducted to **ISO 12869:2012**, as an alternative to the traditional legionella culture-based methods:

Rapid detection of legionella bacteria – the high negative predictive value (NPV) of qPCR means that it is suitable for use as a negative screening tool to rapidly rule out potential sources, for example, in an outbreak situation, and to support public health investigators in prioritising resources.

Indication of the effectiveness of cleaning and disinfection – the high NPV of qPCR, means that negative qPCR results may be a useful indicator for the restarting of system implicated in the source of an outbreak following remedial actions, such as cleaning and disinfection.

Complementary tool for the rapid routine **monitoring of legionella trends at dutyholder sites** – it is important that data from such tests can be properly interpreted, to enable informed decision on the effectiveness of control measures to be made by a competent person.

Interpretation of results – the results of positive qPCR samples are difficult to interpret, as the assay detects legionella DNA from both live and dead bacterial cells and the units of measurement for qPCR (genomic units/litre) are not directly comparable with the action and alert levels for culture (expressed in colony forming units) published in HSG274.

(please refer to the full article before acting on this information).

The sample plan should be defined by a competent person or persons after the risk assessment, and agreed by the Duty Holder (and /or the WSG), and should be in line with published guidance and standards (L8, HSG274, BS 7592, BS 8680, HTM 04-01). The sampling itself needs to be carried out in accordance with

a suitable and sufficient method statement by competent persons, and the samples transported to, and processed by, a UKAS accredited laboratory in an appropriate timescale and under appropriate temperature conditions. The sample method statement, competence of the operative and storage and transportation are all vital as poor sampling will lead to poor management and control.

The sample plan covering a post COVID-19 shutdown should include pre flush (to evaluate outlet colonisation) and post flush (to evaluate system colonisation). Post flush samples should be after a set period of time or when a pre-determined end point, such as a specific water temperature, has been reached. Consideration should be given to sampling outlets of different types according to risk, such as shower-heads, water sources such as mains, tanks and calorifiers and other components such as expansion vessels and bypasses where Legionella bacteria may be present.

Disinfection, sampling and other measures may need to be repeated or included depending on the results of the sample programme. Risk Assessments, written schemes and Water Safety Plans should all be regarded as dynamic documents that may need to be changed based upon results and observations.

As with everything in this paper, the sample plan for each water system will be a bespoke solution based on a risk assessment, specified by a competent person, agreed by the Duty Holder and carried out by competent persons, all to be in line with applicable laws, regulations, guidelines and standards and will be subject to review based upon the findings.

There are some excellent toolbox talks on, amongst other things, biofilms on the Water Management Society website for members to refer too. Please go to the members section/member downloads for further information.

"The most important thing in terms of your circle of competence is not how large the area of it is, but how well you've defined the perimeter."
Warren Buffett

Thank you to the following who have provided valuable advice and support and without whom I could not have produced this article.

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Jane Edmonds – Water Management Society



A day in the life of a water treatment company MD

by Stuart Nixon

One thing I can say is that running a water treatment company is never boring! Even after 18 years running the company, and over 30 years in the industry, I still find that I learn new things every day. As ever the challenge is to separate myself from the day to day operations of the business and focus on the things that make a difference in the long term such as planning and implementation of new operational systems and procedures. I've read books on the importance of working on the business, rather than in the business, but I always find it difficult to separate myself - I guess that is just part of being committed. Fortunately, I have a partner in the business who is also a partner in my life, Angela, and she helps to instil the discipline and rigour needed to run a successful water treatment company, she really is the power behind the throne! She always keeps me on my toes and challenges me, which I may grumble about sometimes, but I know that she is right more often than not!

An awful lot has changed in the world generally, and in the water treatment industry specifically since I saw my first cooling tower as a placement student in 1984, but some things don't change and never will. The secrets to success are all about character, principles, and being true to yourself and the values your parents instilled in you (and also setting yourself realistic goals). In water treatment that means knowing your subject, communicating effectively and treating others as you would like to be treated yourself (with respect and integrity). Your life turns on seemingly random moments and mine certainly did when I first had a chat to the water treatment representative coming in to do his monthly visit on the cooling towers where I was a student. I thought - this is a good job, this suits me -

- a) he's using his chemistry degree
- b) he's problem solving and talking to people and
- c) he's got a company car!

So I joined a national water treatment company as a sales and service rep. in 1990 and I've never looked back. I love the industry I work in and I have made a great many friends in it over the years - I consider myself very lucky. Every day brings a new challenge and there are some things

that are frankly quite stressful, but sticking to character, ethics and principles, and being part of a great team ensures that we generally do the right things.

My working hours, when I am in the office, are usually defined by the school bus times. Our children have quite a trip to school and I drop them at the bus stop at 7:30 in the morning and pick them up at 6:15 in the evening. In between times I'm in the office. One of the joys of owning and running a business is that the office and warehouse is only about 10 minute drive from home, so I am really fortunate that my commute is very short. I am usually first in, unless our Service Manager has a lot of urgent planning to do, so let's put the kettle on, check the answer phone and fire up my laptop. I would have already looked at my email on my phone so there shouldn't be any surprises. I hate surprises in a work context because it generally means that things haven't been planned or communicated correctly. I envy people that are able to compartmentalise their life and completely switch off from work sometimes, I've never managed it!

Everyone else generally appears between 8:00 and 8:30 and we have the usual how are you?, everything OK? and catch up. Then it's dealing with any urgent issues that have come up, setting priorities and looking at my to do lists to see what's next. I tend to have two lists, one 'things that are important and urgent' and the second 'things that are important but not urgent'. I try to ignore things that aren't important. I force myself to schedule the things that are important but not urgent because these are the ones that really make a difference to long term success and stability and can easily be left behind. Some of you may recognise this as Habit 3 (Put First Things First - Quadrant II) from the Seven Habits of Highly Effective People by Stephen Covey. I'm not generally into self-help books, and I tend to switch off or glaze over when people talk about some great book they read that has made a real, positive difference to their lives, but I would urge you, if you read one thing read this book, it really has helped me to be a better person and to be successful in business and life generally (doesn't seem to help my golf handicap though!).

Anyway, back to the working day, sometimes they let me out to see customers and I also spend

quite a bit of time at various conferences and industry events. Meeting customers is great, I find it really stimulating and it also helps to maintain a focus on those that are the most important people and that pay our wages. Without them we are nothing. Their perception is our reality and we need to do our best for them and work at maintaining long term relationships. There are many books and techniques on how to do this but there is no substitute for commitment, character, principles and integrity! Ever! Ever!

I am generally wheeled out if it's a key relationship, high value situation or if there has been an issue (yes, we have them sometimes just like everybody else). I am fortunate in that I have a lot of experience in dealing with people and many years of technical knowledge so just about all situations can be resolved satisfactorily (Stephen Covey again, Habit 4 - Think Win/Win and Habit 6 - Synergise). But I am smart enough to know that there is a still a lot I don't know, and every new relationship has to start with building empathy and trust or it goes nowhere.

Work now is mainly centred around Angela and I making sure that, as our business grows and we have less sharp end involvement, it stays true to our principles and continues to thrive. We have an excellent management team in place to help us. We are both control freaks so it's a challenge but we will get there one day, and we are certain there will be more "lessons learned" in the future.

To those starting out on a career in the water treatment and water hygiene industries my message is simple. It's a great industry to work in. It's a challenge but it's genuine and important. You really can make a difference to the safety of water systems and help organisations optimise their use of precious water and energy resources. So, gather knowledge, be genuine and work hard and you will have a very rewarding time.



Stuart Nixon,
Waterline
Summer 2020
Guest Editor

GRIME SCENE



1



2

Photos that make your skin crawl...

- 1** Glad I wasn't staying in this hotel - this tank actually fed showers!
- 2** This ballcock float had a moss wig!

Sent in by Rob Clarke MWMSoc(Snr) AIIRSM DipEM
AIEMA Legionella Control Solutions Ltd

GET INVOLVED:
Can you beat this grime?
Submit your photos & captions to the Waterline email address:
waterline@wmsoc.org.uk

NEW members

Since the last edition of Waterline was printed the WMSoc has received 29 new membership applications from the following sectors of the industry:
Water Hygiene – 6, Water Treatment – 15, Consultancy – 4, Building Services – 2, Laboratory – 1, Healthcare – 1.



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Waterscan

NEWS FROM THE WHOLE FIELD OF WATER AND ITS EFFECTIVE MANAGEMENT

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Pelicans to return to the UK?

Dalmatian pelicans inhabited the UK at a time when around a fifth of the land was made up of swamps and marshes, with thriving numbers in Cambridgeshire and Somerset. It isn't known when they disappeared, but the most recent remains found date from the middle ages.

Numbers worldwide have fallen significantly, but the species is still found in Russia. Several countries have introduced breeding programmes. Rewilding authorities now think that the pelican, the largest freshwater bird in the world, could be brought back to the UK if some of the marshlands were revived. Benedict MacDonald, a naturalist who has been consulted by the BBC, believes Dalmatian pelicans can follow the route set by white-tailed eagles, which were re-introduced to the Isle of White in 2019.

Speaking to BBC Radio 4's *Saturday live*, he said: "Most people don't know that pelicans were a native species. What we are seeing in large areas of lowland Britain, particularly the Somerset Levels, is the expansion of wonderful marshlands. If those obtain a certain size and richness, then we could see the return of flagship species, and the Dalmatian pelican is one of them."

Cannibalism never went away

And there we were, for years, believing that Comb Jellyfish could persist through extreme conditions because of a lack of predators. Well, according to Professor Jamileh Javidpour of the University of Southern Denmark, predators have always been around, those predators being the adult jellyfish who survive harsh winters by eating their own offspring. A study carried out in the Baltic Sea discovered for the first time that adults were eating their own young. The researchers said it demonstrated the extent to which cannibalism is prevalent across the animal kingdom. Cannibalism has been recorded among more than 1,500 species, including humans, fish and surprisingly squirrels.

Professor Javidpour added: "Because Comb Jellyfish trace their ancestry back to the beginning of most animal life as we know it, during the Cambrian period 525 million years ago, it remains possible that cannibalism is a basic, unifying feature across the animal kingdom."

Green transport from fatbergs and orange peel

Household waste, including orange peel and sewer system 'fatbergs,' unused straw from farmland and old wood will be amongst the unusual components used by 4 world-leading UK-based plants to produce green fuels with support from government funding. Between 2018 and 2032 low carbon fuels are expected to save nearly 85 million tonnes of CO₂ - equivalent to taking nearly 18 million cars off the road. This equates to around a third of transport's projected contribution to UK carbon savings during the 2020s.

Two of the projects announced in December 2019 are being funded under the government's £20 million Future Fuels for Flight and Freight Competition (F4C). KEW Projects and Rika Biogas have been awarded a share of £6.5 million to build plants which aim to provide fuel for heavy goods vehicles. The project at KEW will also begin research which could pave the way for low carbon aviation fuel.

Over the next decade the UK advanced fuels industry is expected to be worth over £400 million and create 9,800 jobs.

A further 2 projects, which are being funded under the £25 million Advanced Biofuels Demonstration Competition (ABDC), are also driving towards their final stages of development. This includes Nova Pangaea Technologies, who will focus on the production of bio-ethanol from wood waste that can be blended with existing petrol used in road transport.

Shark Fin market grows in Hong Kong

Customs officers in Hong Kong have seized 26 tonnes of fins (which were taken from around 38,500 sharks), in consignments shipped from Ecuador. The shipments were discovered on April 24th and May 4th after officers noted they were marked as 'dried fish' in Spanish rather than English which is customary. Each of the two containers held more than 300 bags of dried fins, around 90% of which came from thresher and silk sharks which are both protected species. There has been a sharp rise in shark fin seizures in Hong Kong this year. Only 12 tonnes were seized during the whole of 2019.

A spokesperson for the WWF conservation charity in Hong Kong said: "It could be that traders are seeing a chance to ship the shark fins while government officials in other countries are preoccupied with efforts to combat the Covid-19 pandemic."

Ancient fish fingers excite researchers

A 380 million year old fish fossil with 'fingers' could aid understanding of how the human hand evolved. Researchers believe that the 1.5 metre long *Elpistostege watsoni* may be an evolutionary link between water-dwelling fish and four-limbed land creatures.

Scans show that the structure of its fin has similarities to the human hand, with the skeleton featuring an arm, a forearm and finger-like appendages.

John Long, a palaeontologist at Flinders University, Australia, said: "This is the first time that we have unequivocally discovered fingers locked in a fin in any known fish."

Pope jokes whisky is 'the real holy water'

The Vatican has censored footage of the Pope admiring a bottle of scotch and declaring it 'the real holy water' in a good-natured joke with visiting Scottish priests. The footage was captured during the filming of a documentary following seminarians at the 404-year-old Scots College in Rome. In the censored clip, Pope Francis was captured accepting a bottle of Oban malt whisky, distilled in the Scottish town by the same name, during a reception at the Vatican's Apostolic Palace last year.

However, according to the Scottish Daily Record the Vatican's media team determined that the 83-year-old Pope's jest would not be allowed to make the cut in the final documentary as they did not want him to be seen endorsing whisky.

The one-hour documentary 'Priest School', which was shown by the BBC on the 19th April without the clip, was directed by Tony Kearney and followed the Scottish priests over an 18-month period. Kearney told the Record that the Pope was 'really down to earth with them all', and rather than just handing the bottle off to one of his assistants as he would normally with a gift, he instead held it up and admired it. '(The Pope) said "Questa e la vera acqua santa" which means "This is the real holy water,"' said the director. 'He guffawed with laughter and it was a real ice-breaker with the students and put everyone at ease.'





Alone at sea

One man's dream to spend three years sailing solo around the Pacific nearly turned to disaster after borders started closing around the region, leaving him stranded alone at sea for three months.

Mr Wong - who wouldn't give his first name - set off from Singapore on the 2nd February. The plan was to sail from Singapore to Polynesia, a four month journey, in his yacht.

In late February his auto-pilot broke. "I was in Indonesian waters then so I wanted to anchor and take a break and repair my boat. But I was chased away - they said the lockdown had already begun, so I thought OK I would just continue on."

Every island he reached rejected him and forced him to continue to Tuvalu, his final destination, which he reached on the 21st April. His supplies were now running dangerously low, but he was discovered by maritime officials - who told him to leave. "I said I didn't have anywhere to go and they said to head back to the ocean. At last I said ok at least help me buy some food and fuel."

A boat carrying both these things eventually arrived, but they couldn't approach Wong due to social distancing rules. "I pulled out my small rubber boat and pushed it their way, and they put the goods there and I would tow it back. We took a lot of time pulling it back and forth."

He left, heading for Fiji, but then his boat hit coral and damaged his propeller. Thankfully, a Fiji government navy boat was allowed to tow him in on 29th April - after almost three months of wandering the sea. He was taken to hospital where he had to undergo a swab test. The test, of course, came back negative. "If it had come back positive - I really don't know how that would have happened! I hadn't seen anyone for months at that point!" he joked.

Algal blooms in Antarctica

"Green snow" is spreading in parts of Antarctica as global temperatures rise, according to a study published in the journal Nature Communications. A team of researchers from the University of Cambridge and the British Antarctic Survey have created the first ever large-scale map of microscopic algae as they bloom across the surface of snow along the coastline, playing an important role in the continent's ecosystem and its carbon cycling. Although each of the single-cell organisms are microscopic in size, when algae densely populate the snow, it turns a vivid green across an area so large that it can be seen from space.

Researchers discovered that the appearance of green snow algae was strongly influenced by excrement from marine birds and mammals which acts as a natural fertiliser and accelerates algal growth. Nearly two-thirds of blooms were found within 5km of a penguin colony while other blooms appeared near bird nests and where seals come ashore.

The research combined satellite data with the team's on-the-ground observations over two summers in Antarctica. The green snow algae was found in "warmer" areas of the Antarctic Peninsula where average temperatures are just above 0 degrees Celsius during the Southern Hemisphere's summer months of November to February.

The researchers say that the total amount of carbon held in Antarctic snow algae is likely to be much larger because carbon dioxide is also taken up by other red and orange algae which were not measured in the study.

Weather promotes quicksand warning

The March onslaught of heavy rain and high tides left patches of quicksand on the nation's beaches. Storm tides and coastal streams caused by Storms Ciara, Dennis and Jorge, created large, but hard to spot, liquefied patches on sands across the UK.

Runner Stephen Callaghan had a narrow escape after becoming stuck in quicksand while out for a run in Newquay, Cornwall. He said: "I was running on Porth beach and got stuck up to my waist in quicksand. It is where work is being carried out on the beach but all the fencing has been washed away. I couldn't get my legs out. Luckily I managed to get myself free. There are lots of people on the beach. I fear a dog will go in and get stuck and then the owner will go in after it. An elderly person wouldn't be able to get out."

A spokesperson for the Maritime and Coastguard Agency said: "Adverse weather conditions can increase the risks of quicksand, particularly on flat areas of sand where gullies are created by an overland flow of water. In some of these areas water can flow underneath the surface. Our advice is stay calm, spread your weight and avoid moving."

They advised: "If you have a mobile phone, dial 999 and ask for the Coastguard. If you don't have access to a phone, try and attract the attention of passers-by, and get them to make the call."



Profits wiped out

This and other headlines such as 'man caught short' are in regard to a media report of a gang of toilet roll hoarders, based in Adelaide, South Australia.

The gang bought up huge quantities of toilet paper and hand sanitiser at the beginning of the Covid-19 pandemic, and then attempted to sell the haul on eBay at vastly increased prices.

One of the gang had his on-line account suspended when it became obvious what he was trying to do. He then tried to get one supermarket to buy his remaining stock of 150 32-pack toilet rolls and 150 one-litre bottles of hand sanitiser.

Drakes Supermarket's director John-Paul Drake said both items have been in short supply during the pandemic, with supermarkets nationally putting buying restrictions in place to keep up with demand. Rather than give the man his money back, the Adelaide-based boss blasted the selfish shopper and did not mince words about what he thought of his behaviour. Mr Drake said the hoarder had 20 people stockpiling the in-demand products for him, and exposed the hoarder's antics on Drakes YouTube channel.

'I told him that,' he added - putting his middle finger up to the screen to show how he responded to the request for a refund. *Editor. You've got to love our Aussie cousins!*



Great Barrier Reef's third coral bleaching in five years

One quarter of the Great Barrier Reef suffered severe bleaching during the recent Australian summer in the most widespread outbreak ever witnessed, according to analysis of aerial surveys of more than 1,000 individual reefs carried out in March.

Professor Terry Hughes, director of the Centre of Excellence for Coral Reef Studies at James Cook University, surveyed 1,036 reefs from a plane over nine days. Hughes has released maps showing severe levels of bleaching occurred in 2020 in all three sections of the reef - northern, central and southern - the first time this has happened since mass bleaching was first seen in 1998.

Bleaching occurs when healthy corals become stressed by changes in ocean temperatures, causing them to expel algae living in their tissues, which drains them of their vibrant colours.

The damage came as February brought the highest monthly sea temperatures at the reef since Australia began keeping records in 1900. Some 25% of the reefs were severely bleached - meaning that more than 60% of the corals on each reef had bleached. Hughes said previous observations had shown that bleaching at that extent leads to "high levels of mortality" of corals.

The Great Barrier Reef has experienced five mass bleaching events - 1998, 2002, 2016, 2017 and 2020 - all caused by rising ocean temperatures driven by global warming.

Hughes said there probably would not be the same level of coral death in the north and central regions in 2020 as in previous years, but this was partly because previous bleaching outbreaks had killed off the less heat-tolerant species.



Driverless water taxis for the UK

An American tech company is planning to trial unmanned robot water taxis off Plymouth once the coronavirus lockdown is over. New York state-based Buffalo Automaton, headquartered in the US city of Buffalo, has developed AutoMate, a system which uses AI technology, cameras and sensors to steer boats without a human driver being on board. The firm now wants to launch driverless water taxis in Plymouth and is planning to demonstrate how they work when his team visits the city during the summer of 2020 - should the coronavirus pandemic be over by then.

Chief executive Thiru Vikram said: "We will be demonstrating our self-driving speedboat to the public to give people an idea of what riding in a driverless water taxi would be like."

Australia supports US as South China Sea tensions rise

The US Navy has heaped praise on the Royal Australian Navy for taking part in South China Sea exercises that showed allies in the region that both nations have the 'same interest in ensuring freedom of navigation.'

Australian warship HMAS Parramatta sailed with guided missile-cruiser USS Bunker Hill and then rendezvoused with amphibious assault ship USS America and guided missile destroyer USS Barry. The operations began on April 13th and come as China continues to expand its presence in the region, including opening research stations on artificial reefs in territory claimed by the Philippines, Vietnam, Malaysia and other nations. There are claims that China is exploiting the Covid-19 crisis, bolstering territorial claims whilst many governments are distracted by the pandemic.

'They (Australia) have the same interest in ensuring freedom of navigation and observance of internationally accepted norms and customs pertaining to the law of the sea,' Captain Kurt Sellerberg, commanding officer of the USS Bunker Hill, said. He added: 'The Aussies are true professionals in every sense of the word, and our current combined deployment exemplifies a shared commitment to our historically strong and enduring relationship.'

Food growing fields contaminated with microplastics

The majority of British sewage is now repurposed into 3.2 million tons of treated sludge each year, by the numerous water companies. This practice has grown over the last 20 years, after sewage dumping at sea was banned in 1998. There is a concern that growing levels of microplastics are being found in the sludge. A confidential report for the Environmental Agency was prepared in 2017, but has not been acted upon. The report has been leaked to Greenpeace's Unearthed team.

The report advises that microplastics could harm ecosystems or crops and contain chemicals which can be released as they break down over hundreds of years. One of the biggest contributors of microplastics are synthetic fibres from clothes, released during cleaning in a washing machine.

Water UK, the industry body for water companies, said: "Robust research from the UK and across Europe shows conclusively that sludge recycling allows nutrients to be returned to the land in a way that is safe, sustainable, good for farmers, and good for the environment."

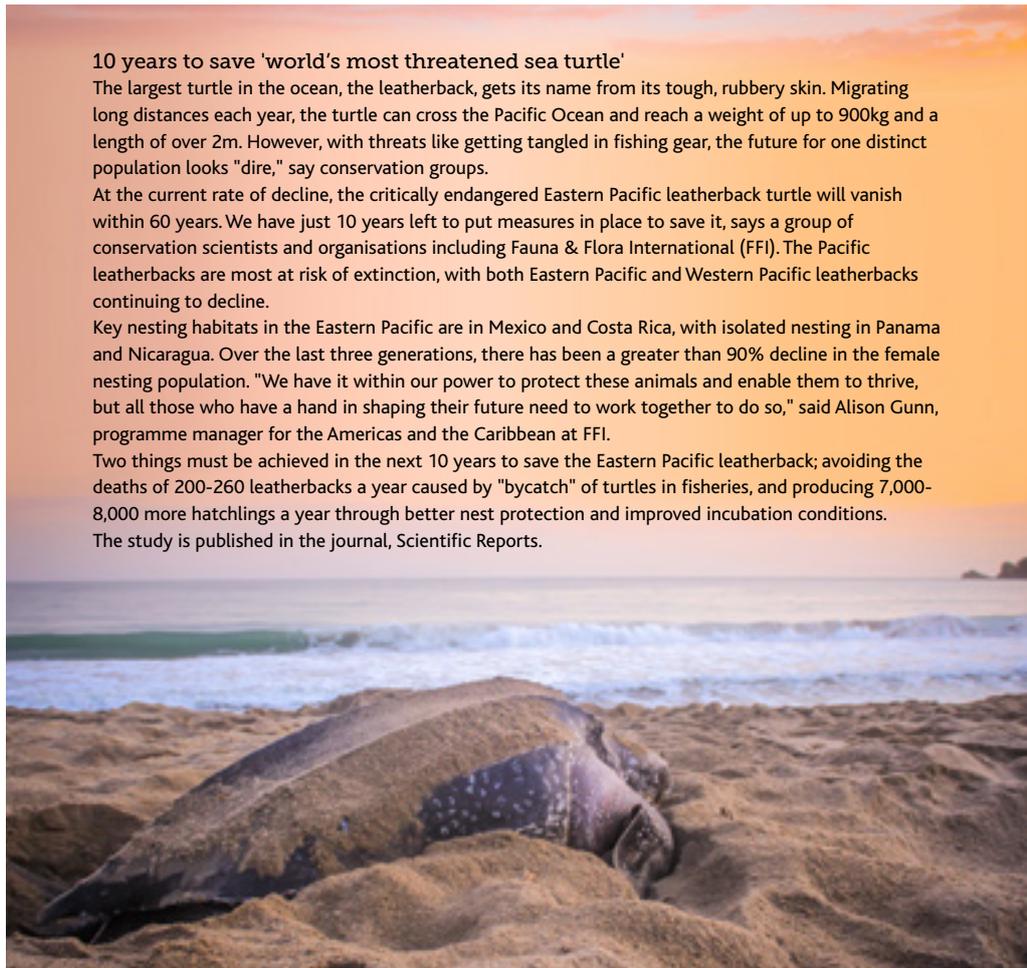
10 years to save 'world's most threatened sea turtle'

The largest turtle in the ocean, the leatherback, gets its name from its tough, rubbery skin. Migrating long distances each year, the turtle can cross the Pacific Ocean and reach a weight of up to 900kg and a length of over 2m. However, with threats like getting tangled in fishing gear, the future for one distinct population looks "dire," say conservation groups.

At the current rate of decline, the critically endangered Eastern Pacific leatherback turtle will vanish within 60 years. We have just 10 years left to put measures in place to save it, says a group of conservation scientists and organisations including Fauna & Flora International (FFI). The Pacific leatherbacks are most at risk of extinction, with both Eastern Pacific and Western Pacific leatherbacks continuing to decline.

Key nesting habitats in the Eastern Pacific are in Mexico and Costa Rica, with isolated nesting in Panama and Nicaragua. Over the last three generations, there has been a greater than 90% decline in the female nesting population. "We have it within our power to protect these animals and enable them to thrive, but all those who have a hand in shaping their future need to work together to do so," said Alison Gunn, programme manager for the Americas and the Caribbean at FFI.

Two things must be achieved in the next 10 years to save the Eastern Pacific leatherback; avoiding the deaths of 200-260 leatherbacks a year caused by "bycatch" of turtles in fisheries, and producing 7,000-8,000 more hatchlings a year through better nest protection and improved incubation conditions. The study is published in the journal, Scientific Reports.



Waters of Murray-Darling Rivers join for first time in two years

The waters of the Murray River and the Darling River in NSW have joined for the first time in two years, on 12th April, in a milestone for drought-stricken communities in New South Wales. Water flowing down the Darling joined water backed up from the Murray River around 5.30pm on Sunday evening about 90km upstream from Wentworth in NSW.

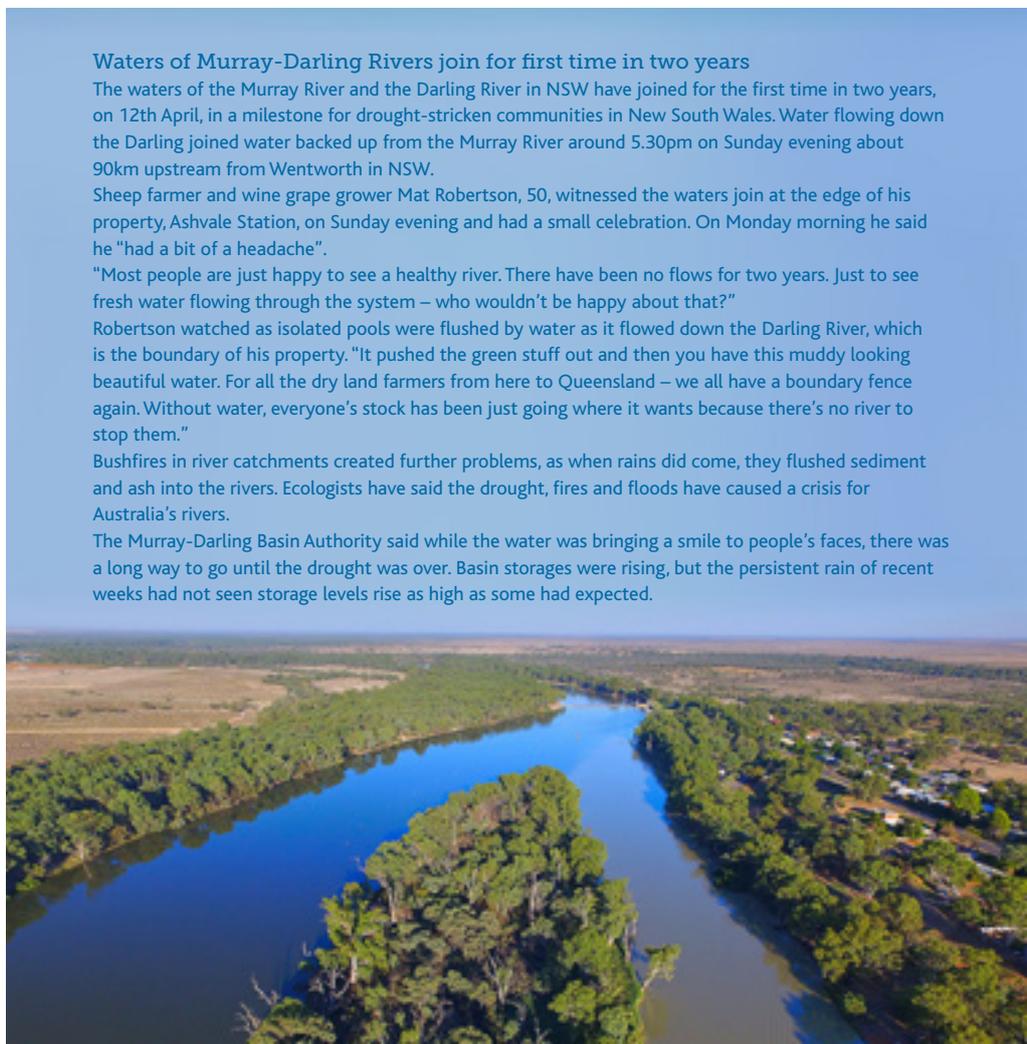
Sheep farmer and wine grape grower Mat Robertson, 50, witnessed the waters join at the edge of his property, Ashvale Station, on Sunday evening and had a small celebration. On Monday morning he said he "had a bit of a headache".

"Most people are just happy to see a healthy river. There have been no flows for two years. Just to see fresh water flowing through the system - who wouldn't be happy about that?"

Robertson watched as isolated pools were flushed by water as it flowed down the Darling River, which is the boundary of his property. "It pushed the green stuff out and then you have this muddy looking beautiful water. For all the dry land farmers from here to Queensland - we all have a boundary fence again. Without water, everyone's stock has been just going where it wants because there's no river to stop them."

Bushfires in river catchments created further problems, as when rains did come, they flushed sediment and ash into the rivers. Ecologists have said the drought, fires and floods have caused a crisis for Australia's rivers.

The Murray-Darling Basin Authority said while the water was bringing a smile to people's faces, there was a long way to go until the drought was over. Basin storages were rising, but the persistent rain of recent weeks had not seen storage levels rise as high as some had expected.





Pub openings in Japan

As Japan's restaurants and bars are looking to reassure the public that dining out is safe again, one pub thinks it has found the perfect solution.

Customers are first greeted by a hostess on a monitor, of course, who instructs them to disinfect their hands and check their temperature with a thermometer provided. They then step into a machine that looks like an airport security scanner, or a car-wash for humans, to get sprayed with a fine mist of the chlorine-based disinfectant for 30 seconds.

Customers then pick up a map that guides them to their seat where they order with smartphones. Throughout the process they have not come into contact with a single person.

"We wanted to develop a system that is in accordance with the new lifestyle and something that is a high model that could prevent infection," said the president of the Kichiri&Co group that owns the pub. "It's still an experiment, but once we develop the system, we want to share the know-how at each of our restaurants."

A clear acrylic screen is set up between each diner to further minimise the risk of infection.

Dolphins bring gifts from the sea

A pod of dolphins in Australia has been bringing gifts from the sea to the shore - apparently because they miss interacting with humans during the coronavirus pandemic. The humpback dolphins usually mingle with visitors at Barnacles Cafe and Dolphin Feeding at Tin Can Bay, Queensland. However, with the coronavirus pandemic keeping tourists away, the pod has taken to bringing an array of items - from corals to sea shells - for volunteers at the feeding centre.

"One male dolphin brings in objects on his rostrum, or beak, and then he carefully presents them to us," said volunteer Lyn McPherson to ABC News, talking about 29-year-old male dolphin Mystique. "What we have to do is give him a fish in return. We haven't trained him, but he has trained us to do this."

The items that the dolphins bring back include bottles, corals, sea shells, bits of timber and wood, among other things. According to Ms McPherson, Mystique sometimes brings back 10 items a day to the shore, convincing volunteers that he has a stash of gifts hidden away.

President Trump and his UV lung disinfection idea

Donald Trump was ridiculed for suggesting exposing lungs to UV and injecting patients with disinfectant, to wipe out the Covid-19 infection. It now turns out that although he got the wrong end of the stick, one US business is claiming it can disinfect the lungs with UV. Colorado-based Aytu BioScience said it had carried out successful early trials of its Healight technology which delivers intermittent ultraviolet light through a tube in the throat, directly to the lungs. The company terms the technique "injectable disinfectant." The firm says that the treatment shows potential as an antiviral and antibacterial treatment, while causing no damage to mammalian cells.

Aytu is now working with Cedars-Sinai Hospital to speed up regulations so it can trial the technology on critically ill coronavirus patients.

Editor: An Atlanta man was rushed to hospital after drinking a pint of bleach to prevent Coronavirus. The president told reporters: "I can't imagine why. I can't imagine that."

Puffin along

The annual puffin count on Skokholm Island, just off the Welsh coast, has reached its highest April total since 1953, with a count of 8,534 birds.

Numbers of the seabird are suffering elsewhere due to a lack of their favourite food, sand eels. Also puffins are sensitive to storms, and they nest in burrows in the ground, where they are vulnerable to predators such as rats.

South and West Wales puffins, however, are recovering slowly due to a decades-long fall in pollution from water treatment facilities discharges, no predators on Skokholm Island and an abundance of the sand eels in the Irish Sea.



'Dinosaurs walked through Antarctic rainforests'

Scientists drilling off the coast of West Antarctica have found the fossil remains of forests that grew in the region 90 million years ago - in the time of the dinosaurs.

The research, led from the Alfred Wegener Institute (AWI) in Germany, is published in the journal *Nature* and has emerged from an expedition in 2017 to recover marine sediments in Pine Island Bay. AWI and its partners, including the British Antarctic Survey (BAS), used a novel cassette drill-mechanism called MeBo to extract core material some 30m under the seafloor.

When the team examined the sediments in the lab, it found traces of ancient soils and pollen and even tree roots.

The interpretation is that this sector of West Antarctica, in the geological period known as the Cretaceous, featured temperate rainforest and swamp conditions - the kind of vegetation you will find on New Zealand's South Island today.

Modelling work suggests average annual temperatures in this Cretaceous environment would have been in the mid-teens Celsius; summer averages would have been in the 20s. But the vegetation must have been pretty special because, being so far south, it would have had to endure three to four months of polar darkness.

Got enough toilet paper?

Were you worried about whether you had enough toilet paper for the coronavirus lockdown? A German website can tell you how long your supply will last.

Toilet paper has become one of the commodities shoppers across the world have hoarded as the coronavirus crisis forced people to stay indoors. The website *Blitzrechner.de* can help reassure shoppers that they have enough. Just tell it how many rolls you have and how often you go to the toilet. You can adjust the settings for the number of wipes per trip, the number of paper squares per wipe, the number of family members in your household and how long you plan to stay home.

A person with a stockpile of 10 rolls, who uses the typical amount of paper three times a day, should survive for 53 days, it says. A message notes that this is 39 days longer than the recommended 14-day quarantine for those with symptoms.

Similar tongue-in-cheek stockpiling calculators have sprung up in other countries too, like the UK site *Howmuchtoiletpaper.com*.

Chancellor Angela Merkel set a better example when she was photographed doing her weekly shop with just one pack of toilet paper in her trolley -- and four bottles of wine.

Red planet's 'boiling toothpaste'

Scientists have made a surprising discovery about Mars by playing with muck in the laboratory. An international team of researchers wondered how volcanoes that spew mud instead of molten rock might look on the Red Planet compared with their counterparts here on Earth.

The UK's Open University has a special chamber that can recreate the Martian environment of extreme cold and low pressure. Here, simulated Martian mud flows were seen to behave a bit like boiling toothpaste. Mars' low atmospheric pressure - less than 1% of the Earth's value - makes water rapidly evaporate, boil and ultimately freeze.

The mucky gunge resembled a certain type of lava referred to as "pahoehoe", which is observed at Hawaii's famous Kilauea volcano.

The research results could now complicate some investigations at the Red Planet, believes study lead Dr Petr Brož from the Czech Academy of Sciences' Institute of Geophysics. "You'll look at some features (from space) and you won't know for sure whether they are the result of lava flows or mud flows. Without a geologist on the ground to hit them with a hammer, it will be hard to tell."

For a long time, Dr Brož had a sceptical view about mud volcanoes on Mars. He'd actually spent several years trying to disprove an interpretation that large numbers of conical forms on the Red Planet might be mud flows.

Fears that 15,000 pubs may never re-open

Emma McClarkin, chief executive of the British Beer and Pub Association, said the coronavirus pandemic had been 'devastating' for the sector financially. And she warned pubs could be facing a 'double hit' when they reopen as changes to consumer behaviour could see them reluctant to socialise in large numbers. She said it was now vital the Government agrees to provide financial support to the industry even after pubs begin trading again. 'We could be losing 40% of our businesses if they do not open by the end of September. That equates to about 15,000 pubs and breweries.'

On how pubs will operate in the future, she said staff will likely greet customers at the door and show them to a table to take their order – rather than at the bar. Staff could also be required to monitor toilets to ensure patrons are abiding by social-distancing measures.

Ms McClarkin said the perceived vision of people cramming into pubs once they eventually reopen was 'something of the past. There are going to be much fewer people inside our pubs and that is part of the reality going forward. In the current situation, people are nervous about going out, but they are definitely nervous about socialising in the way they used to and it will take time to build that consumer confidence.' She said the two-metre distancing rule would also reduce indoor capacity by about 70%.

Landlords are also facing increased costs around cleaning and the possibility of having to invest in personal protection equipment (PPE) for staff.



Sunny, dry spring beaks records

May was the sunniest calendar month on record, and spring was the sunniest spring, the Met Office has said. The UK enjoyed 266 hours of sunshine in May – surpassing the previous record of 265 hours in June 1957. And it is even more extraordinary following a drenching winter, with record rain in February. On average the UK gets 436 hours of sunshine between March and the end of May.

This year we've bathed in an extraordinary 626 hours – smashing the previous record by a "staggering" amount, one Met Office worker said. It is because the jet stream has locked the fine weather in place, just as it locked the previous winter rainfall in place. Professor Liz Bentley, chief executive of the Royal Meteorological Society, said: "We've swung from a really unsettled spell with weather systems coming in off the Atlantic to a very, very settled spell. It's unprecedented to see such a swing from one extreme to the other in such a short space of time. That's what concerns me. We don't see these things normally happening with our seasons. It's part of a pattern where we're experiencing increasingly extreme weather as the climate changes."

Mark McCarthy, from the Met Office, said: "If we look at the difference in rainfall that's fallen over the winter compared to spring it is the largest difference in rainfall amount in our national series from 1862. The stand out is by how much sunshine has broken the previous record – set in 1948. There's been more sunshine than most of our past summer seasons. It's quite remarkable."

For April 2020, rainfall for the UK registered at just 41% of the long-term average, with much of it falling where least needed. This has been followed by probably the driest May for 124 years. But while many are enjoying the warm weather, the lack of rain is becoming "increasingly serious" for farmers, the National Farmers' Union has said. It expects the "significant impact" of the weather on wheat production in the UK will lead to food price rises. Yields could fall by up to 50% compared with 2019.

Young French drinkers lose the taste for wine

According to figures released by the Bordeaux Wine Trade Council, sales of claret fell by 13,000 bottles in France in 2019, a 10% drop, whilst storm clouds are gathering in overseas sales for French wine and Bordeaux in particular, with exports to China down by 17%, Hong Kong by 25%, and by 36% in the US after Donald Trump slapped a 25% tax on European wines. Sales to the UK rose by 15%.

There is a growing taste for craft beers among young French drinkers, and a definite move away from red wines in favour of chilled wines such as rosé, and cold beer. The number of microbreweries in France has risen from 200 to more than 1,600 in the past decade.



Global Lockdowns changing the environment

Around the world polluting emissions have plummeted as lockdowns aimed at slowing the viral spread have closed businesses and trapped billions of people at home. In India, where air pollution is among the world's worst, people are reporting seeing the Himalayas for the first time from where they live. Globally the sky has become clearer and a deeper shade of blue. This could however inadvertently increase global warming potential.

In Venice, Italy's lockdown has left the city's canal waters looking impossibly clean. However, this is not due to a decrease in pollution. "The water now looks clearer because there is less traffic on the canals, allowing the sediment to stay at the bottom," a spokesperson for the Venice mayor said. While the city's water may not actually be cleaner, the air quality has certainly improved, with fewer water taxis and boats ferrying the tourists and residents along the canals.

Global CO₂ levels for 2020 v 2019 are expected to fall by 4% by year end, if lockdowns end by mid-June.

Bears wake up much earlier this year

Across the world, bears have emerged from hibernation by as much as a month earlier than normal this year, after an abnormally warm winter. The US, Canada, Scandinavia and Russia have all seen a lot less snow, accompanied by much higher temperatures. February was the second warmest globally, on record, and the warmest ever in Europe.

Historically hibernating bears sleep for four months from November to March, but this year many have woken a month early, and have struggled in vain to find food. If this pattern repeats in future years it will enforce fears that climate change is damaging sleep cycles and disrupting the food chain.



Antarctica's hottest day ever

Antarctica has logged its hottest temperature on record, on the 6th February 2020, with an Argentinian research station thermometer reading 18.3°C, beating the previous record by 0.8°C.

The reading, taken at Esperanza on the northern tip of the continent's peninsula, beats Antarctica's previous record of 17.5°C, set in March 2015. A tweet from Argentina's meteorological agency revealed the record. The station's data goes back to 1961.

Antarctica's peninsula – the area that points towards South America – is one of the fastest warming places on earth, heating by almost 3°C over the past 50 years, according to the World Meteorological Organization. Almost all the region's glaciers are melting.





Ryanair passengers will need permission to use the facilities

Passengers travelling with Ryanair will have to ask permission to use the toilet under new rules laid out by the airline, as it prepares to restart 40% of flights in July in the hope that government restrictions on travel in Europe will be lifted.

Ryanair will advise passengers to check their temperature before going to the airport, check in online and download their boarding pass to their smartphone. Travellers will undergo further temperature tests at the airport, must wear face masks or other coverings and wash their hands and use hand sanitiser in terminals.

On board the aircraft, they will be able to buy pre-packaged snacks and drinks, using cashless payments only. Queueing for toilets will be prohibited on board, and passengers will have to wait for permission from cabin crew to use the lavatory. Physical distancing at airports and on board will be encouraged where possible.

New warning over fire-prone washing machines

In April this year a further 55,000 Whirlpool washing machines in use in UK homes were identified as posing a fire risk, and should stop being used and need repairing or replacing. This covers a further 21 Hotpoint and Indesit machines.

Owners may have checked twice previously and been told their machines were safe, but now need to check again. Some 20% of machines sold since 2014 are affected by a safety fault and need to be recalled, a process that started in January. Seventy-nine fires are thought to have been caused by an overheating door locking system, a fault that develops over time, according to Whirlpool.

Initially, in January, the company said it needed to repair or replace 524,000 machines in UK homes, and the company said in April that it had located 210,000 of those appliances, and had resolved 177,000 of those so far. The total number of models affected is 66.

EU and UK Fishing Rights

On the 30th April, Michel Barnier, the EU's Brexit negotiator said that trade talks could collapse unless EU boats keep their current access to UK fishing waters, as the price for continued negotiations. A UK source said that the EU's red line would need to change, otherwise the UK itself could terminate negotiations in June. "There are some fundamentals that we're not going to change, nor going to move on because they are not so much negotiating positions as they're sort of what an independent state does." They continued: "An independent state has independent control over coastal waters. What we want now is an EU understanding that we are not going to subordinate our laws to them in any areas."

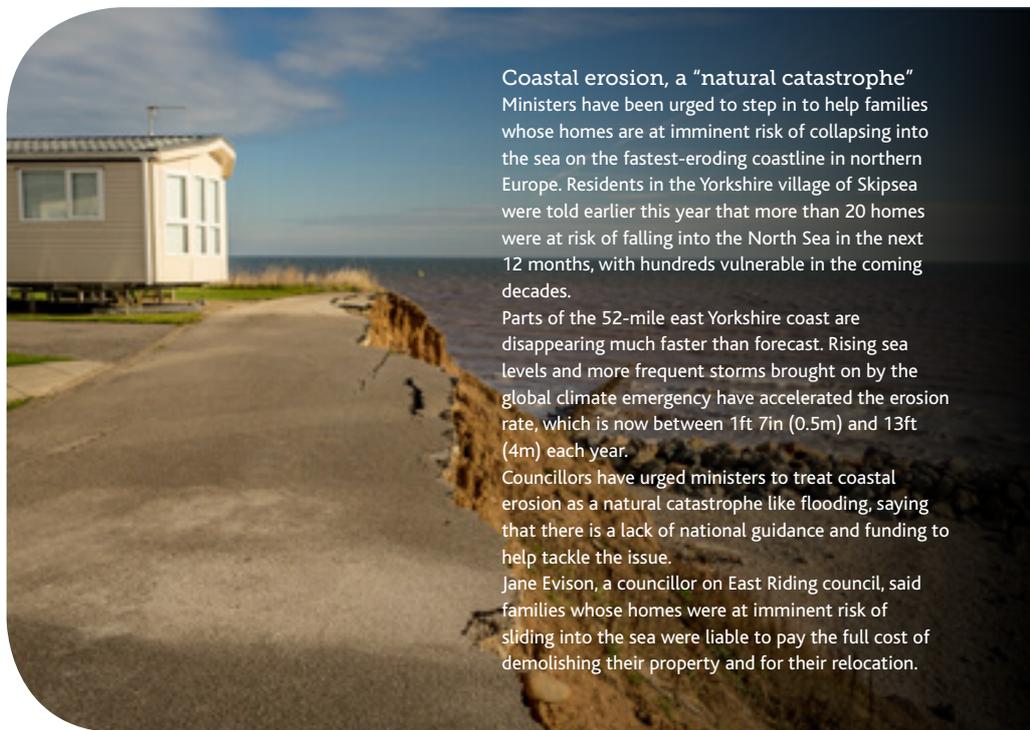
Editor with apologies to Churchill: We shall defend our island, whatever the cost may be, we shall fight in the fishing grounds, we shall fight on the shorelines.....

Pick the Alien campaign

When European holiday flights recommence, holidaymakers may see a change to the traditional menus in Greece. Instead of grilled calamari, trumpet fish soup and lionfish ceviche could soon be staples on a taverna's menu.

A new cookery book, *Recipes for Edible Alien Species*, is to blame. Published by the Cyclades Preservation Fund and iSea, two conservation organisations, the idea is to persuade people to eat invading species.

Dozens of alien fish are now thriving in the Mediterranean, having swum through the Suez Canal. Many of the newcomers are prolific breeders and aggressive to native species, which have no natural defences against the invaders.



Coastal erosion, a "natural catastrophe"

Ministers have been urged to step in to help families whose homes are at imminent risk of collapsing into the sea on the fastest-eroding coastline in northern Europe. Residents in the Yorkshire village of Skipsea were told earlier this year that more than 20 homes were at risk of falling into the North Sea in the next 12 months, with hundreds vulnerable in the coming decades.

Parts of the 52-mile east Yorkshire coast are disappearing much faster than forecast. Rising sea levels and more frequent storms brought on by the global climate emergency have accelerated the erosion rate, which is now between 1ft 7in (0.5m) and 13ft (4m) each year.

Councillors have urged ministers to treat coastal erosion as a natural catastrophe like flooding, saying that there is a lack of national guidance and funding to help tackle the issue.

Jane Evison, a councillor on East Riding council, said families whose homes were at imminent risk of sliding into the sea were liable to pay the full cost of demolishing their property and for their relocation.

Fancy a cruise?

As one regular UK cruiser said: "The ships are really mobile hotels, and we wake up somewhere different every day... we use it to go to places we want to see."

But those floating hotels are now rapidly returning to port, discharging their passengers and being mothballed. The industry has not just been devastated, it has ceased to function altogether.

Coronavirus has been the perfect storm. An industry worth £37bn a year, with 26 million passengers per annum, ground to an almost total standstill overnight.

Ironically, the industry was well prepared for the outbreak of disease on board its ships, as it has happened plenty of times before, most often the norovirus "vomiting bug", but also Legionnaires disease.

The worst thing you can do if passengers start falling ill is keep people on board. Normally the ship goes to the nearest port, gets everyone off and then sanitizes the vessel, and is ready to start cruising again within a matter of weeks. This time many governments forced ships to stay at sea or if allowed to dock made to keep people on board, increasing the numbers infected.

Most cruise ships are not registered where they do business, in the USA and Europe, but offshore in places like Panama and the Bahamas. This saves the industry a lot of tax, and it means that they don't have to follow American or European labour laws.

Now, however, this way of operating doesn't look so clever - the cruise line industry is not included in many countries bailout schemes, and could take years to recover.





Climate change causes closure of dog-sled business

A dog-sledding centre in the Scottish Highlands says it is having to close down after nearly two decades as climate change has "crucified" the business. Alan Stewart, the owner of Cairngorm Sleddog Centre, said snowy trails had been turned into mud baths and increasing temperatures meant he could no longer train his dogs properly.

He said the dogs could only run in temperatures below 10°C, which used to give him seven months of a year training in the Cairngorm Mountains, but this had been reduced to three months in the last few years.

Mr Stewart, who first noticed the changes to the environment seven years ago, said conditions on the trails had deteriorated to "liquid mud".

"Climate change has crucified us," he said. "It's horrendous. I live very remote - not like anyone else lives in the UK. It's a way of life. My dogs are my best mates."

Queen wins battle with environmental campaigners

The Cairngorms National Park Authority, after a close look at the proposals, has approved plans by Her Majesty to install a hydro-electric turbine at Balmoral.

The two megawatt generator on the River Muick will produce up to £650,000 of energy a year, enough to power the estate and sell surplus electricity to the national grid.

Opponents feared it would be too noisy for woodland creatures.

The park authority accepted it would jar with the national park, and insisted that no work should be undertaken during the nesting season from February to August.

The scheme will provide 'greener' electricity to the estate.

No difference in litter on beaches inside or outside protected areas

Researchers have found no difference in the amount of man-made litter present on beaches inside and outside marine protection zones.

The study analysed 91 marine conservation zones, 256 special areas of conservation and 89 special protection areas created for birds. It used 25 years of beach cleaning data collected by Marine Conservation Society volunteers.

Plastic was the main form of litter, and "public littering" the most common identifiable source.

Marine protected areas in Kent, Devon and Cornwall had the highest levels of shore-based rubbish.

Regional differences in the items found, such as fishing materials in the West Country, and debris from sewage around large rivers, demonstrate the need for locally appropriate management, the researchers said.

This could be the longest ocean creature ever recorded

A team of scientists has discovered a 150-foot (46-meter) siphonophore, which they say might be the longest animal ever recorded. The gelatinous mass was discovered during a month-long scientific expedition exploring the submarine canyons near Ningaloo in the Indian Ocean off the coast of Western Australia.

Each siphonophore is a floating colony of tiny individual zooids, clusters of cells that clone themselves thousands of times into specialized bodies that string together to produce an extended body. Siphonophores are predators that feed, like jellyfish, by dangling tentacles in the water that sting and paralyze small crustaceans and fish.

Nerida Wilson, a senior research scientist at the Western Australian Museum, led the expedition. Wilson said that the discovery of the extra-long siphonophore came when many researchers on board were least expecting it. Using an underwater robot, the research vehicle dived as deep as 4,439 metres, but the enormous siphonophore was discovered as the vehicle was making its way back to the surface, at around 630 metres.

Editor: A previous Waterscan article on jellyfish noted that the Portuguese Man-of-War is also a siphonophore, and not a true jellyfish. We never stop learning.

Swimming pools to use more chlorine after lockdown

Swimming pools will be told to use more chlorine when they reopen to the public after research from the World Health Organisation (WHO) showed a certain concentration of the chemical can eliminate coronavirus in water.

According to WHO, a residual concentration of free chlorine of more than 0.5 mg/l in the pool water for a minimum of 30 minutes of contact at a pH of less than 8.0 is sufficient to eliminate enveloped viruses like coronaviruses.

As at the end of May people in England were allowed to swim outdoors for exercise, in lakes and ponds under eased lockdown rules. At that time Prime Minister Boris Johnson said: "We can't do anything for swimming pools (yet) because there is a lower risk outdoors than indoors."

Swim England, the national governing body for the sport, is now developing social distancing and chlorination rules for 4,000 indoor facilities when they eventually reopen to the public.

HMS Queen Elizabeth leaves port after Covid-19 scare

Britain's most powerful warship set sail on a training exercise for eight weeks on 30th April - despite two of its 700-strong crew testing positive for coronavirus. The 65,000 tonne HMS Queen Elizabeth had been expected to take to the water from Portsmouth Naval Base at the start of the week, but the departure was delayed to allow the ship's company to be tested.

Two people were found to have contracted the virus and were removed just hours before the vessel left the harbour, after several days of mixing with others on board, though navy bosses insist all were complying with social distancing where practicable.

It comes after concerns were raised when more than 600 members of the crew of a French aircraft carrier and accompanying vessels tested positive for Covid-19, while a sailor died after coming down with the disease on the USS Theodore Roosevelt.

A Royal Navy spokesman said: 'While many Royal Navy and Royal Marine personnel from the regular and reserve forces remain ashore supporting the current national fight against Covid-19, the ship's company of HMS Queen Elizabeth are focused on ensuring that UK Defence remains prepared for future global threats.'

'All personnel sailing with the ship have undergone testing for coronavirus. As a further precaution HMS Queen Elizabeth will conduct a period of isolation at sea, before she starts her training with the Flag Officer Sea Training staff. She will be operating in waters close to the UK coast and the commanding officer has the discretion to cease the training, if deemed necessary.'





Otters use wet spell to discover new food sources

The flooding in February and March caused otters to leave the rivers where they live, and some people with ornamental fish ponds discovered they had unwanted visitors plundering their shoals.

Otters were once threatened with extinction in England, but their numbers have improved since hunting was banned in 1978, and farmers reduced the use of harmful pesticides. There are currently around 10,300 otters in the UK, with the majority, almost 8,000, found in Scotland.

Founder of the Wild Otter Trust, Dave Webb said this was a common phenomenon after floods and suggested people put a steel mesh over their ponds, adding: "Often, sadly, most of the garden ponds are not protected well enough."

Koi Carp are probably the most common ornamental fish, and can cost from around £10 for a small young fish up to thousands and even tens of thousands of pounds for large, mature and more specialised varieties..

How sea turtles protect their eggs

Leatherback and hawksbill turtles have been seen scattering sand at several exposed sites away from their nests in a seven year study undertaken in Trinidad and Tobago.

Previously it was thought that this behaviour was a means of camouflaging the nest from egg predators, but now researchers think otherwise, with findings now published in the journal *Royal Society Open Science*. The findings strongly support the idea that they create a series of decoy nests, which could explain why female turtles endure greater risk, staying on the beach away from their nest, rather than returning to the safety of the sea.

70 million pints 'down the drain'

According to figures released by the British Beer and Pub Association (BBPA) on Friday, 15th May, some 47,000 publicans now face the "heart-breaking" task of destroying 70 million pints of beer nationwide, due to spoilage, enough to fill nearly 16 Olympic-sized swimming pools.

According to the BBPA, some pubs and brewers have found other uses for their ales, supplying it as feed for livestock or for anaerobic digestion machines that make fertiliser.

"It's a great shame that so much great British beer that should have been enjoyed in community pubs up and down the country has gone to waste," said Emma McClarkin, the BBPA chief executive. "People won't have a chance to drink it as it will go off before pubs can reopen."

The BBPA's figure of 70m lost pints was based on an estimate of 10 beer taps each at the UK's 47,000 pubs, which were ordered to shut on 20th March and cannot reopen until at least 4th July.

Nor is throwing away beer as simple as it sounds. In some cases, approval from the water board or local authority is required. And while pubs can reclaim beer duty from what they have already paid to brewers, they have to be able to verify how much they have thrown away. Some brewers have been asking publicans to film themselves pouring the beer away and show the measurements to prove they are reclaiming the right amount.

Russia warming twice as fast as the rest of the world

Russia has published a plan to adapt its economy and population to climate change, aiming to mitigate damage but also "use the advantages" of warmer temperatures. The document, published on the government's website in January, outlines a plan of action and acknowledges changes to the climate are having a "prominent and increasing effect" on socioeconomic development, people's lives, health and industry. The country is warming 2.5 times faster than the planet as a whole, on average.

It lists preventive measures such as dam building or switching to more drought-resistant crops, as well as crisis preparations including emergency vaccinations or evacuations in case of a disaster. The plan says climate change poses risks to public health, endangers permafrost, and increases the likelihood of infections and natural disasters. It also can lead to species being pushed out of their usual habitats.

Possible "positive" effects are decreased energy use in cold regions, expanding agricultural areas, and navigational and trade opportunities in the Arctic Ocean.

Putin, however, has repeatedly denied the scientific consensus that climate change is primarily caused by emissions deriving from human activity, blaming it on "processes in the universe". He has also criticised the Swedish climate campaigner Greta Thunberg, describing her as an uninformed, impressionable teenager possibly being "used" in someone's interests. He has also voiced scepticism about solar and wind energy, expressing alarm about the dangers of turbines to birds and worms, causing them to "come out of the ground" by vibrating. While there is evidence that large wind-power installations can pose a risk to birds, known research does not suggest they harm worms.



The ancient mariners

Four fossilized monkey teeth discovered deep in the Peruvian Amazon have provided new evidence that more than one group of ancient primates journeyed across the Atlantic Ocean from Africa, according to new University of Southern California (USC) research just published in the journal, *Science*.

The teeth are from a newly discovered species belonging to an extinct family of African primates known as parapithecids. Fossils discovered at the same site in Peru had earlier offered the first proof that South American monkeys evolved from African primates. The monkeys are believed to have made the more than 900-mile trip on floating rafts of vegetation that broke off from coastlines, possibly during a storm. The research shows that in addition to the New World monkeys and a group of rodents known as caviomorphs -- there is this third lineage of mammals that somehow made this very improbable transatlantic journey to get from Africa to South America. Scientists have named the extinct monkey *Ucayalipithecus perdita*. The name comes from Ucayali, the area of the Peruvian Amazon where the teeth were found, pithikos, the Greek word for monkey and perdita, the Latin word for lost.

The monkey would have been very small, similar in size to a modern-day marmoset. Researchers believe the site in Ucayali where the teeth were found is from a geological epoch known as the Oligocene, which extended from about 34 million to 23 million years ago. Based on the age of the site and the closeness of *Ucayalipithecus* to its fossil relatives from Egypt, researchers estimate the migration might have occurred around 34 million years ago.

Toad lovers on patrol during spawning season

From late February to early April each year, near Castle Carey, Somerset, hundreds of toads and newts make a perilous journey across a busy road to breed. This mass migration destination is a pond in the Woodland Trust owned Haddon Wood, which was installed in 2013 after the land was donated to the Trust; little did they know how popular this would become for amphibians in the following years.

Now, volunteers are out from sunset to 10.30 on evenings when the weather is right – toads only launch their journeys when it is wet and the temperature is higher than 5 degrees. The volunteers' job is to encourage traffic to slow and aid the amphibians across the road. By late March, despite best efforts, over 150 toads had been killed but prior to these volunteer patrols that would have been hundreds if not thousands of deaths.

A spokesman said: "Toads generally always go back annually to the pond they were born in – the same days each year. The adults then gradually disperse into the countryside – somewhere within a mile or so – to damp vegetation in the following months. It is a fascinating journey."

And finally.....

Just before 5 a.m. on Sept. 14th, 2019, a fully-functioning toilet made of 18-karat gold was stolen from an art exhibition at Blenheim Palace, the birthplace of Winston Churchill. There has been no trace of it since.

The artwork was called "America" by Maurizio Cattelan, and according to the US press, the 'John' is still missing, probably melted down, with a gold value of at least £4 million.

Editor: The police have said that they are still looking, but they have nothing to go on!

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PipeLine

Colin Brown, WMSoc Chairman

Keep on working

Well the summer is finally here, not one any of us imagined in the dark days of winter, but at least the UK has been experiencing some very unseasonably good weather.

During the lockdown period the WMSoc has been continuing to work in the background to provide all the services you expect whilst keeping its staff safe. This has meant a pause to face to face training and events, but work to review future online training, and to update and create new technical documents for you to download. We have also been passing on useful industry updates via our e-bulletins and online News sections which we hope you have found valuable.

I am pleased to say that interest in the society is as strong as ever with 29 new members in the past 3 months and 4 new volunteers to join Water Management Society Council, causing a vote which I hope you will all take part in to select our representatives for the coming year. The results of the vote will be announced at our AGM which will take place on the 25th September along with our 20:20 Vision event.

We are all taking tentative steps to return to a new normal, and at WMSoc we are opening our training facilities once more whilst reducing class sizes to keep our students and staff safe. We would like to thank you all for your continued support as water management becomes ever more important as we return from this period of shutdown, and hope you enjoy the focus of this quarter's magazine.

THE WATER MANAGEMENT SOCIETY PRESENTS

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A REQUEST FOR DATA BACKED EXPERIENCE OF WORKING WITH OXIDISING BIOCIDES

Dear Waterline readers, the WMS Technical Committee has been trying for some time to pull together useful information on the use of oxidising biocides in predominantly hot & cold water systems both for 'slug' offline treatments and on-going low level use. We have anecdotal evidence that off-line 50ppm bulk water Chlorine Dioxide disinfectants will produce a smell so bad that the room/building will need to be evacuated. However, what we are lacking is measured evidence for inclusion in the document.

Chlorine Dioxide exposure limits in air are pretty low, has anyone done any testing? At 1000ppm as a spray disinfection, has anyone measured local ClO₂ levels outside the tank in the plantroom? Hydrogen Peroxide is quoted as anything from 100ppm for an hour to 500ppm for 24 hours, these can't both be right for disinfection of pipework (not disinfection of water).

So, our request, anyone with figures on the use levels of Chlorine (HOCl), Chlorine Dioxide, Ozone, Hydrogen Peroxide etc. stability/longevity, concentrations in air, side effects..... Please drop us a line.

WMSoc Technical Committee

EMAIL:
admin@wmsoc.org.uk



THE WATER MANAGEMENT SOCIETY

TOOLBOX TALKS

BIOFILM

Biofilm an introduction - what is Biofilm?

A biofilm is a complex mix of microorganisms, mucus and nutrients; it is the natural habitat of many bacteria that are able to grow in water systems and will develop on any permanently wetted surface. In many cases biofilms in engineered water systems are microscopically thin and cannot be seen or felt but they can become substantial and recognisable as slime, often around the waterline where there is a high concentration of oxygen. Within biofilms there will be a variety of living and dead microorganisms which might include bacteria, algae, fungi, protozoa and complex organisms such as nematodes.

The binding mucus will incorporate minute particles such as rust, scale and organic materials as well as microorganisms and will be "grazed" by bacteria, amoebae, nematodes and even by larger organisms such as molluscs or fish where they are present.

The microorganisms in biofilms are described as "sessile" and those in the body of the water as "planktonic", however normally sessile microorganisms might release planktonic spores or even break away as part of their life cycle, transported on the water current or swimming to colonise other places. The biofilm will continuously grow and dwindle, fragment and settle and should be regarded as a permanent but dynamic feature.

Microorganisms, such as bacteria and fungi, also grow at the surface of water if it is undisturbed and can form a floating biofilm which can develop into a film or scum but is often not visible.

Why biofilms cause problems within water systems

Biofilms create an environment where

microorganisms live, breed and multiply; they also provide some protection against shear (surface disruption) from water currents and biocides in the water. The mucus component of biofilms is a polysaccharide (sugar) and lipid (fat) gel comprised mostly of water and which is highly insulating, so it reduces the efficiency of heat exchange. Biofilms also cause drag, which impedes (slows) water flow and increases pumping demand.

The coating of surfaces with biofilm acts as a barrier which can create corrosion cells directly and, as it impedes the diffusion of oxygen, reducing conditions can develop which favour nitrite-reducing bacteria (NRBs) or sulphate-reducing bacteria (SRBs). NRBs degrade nitrite-based corrosion inhibitors and SRBs generate hydrogen sulphide (H₂S), which causes under-deposit acid corrosion and a foul smell like bad eggs. If not limited by the supply of nutrients or otherwise controlled, the biofilm might become so well established as to cause blockages in drains, strainers or even pipework.

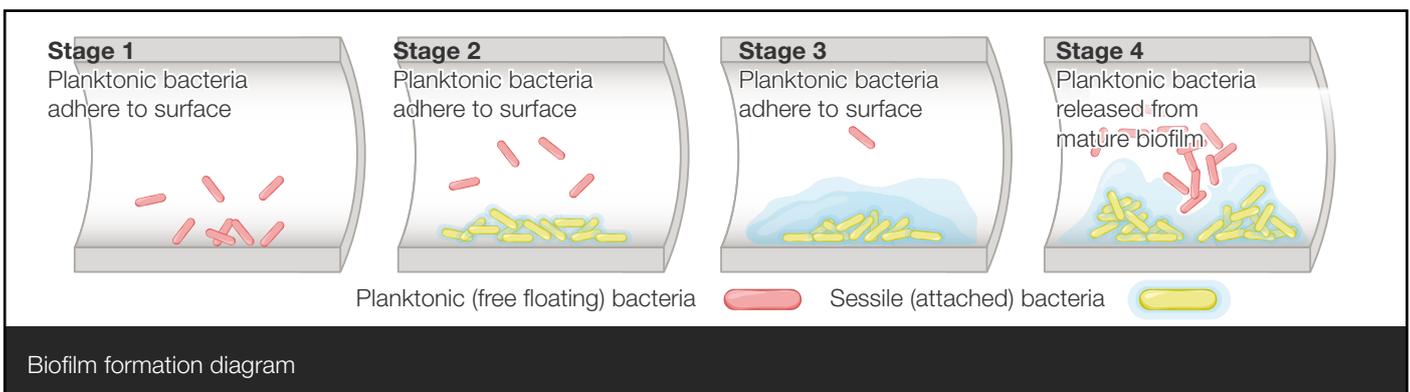
The effects of biofilms on systems varies widely from insignificant (their universal

presence is often not realised e.g. plaque on teeth) to critical, such as when blockages prevent systems working or when they render the water unfit for purpose. This can be particularly significant in clean or ultraclean water systems or conventional systems used by people highly susceptible to infection.

Controlling Biofilms

Systems operating with suitably treated water, such as the mains supply, process systems dosed with biocides and domestic hot water systems, can usually be maintained largely free of significant biofilm, but other systems and any areas of treated systems where the biocide or temperature is not maintained are likely to develop biofilms. The rate of development will vary according to conditions such as the availability of nutrients and oxygen, temperature and exposure to light.

Once a biofilm is established, treating with disinfectant alone might not be effective in removing it, so additional techniques such as abrasion or the addition of biodispersants might be required.





ANSWERS TO THE ARTICLE IN OUR SPRING ISSUE

SAMPLE MATRIX TYPES- WHY DOES IT MATTER TO ME?

Q1: What does UKAS stand for?

Q2: When was the UKAS Guidance on Sample Matrices last updated?

Q3: What are examples of Healthcare Waters?

Q4: How often do UKAS visit laboratories to review their performance against ISO 17025?

Q5: How many water matrix types are there as of May 2019?



A1: United Kingdom Accreditation Service

A2: May 2019

A3: Dialysate and endoscope waters

A4: Once per annum

A5: Twelve broad categories listed in *Technical Bulletin - Guidance on Water Matrices Definitions for Sampling and Testing to ISO/IEC 17025*. Saline water and trade effluent water matrices appear to be missing from the table on page 8, Spring 2020.

We received a number of correct answers from our Spring edition, many thanks to all who took part. We have selected to publish the answers above from Matthew Lyles M.W.M.Soc, one of our newer members. Welcome to the society Matthew!

If you would like to get involved with this issue's CPD activity, see page 26.

COVID-19 TRAINING UPDATE

Following government advice in March the training function of the Water Management Society closed its doors to students and staff alike. With the gradual lifting of lockdown measures and in line with the new "Working safely during Coronavirus (COVID-19)" government guidance we are now ready to reopen to students.

The training function will therefore be opening from the 6th July 2020. In order to do this we have put in place a number of measures to keep our students, teachers and staff safe in the coming months, including:

- Social distancing in classrooms with reduced student numbers
- PPE for when social distancing is not possible

- Restricted use of communal areas
- Limited use of our practical training area
- New cleaning and hygiene practices
- Pre-packaged catering in place of buffet lunches

We obviously need our students to help us to remain safe, and we are offering the flexibility of rescheduling training with no admin fee for anyone who has symptoms, has been exposed or has been contacted by the Track and Trace team during the 14 days prior to training. In addition, there are a number of high risk groups who, for the moment, are excluded from this training in accordance with government advice. This

situation will be continually reviewed and we will be happy to reschedule training so that we can welcome back all our students to our training centre as soon as it is safe for them to do so.

More details of our COVID-19 Risk Assessment, Control Policy and updated Delegate Sign-In Policy and FAQ can be found online on our training pages: www.wmsoc.org.uk/legionella-training-courses/trainingoverview.php

We look forward to welcoming you back to our training soon. If you have any concerns over your training or would like to book a course please get in contact with our team training@wmsoc.org.uk or 01827 289558.

EMAIL:
training@wmsoc.org.uk

GET TRAINED. GET CERTIFIED. GET WMSoc TRAINING.

The article first appeared in the November 2019 edition of Health Estate Journal (www.healthestatejournal.com), the IHEEM (www.iheem.org.uk) magazine.

Materials impact warrants careful thought / Different materials pose different risks / Problems with lead nickel, and EPDM explained

Paul Millard, WRAS

Paul Millard, Technical Manager at the Water Regulations Advisory Scheme (WRAS), highlights three key plumbing material issues which he says should be considered and addressed within Water Safety Plans (WSP) to maintain the water supply in hospitals and other healthcare facilities in a safe and hygienic condition.

The development, construction, installation, commissioning and maintenance of hot and cold-water supply systems is vital for public health. Healthcare premises are dependent upon water to maintain hygiene and a comfortable environment for patients and staff and for treatment and diagnostic purposes. The safe use of water is an important issue, where potential contamination could have a greater impact on vulnerable people. Patients are more likely to have weakened immune systems, putting them at a particular disadvantage when exposed to any contamination of the water supply.

The Department of Health & Social Care has long recognised the importance of safe water in healthcare premises and provides key guidance through its Health Technical Memorandum, HTM 04-01. One of the recommendations is the establishment of a WSG – a multidisciplinary group, one of whose key responsibilities is to undertake the commissioning and management of Water Safety Plans (WSPs).

Three key issues

In this article, I intend to highlight three key material-related issues which should be considered and addressed within WSPs. Use of appropriate materials is one important preventive measure and I will consider potential problems related to lead, nickel and EPDM rubber and how to avoid them within healthcare premises. WRAS was set up by UK water companies to assist individuals and organisations in complying with water fittings regulations. The regulations are in place to ensure that the water supply to public and private premises, including healthcare buildings, is safe.

Lead

Lead is a highly toxic metal that is known to affect the brain and parts of the nervous system when ingested. Commonly used in plumbing systems until 1970, it can still be found today in the pipes or fittings of old buildings with historic water systems that haven't been updated. The World Health Organization (WHO) makes it clear that there is no known level of lead exposure that is considered safe. If lead is kept in contact with water for an extended period, it can permeate the

drinking water supply and be harmful to those who ingest it. The lead from the pipes or fittings can dissolve into the water and this possibility is increased throughout the length of time the water remains stationary within the fittings. So, if a tap has not been opened for a while, the lead in the pipes carrying the water supply may dissolve into the supply, contaminating the water and making it unsuitable for consumption.

Restrictions not retrospective

Although it has been illegal to use lead pipes and lead solder on wholesome drinking water systems for over 30 years, these restrictions are not retrospective, so do not legally require older systems to be updated. The limits for lead exposure in drinking water are currently under review in the UK and EU, meaning that there is the potential for limits to be further reduced, decreasing the chance of harmful contamination of wholesome water systems.

The lead particles in contaminated water cannot be completely removed after they enter the human body and consequently, the concentration of lead builds up within the body over time. Research into the effects of lead highlight that the young and old are particularly at risk; the effects of exposure range from joint and muscle pain to memory loss and the lowering of IQ levels, which is particularly important when the patients in a healthcare facility are taken into consideration. The elderly are more likely to have weaker joints, making them more susceptible to further damage, and demographics such as children, infants, and the unborn babies of pregnant women, are at risk of cognitive development issues if exposed to lead. This is not a short-term problem, as cognitive development at early stages of life is directly linked to IQ, which can be linked to adult factors such as earning potential in later life.



Poorly soldered joint increases the contact area of lead with the water supply.

Adequate backflow

The use of lead on any part of a wholesome water system is prohibited by the Water Supply (Water Fittings) Regulations and Scottish Byelaws.

This includes lead pipes, solder, or any other fitting and encompasses any water system that is directly used for, or has the potential to interact with, drinking water. While lead is allowed on closed circuit heating and gas systems, these systems are legally required to be fitted with adequate backflow protection to ensure that they do not contaminate the drinking water supply. Some contractors will choose to use lead solder on these permitted systems, as it is cheaper and easier to work with than its lead-free counterpart, but the two are virtually indistinguishable by sight and easy to confuse – a dangerous mistake if made on potable water systems. For this reason, it is recommended that contractors do not use lead on any system and simply remove it from their toolbox to avoid confusion and potential contamination.



A lead stop-tap.

Built before 1970?

In areas with a particularly high proportion of vulnerable people, such as a hospital or other healthcare estate, it's worth checking for lead pipes if the building was erected before 1970. WaterSafe has created a useful video to show the easiest way of testing – a scratch test – which can be found at watersafe.org.uk/lead. Unpainted lead pipes are soft and dull grey in colour but will reveal a shiny silver metal when the surface is gently scraped with a coin. This is the most straightforward way of testing for lead pipes, but it's vital that anybody completing this scratch test washes their hands thoroughly after working with the lead to avoid ingestion of the metal.

The possibility of lead in your plumbing doesn't just lie in the pipes themselves, however, and it is just as important to make sure that your water systems don't make use of lead solder. There are test kits available to purchase to check for this and these are being used to detect unauthorised use of lead solder by facility managers, owners, and water company enforcers alike. It is illegal for the general public to buy lead products, but the illegitimate use of lead solder is still an issue within the industry, as it is available to purchase for 'professional users'.



Examples of legal prosecution show that there are real consequences for those who ignore the regulations, but they also prove that there are some who continue to use lead solder in unauthorised ways. This shows that there are still plumbing professionals and their clients who need to understand the dangerous impact that lead can have if it reaches the drinking water supply, as well as the potential repercussions from a legal and financial perspective.



An easy-to-use non-destructive test for detecting solder use.

Drinking water standard for lead

As professionals in the health estate industry, you have a particularly important responsibility to prevent lead from penetrating the potable water systems in your facilities. In the UK the drinking water standard for lead was reduced to 10 µg/l in 2014 and there are plans to reduce this limit further in the proposed revisions to the Drinking Water Directive. This means that some products that allow low levels of lead to dissolve into the water supply may no longer be compliant in the near future. Exposure of consumers to lead in drinking water has reduced dramatically as a result of the water industry's twin-track approach of chemical treatment (plumbosolvency control) and communication pipe replacement. The communication pipe is the pipe from the main to the boundary of the premises, which is owned by the water company. The pipes and fittings within the premises are the responsibility of the owner. Continuous chemical treatment is not a sustainable solution, however, and lead removal is the only long-term effective measure.

Identify and seek to remove

As there is no safe limit for lead ingestion, those responsible for water supplies in healthcare premises should identify existing lead in their system and seek to remove it. It is absolutely vital that contractors are prevented from using lead in water supply systems and that you look to ensure that nobody uses lead solder on drinking water systems or, better still, carries lead solder in their toolbox at all. Did you know, in fact, that most water suppliers offer to replace their part of the lead supply pipe free when customers replace theirs? This not only removes lead exposure risks, but often has the added benefit of improving water supply flow and pressure too. It is worth checking with your local water company.

Nickel

Nickel is a naturally occurring metal which is most commonly found in water systems due to leaching from pipes or fittings containing the substance. Although its effect on our health can be

substantial, it can often be overlooked in sanitary engineering, or by plumbing professionals. The primary source of nickel in drinking water is from leaching of metal alloys that are in contact with the drinking water, such as brass and stainless steel. Of particular concern are nickel-coated fittings such as taps, particularly where the coating is poorly applied and exposed in the spout of a tap, which can leach nickel.

Nickel failures can be identified through routine water quality compliance monitoring, where drinking water standards limit nickel to below 20µg /l. The effects of nickel vary, with some individuals being particularly sensitive. This has led to a change in advice by water companies where there are failures. All exceedances are now reported to local Public Health teams, so that they can assess each scenario and tailor advice to the specific circumstance. For example, consumers may be advised to flush taps before drinking or using the water.

Effect on the skin

Nickel can affect the skin and sensitivity, with the most common effect in the population being allergic contact dermatitis. This is the most common symptom reported from the levels of nickel likely to be found in water systems. In one instance a nickel-plated water heater generated very high levels causing nickel intoxication, resulting more severe symptoms such as nausea, vomiting, headaches or weakness – although, cases like this remain rare.

In contrast to lead, nickel is actually more likely to be an issue in newer fittings than their older counterparts, particularly when they have been coated with nickel or chromium. Chrome doesn't adhere straight onto the brass, and a base coating of nickel is used to help bond it to the fitting. It is the areas not covered by the chrome which then dissolve into the water. Nickel is also more likely to be found in higher concentrations when the water has remained static in the system for extended periods, as the metal in the systems has more time to leach into the water. Therefore, good turnover of water is essential in the short term and, where this is not possible, a change to the design or temporary flushing may be required. Research indicates that, over time, the level of nickel leaching will diminish.



A tap spout and tail connection showing how the plating overspills to the inside water pathways.

Be aware of the signs

While reports of nickel exceedances in water quality sampling remain relatively low, it is worth being aware of the possibility of nickel

contamination. If anyone using your facilities is exhibiting or reporting skin sensitivities, allergy-like symptoms, or similar, it's possible that they are being affected by nickel in the water supply. It is much better to be safe and have a test conducted, where the water analysis should reveal if it is present – if it is, consult your local Public Health team for advice.

Choosing products that are lead and nickel free?

WRAS runs a voluntary product and materials approval scheme, which aims to help manufacturers demonstrate, as required by the Water Supply (Water Fittings) Regulations 1999, that water fittings and non-metallic materials are of a suitable quality and standard. WRAS is just one of a number of approval / certification schemes, not to mention test facilities, which manufacturers can use to demonstrate that their products comply with this requirement.

The Regulations stipulate that no material in contact with water required to be wholesome poses a contamination risk. Unfortunately, there are no UK testing requirements for metallic materials. This means that approval schemes are not able to include them in their formal requirements. The UK has been participating in the 4MS initiative, which seeks to identify common European standards for materials in contact with wholesome water. A new European Standard, BS EN 15664, has been issued, which establishes a method to assess metal leaching, but it does not include UK acceptance criteria, which prevents it being used to demonstrate conformity with this requirement. There is a suggestion that manufacturers should be encouraged to use metal alloys from the 4MS positive list. WRAS agrees that use of alloys on this list would, in the longer term, improve compliance and reduce the risks to consumers from metals leaching from metallic fittings. However, we remain concerned that until UK performance criteria are set, the use of alloys from this list cannot be required and, as a result, not all manufacturers will use them. We also note that metal leaching rates can increase over the first few months of installation. The long-term metal leaching test for BS EN 15664 will not address this risk or the risk of nickel leaching from surface finishes on water fittings such as nickel plating.

EPDM

EPDM (ethylene propylene diene monomer) is a synthetic rubber material that can be found in many products such as hoses, washers, flexible seals and thermostatic mixing valves (TMVs) – all of which are likely to be found on a healthcare estate. Some forms of EPDM may provide an environment that supports microbial growth. It is not clear why the material is susceptible to microbial colonisation; this could be due to inappropriate materials providing nutrients, among other theories. One school of thought is that it might be attributable to the surface finish, as some EPDMs have been found to have particular rough surfaces which facilitate colonisation. Consequently, NHS Estates &

Facilities has raised concerns in an Estates Alert regarding the use of EPDM. As with all forms of non-metallic materials, there are concerns that some materials, including EDPM, can leach nutrients which can further enhance microbial growth. Healthcare premises should always select products that have been tested to demonstrate conformity. While some EDPM products can conform to the non-metallic materials in contact with drinking water testing standard (BS 6920), they may not be considered to perform as well as alternatives such as copper pipe.

Importance of testing and competent installers

It is only when fittings are tested that manufacturers and suppliers can be certain that they meet minimum standards and compliance with water fittings regulations. WRAS provides an exhaustive and up to date list of all products and materials that have been rigorously tested and proven to be safe, robust and efficient, provided they are installed and maintained in the proper manner. The list can be found online at www.wras.co.uk, or you can check individual products for the WRAS Approved logo on the packaging. It is vital that you are sure that any products or materials used on your premises are compliant with the regulations and checking that they have been WRAS Approved is one way of certifying this. This is especially crucial when you are working with the water supplies for healthcare estates, as the requirement for the potable water to be safe and uncontaminated is of upmost priority in a medical environment. If there are any issues or you have any questions, it is always best to get in contact with WRAS or your local water supplier to ensure that your water systems remain safe, secure and efficient.

Appropriate qualifications

Only installers with the appropriate qualifications, regulatory knowledge, and competence should be

used to install and maintain water installations. WaterSafe is the national register of approved plumbers in the UK, supported by all the UK water companies and the drinking water quality regulators. Approved plumbers on its register are all trained in the Water Fittings Regulations – the national requirements which govern the design, installation, operation, and maintenance of plumbing systems, water fittings, and appliances, which use water. As well as protecting the quality of drinking water, the Regulations are designed to prevent the 'waste and undue consumption of water'.

For most types of plumbing work, plumbers have a legal duty to notify the local water supplier before they start work, which can lead to delays. Approved plumbers can carry out some work without advanced notification. A 'work completed' certificate issued by a WaterSafe plumber also provides a defence if challenged by a water company enforcing the Water Fittings Regulations. In addition to plumbing installers, water companies operate sector memberships for specialist areas of work covering external water services (below ground pipework etc), catering equipment, and point-of-use (chilled water) equipment. You can also search for these sector scheme members on the WaterSafe website.

Conclusion

There are a range of materials that could potentially contaminate the water supply and this is an incredibly important issue for those managing hot and cold water supply systems in healthcare premises, as they have a responsibility to protect patients, visitors and staff. Metals such as lead and nickel leaching into the water supply have known health effects and there are measures which can minimise these risks. The selection of appropriate, compliant products is essential, as is using qualified contractors who understand the Water Fittings Regulations and would never use lead solder.

About Paul Millard

Paul Millard, Technical manager at WRAS, joined WRAS in 2012, and provides technical liaison and support both to the water industry and other external organisations. Previously, he worked for Anglian Water, where he was Water Regulations Manager responsible for the company's enforcement of Water Fittings Regulations. With over 25 years' experience in the water industry, his early career saw him involved in a range of activities – including network management, leakage, customer complaints and water byelaws / regulations. Since 2001 his career has had a heavy focus on providing technical expertise and guidance on the enforcement and interpretation of the Water Fittings Regulations – culminating in him becoming increasingly involved with national standards as a water industry representative.



GAIN A CPD POINT BY ANSWERING THESE QUESTIONS ON THIS ARTICLE

Q1: What age of buildings are more likely to have lead pipes providing drinking water?

Q2: In the UK how long has lead been prohibited from drinking water plumbing systems?

Q3: What are some of the effects excessive lead can have on the human body?

Q4: What level of nickel is permitted in drinking water systems and its potential effects?

Q5: EPDM is one of the common synthetic materials used in plumbing system components.

Testing to which standard is used to establish whether a particular non-metallic material it is safe to be used in drinking water systems?

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

The answers will be published in the Autumn 2020 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.





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

Dear Editor

Could ECHA and the Biocide Products Regulations put people at risk?

We are facing a situation in the UK where direct or indirect costs of ECHA BPR registration, currently adopted by the HSE, has reduced the number of manufacturers supplying PT5 Hydrogen Peroxide (H₂O₂) for disinfecting hot and cold water system waters, required where there is potential for consumption by humans. There are still companies supplying H₂O₂ listed in Article 95; awaiting approval to PT5 – Drinking Water, but how long for? Unless resolved, the Water Treatment Industry may no longer be able to utilise H₂O₂ for constant treatment of entire systems, sometimes the most cost effective solution using single point installations. It appears this is not a consumer safety risk from the product at prescribed dose, or for reducing the quality of water supplied, but because the PT5 category requires products to cover a broad spectrum of efficacy testing to render water fit to drink.

The matter raised is specific to treating water within buildings for the purpose of legionella control, without affecting the ability to drink water safely. It is not for Municipal Supply nor for the purpose of claiming to make any other water safe to drink. Whilst the DWI provide Annex 2, including National Guidance to remove H₂O₂ before supply, this relates to municipal supply, not water within buildings. In these instances the Building Owner/Responsible Person and local Environmental Health Officer must assess the risks to occupiers/users. DWI did advise that; "PHE have provided the advice H₂O₂ cannot be used in public supply as a protection for vulnerable consumers such as those on home dialysis."

There is another discussion here that unfairly raises H₂O₂ concerns: Leicester Hospital (2008) following an unfortunate and avoidable fatality. Taken from a previous Waterline Letter – was this simply poor risk assessment and management of the application, therefore could the situation have occurred with other oxidizing agents (chlorine, chlorine dioxide)?

The HSE biocides team confirms that; it is acceptable to treat water within a building water system if the active product manufacturer is listed on Article 95 to PT5. It is the product manufacturer's responsibility to ensure their products are suitably efficacious, including meeting any necessary testing standards. EN13623 standard for efficacy testing against legionella is available through independent providers.

DWI confirms that; system design can contribute to deterioration of supplied water quality, which may require a need for further treatment, by consultation with the local EHO.

The product quality standard BSEN902 (Chemicals used for treatment of water intended for human consumption — Hydrogen peroxide); is given the status of National Standard. Annex A suggests use for disinfecting a system with oxidizable impurities, using a metering pump to 20mg/l (max 35mg/l). This would imply constant dosing? Is this document now void?

ECHA provide an Assessment Report: Evaluation of Active Substances, supporting automated treatment of water intended for Human Consumption with Hydrogen Peroxide; a constant dose of 25ppm without any noted risks (Table 2.2.1.3-1 Summary of professional exposure).

NSF have independently assessed specific suppliers' products as safe for use in constant supply/drinking water treatment to 16ppm, including municipal supply. This is already used in some parts of the USA and Canada.

Secondary benefits reported show reduced environmental impact, without harmful by-products associated with chlorine; H₂O₂ breaks down as Hydrogen and Oxygen. Others include; low odour and taste compared with traditional chemicals, reduced turbidity and claims (BSEN902) to reduce corrosion by passivation. Also stability in hot water.

H&S considerations during chemical handling include eye protection, particularly with high % concentrations. However no other activating chemicals are required, commonplace in swimming pool treatment or chlorine dioxide generation in situ; these have potential for accidental gas release (e.g. incorrect product added to dosing drums, or mixing outside the designed point).

H₂O₂ disinfectants have gained momentum and availability as a biocide. However, it would appear constant dosing systems using this method may no longer be approved. Not because they render the water un-potable/unfit for human consumption but perhaps the reason is manufacturers' no longer see a return for investment to meet BPR PT5?

Consequently, systems with inherent legionella presence may see increased pressure of potentially expensive engineered solutions. Alternatively a requirement to replace H₂O₂ plant to Silver Ion or Chlorine Dioxide at cost; with tighter limit on treatment levels, additional plant complexity for maintenance and testing requirements.

Will the process affect availability of ALL products awaiting PT5 registration including Sodium Chlorite, Silver, Chlorine? Could Silver Hydrogen Peroxide products promoting Silver as a biocide element (not a stabilizer) be used if the silver manufacturer is listed on Article 95 to PT5?

Will this leave the building occupants exposed to increasing legionella risks? What allowances are there to make changes without immediately putting people at risk of legionellosis? Will BPR implications restrict future product developments and innovation in this industry?

I look forward to your comments on the issues raised above.

Chris Box
Managing Director
Hydrocert Limited

COOLING TOWERS RECONSIDERED

GARY DICKER, DIRECTOR AT DHD COOLING, EXPLAINS WHY THE EVAPORATIVE COOLING TOWER IS STILL A GREAT CHOICE.

There is a lot of bad press surrounding evaporative cooling towers, but they are still one of the best long-term solutions for industrial and commercial cooling challenges and here's why.

In order to reach certain cooling temperatures dry cooling alone is not the answer, in these cases there are a few bolt-on options that you can put on a dry cooler that will reduce cold water temperatures, but these come with their own distinct disadvantages.

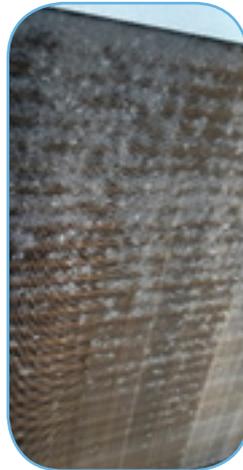
The downside of dry and hybrid coolers

Air coolers typically rely on passing large volumes of ambient air over a finned coil; ambient air temperatures in the UK can soar to nearly 40 °C at times and in some circumstances the air local to an air cooler can be influenced by other plant, or even the equipment itself resulting in even higher inlet air temperatures.

To achieve colder water temperatures there are various methods of wetting the finned coils, or increasing the moisture content of the air which will bring the air temperature down, which will reduce the inlet air temperature improving performance, but here's the rub: Finned coils are often quite delicate, which makes them very hard to clean, couple this with the need for air to come in direct contact with the base material of the coil in order for the heat exchange to occur and you can start to see the problem.

There are various methods of humidifying the incoming air to reduce the temperature, in order to aid cooling. Many of these methods can still result in the coil surface becoming wet for longer periods which can help to adhere impurities in the air to the coil fins.

Wetting the coil itself will result in evaporation occurring on the coil surface, evaporation of water only removes pure water leaving any impurities either in the water or in the air on the coil surface. Impurities can then start to build up over the coil fins resulting in a sort of thermal blanket forming, creating a barrier between the air and the coil. This barrier will attract more impurities, further building this layer, not only affecting the heat exchange between the air and coil surface, but also restricting the airflow – a double whammy when it comes to heat rejection.



Fin coil covered in seeds and airborne debris - Air coolers draw in large volumes of air to cool processes, anything that is contained in this air that cannot pass through the coils will lead to clogging and performance reduction.

Finned coils need regular cleaning, but they are hard to clean due to the trade-off between the water pressures needed to clean the coils versus the potential to fold the fins during cleaning. Other methods of cleaning exist, but in many cases it is the mechanical action of the water dislodging impurities that has the greatest effect. Regular cleaning also weakens and eventually will cause the break-down of the fins which is terminal for the fin coil.



Constant cleaning of delicate fins can weaken the thin materials over time leading to widespread damage and fins failing.

Cooling towers maintain performance for longer

Cooling towers on the other hand, exchange the heat contained in the circulating water by spreading out the water over a large surface area and bringing air into contact with the surface of the water. The volume of water passed over the cooling tower is always much greater than the amount of evaporation that occurs, which is typically about 1.6% of the circulating flow, so the opportunity for impurities to build up is reduced, as the water has a constant washing affect. Couple this with the fact that fouling of the heat exchange surface does not significantly reduce the surface area of the water until it is very severe, and you have a heat exchanger that maintains its performance for much longer than a dry cooler.



Providing the cooling tower case remains watertight, and free from corrosion, then internal components can be cleaned and replaced, to maintain safe and reliable operation.



Ageing cooling towers can achieve design performance for many years, by replacing old and damaged components, during regular maintenance outages, it may not be pretty but it works.



One of the cheapest components in a cooling tower is the fill pack (heat exchange surface), which is designed to be easily removed and replaced in most cases. Compare this to a dry cooler, where the most expensive and difficult part to remove and replace is the coil.

Freezing coils can be catastrophic, crippling plants in a matter of hours and while cooling towers can also freeze, they often require little or no thought throughout the winter months.

Lowest cold-water temperatures and highly manageable

There are many arguments as to why cooling towers are not the ideal choice in some locations - visible plume, high water usage and the cost of chemicals are the main three - but just consider the following before dismissing them.

Cooling towers that are 40 years old can still be maintained, providing the fill is clean, and the air moving equipment and water distribution systems are working, still delivering the same cold-water temperature that they did 40 years ago.

Regular cleaning is simple to undertake, and replacement of the main components is also relatively simple.

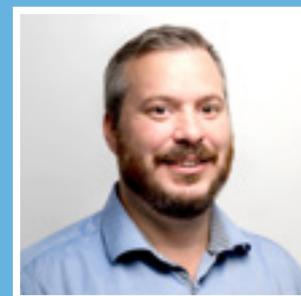
In the UK, water treatment is at the top of its game using intelligent dosing systems to monitor the condition of the circulating water, to protect not only humans from harmful bacteria, but also the process equipment from scale and corrosion. Cooling towers are a more than manageable risk.

Probably most importantly, cooling towers achieve the lowest cold-water temperatures compared to dry and hybrid coolers, which can directly affect productivity, or process performance.

Justification of utilising alternative methods of cooling often centres around payback, which focuses on the cost of water treatment and the cost of water in evaporative systems. These justifications are based on a fixed baseline performance of a given system, in adiabatic dry air coolers and hybrid coolers this baseline performance will deteriorate, and may never return to the original design performance, so it may be true for the first 3 months, but 3 years after installation it almost certainly won't be, which makes these justifications not altogether realistic.

Cooling towers, some of which were built in the 60s, dominate areas of the countryside and some of the towns and cities around the globe. They offer a long term effective solution to cooling, they can run on appropriately treated sea water, river water, effluent water and borehole waters, they can be built of wood, plastic, metal and concrete, some are big, some are small, but with the right systems in place they are capable of doing their job safely and effectively delivering cold water to everything from data centres in frozen landscapes to metal smelting plants in the deserts, for many, many years.

There's still a lot going for the trusty cooling tower!



Gary Dicker, Director, DHD Cooling

For further information contact Gary Dicker of DHD Cooling on 01905 317370 email gary.dicker@dhdcooling.co.uk or Nick Brooks of Vantage PR on 01600 715251 or email pr@vantage.uk.com

DHD Cooling Ltd., 6 Sansome Lodge, Sansome Walk, Worcester WR1 1LH

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Climate scientists appeal for help digitising historic UK rainfall records during lockdown

A climate scientist is appealing for volunteers to help "rescue" 65,000 pages of old UK rainfall records while housebound during the coronavirus lockdown. The majority of the country's records from before 1960 exist only in Met Office scans of their original paper form, dating back as far as 1820. The Rainfall Rescue Project wants to digitise the records, which cover four million measurements from weather stations in every part of the UK. With the majority of Britons confined to their homes, Professor Ed Hawkins hopes to find volunteers to help transcribe these old records, which could help scientists to better prepare for future droughts and flooding. "I think given the present circumstances we might well find more volunteers who are looking for distractions and are able to help," said Prof Hawkins, of the National Centre for Atmospheric Science and the University of Reading. Volunteers can help by visiting the project's website and copying over the amounts of rainfall and locations from the scanned handwritten records. "If you do just a couple of minutes every now and then – that's great," Prof Hawkins said. "If you want to spend an hour doing 30 or 40 columns – then that'll be amazing. But any amount of time, it will all add up and be a tremendous help."

More information:

www.zooniverse.org/projects/edh/rainfall-rescue

Thames Water News - 40kg fatberg dragged out of sewer as blockages rise during pandemic

Engineers from Thames Water made the grim discovery while repairing a collapsed sewer in Maidenhead. The so called 'fatberg' included wet wipes and other 'unflushables'. The company, which is based in Reading, Berkshire, says blockages in the region have climbed almost 20 per cent during lockdown. It says engineers are clearing similar blockages to this one at least once a week to prevent pollution to homes and the environment. Each operation takes two hours, using up valuable repair time. During the coronavirus outbreak, Thames Water has seen an increase of about 10 sewer blockages per day compared to normal.

Meanwhile, engineers at Beddington sewage works in Croydon have had to remove three large blockages from the inlet filter screens at the site in three weeks. The company said they usually would only be cleared every two to three months.

The panic buying of toilet roll at the start of the pandemic led to some people using seemingly harmless alternatives such as wet wipes, tissues, kitchen roll and even newspapers. However, these products are 'unflushable' and, along with other items such as nappies, sanitary products and cotton buds, do not break down like toilet paper.

Veolia achieves RoSPA's Order of Distinction for 17th consecutive year

Veolia Water Technologies UK (VWT UK) has achieved the Royal Society for the Prevention of Accidents (RoSPA) Gold Award for Health & Safety for a 17th consecutive year, maintaining its RoSPA Order of Distinction accolade.

The RoSPA Health & Safety Awards offer organisations a key opportunity to benchmark health and safety performances every year. It also demonstrates companies' ongoing commitment to raising health and safety standards.

Julia Small, RoSPA's Head of Qualifications, Awards and Events, said: "The RoSPA Awards scheme is the longest-running of its kind in the UK, but it receives entries from organisations around the world, making it one of the most sought-after global accolades in health and safety." "RoSPA wants every employee, wherever they are, to work safely in the knowledge that they will be going home unharmed and healthy at the end of every day."

A majority of the awards are non-competitive and mark achievement based on merit, bronze, silver and gold levels. Gold Medals, President's Awards, Orders of Distinction and the Patron's Award are presented to organisations sustaining the high standards of the gold level over consecutive years. Achieving the Order of Distinction award requires 15-year consecutive Gold Awards.

Lyndsey Wicks, Northern Europe Health and Safety Manager at Veolia Water Technologies UK commented: "We are both proud and delighted to receive this award for a seventeenth consecutive year. It highlights our absolute dedication to health and safety for both our own premises as well as those of our customers. We work hard at exceeding standards when it comes to health and safety, so it is fantastic that our approach and our results are industry recognised."

For more information about Veolia Water Technologies UK and health & safety, please visit: www.veoliawatertechnologies.co.uk/about-us/health-and-safety



Microbiologically controlled water secured for new Louisa Jordan NHS Hospital in Glasgow thanks to expertise of SNIPEF member DMA Canyon

The rapid conversion of Glasgow's SEC into a new NHS hospital was secured by an array of skilled Scottish tradespeople including Wishaw-based DMA Canyon, an eight-year member of the Scottish and Northern Ireland Plumbing Employers' Federation, (SNIPEF) who were called upon to use the expertise it had already demonstrated in water management work at various Scottish hospitals. At NHS Louisa Jordan, the company were tasked with ensuring the former concert and exhibition centre's water was delivered at high dependency care standard. David Watson, a director of DMA Canyon, said: "Over the years we have refined our expertise in detecting and controlling Legionella and other waterborne pathogens in water supplies. Hospitals are, of course, a special case since their water needs to be microbiologically controlled at the highest standard to minimise the presence and release of waterborne pathogens. To achieve this, we fitted Pall Medical Point-of-Use Water Filters throughout the site. These must be monitored closely and replaced every 31 or 62 days to ensure compliance with the required standards."

He added: "The entire project was a huge collaborative success with a completely new plumbing system installed in record time and our job was to add the vital finishing control measures, ensuring the water environment is fit for an intensive care facility. Even though there are currently no patients on site the process of continual monitoring must be undertaken." "I am very proud of the contribution we have made and I have pointed out to my younger colleagues, including John Fraser, 25, one of our adult apprentices that they have participated in a project, the scale and importance of which they may never see again in their working lives."

For further information, please contact Fiona Hodgson, chief executive, SNIPEF, Bellevue House, 22 Hopetoun Street, Edinburgh EH7 4GH. T: 0131 556 0600. E: info@snipef.org

HSL Compliance acquires assets of Aegis Water Treatment Limited – Press Release

HSL Compliance (hsl), part of the SGI Holdings group of companies (SGI) announced on the 9th March that they had acquired certain trade and assets of Aegis Water Treatment. Aegis specialises in water treatment systems, including those that help to prevent and control legionella. Following the appointment of specialist business advisory firm FRP as administrators of Aegis on the 6th March an accelerated sales process enabled the sale of the company's trade and assets to hsl, in a deal that sees all the current Aegis staff transferred across. The deal will significantly strengthen the water treatment services offering by hsl, who are one of the UK's largest compliance companies, helping their clients with their water hygiene, water treatment and hazardous material risk management.

"Aegis have some excellent people and the quality of their work has been praised by all the customers we have spoken to in the Due Diligence process, we look forward to welcoming them into the group," said Gavin Hartley, Managing Director of hsl.

For further information contact: www.hsltd.com

South of England could run out of water by 2040

The National Audit Office (NAO) said the country's total water supply is forecast to drop by 7 per cent by 2045 because of climate change. In the coming years there will be decreased rainfall and a need to reduce the amount of water taken from natural waterways.

The South East is particularly at risk of shortages. This is likely because the region is already a 'water-stressed' area where London's consumption of water outstrips supply during dry years.

The NAO said water companies will need to limit the amount they take out of rivers, lakes and the ground because taking out too much from these sources could harm biodiversity. The auditor predicted that four billion litres of additional water will be needed per day by 2050 to counter the risk of drought caused by climate change.

Drier weather is expected to see a 600million litre reduction in rainfall. And the amount removed from natural reserves will need to be slashed by 500million litres a day to ensure sustainable biodiversity can continue.

According to NAO figures, the daily demand for water in England and Wales stands at 14billion litres, but roughly three billion litres of that is lost through leakage. Each person on average uses 143 litres of water a day. Gareth Davies, head of the NAO, criticised ministers for failing to act on the issue of water sustainability, with personal water consumption having risen every year for the past five years.

The auditor urged the Government to monitor the suppliers' pledge to reduce leakage by at least 15 per cent by 2025.

Canal and River Trust "website notices and stoppages"

From Wednesday 13th May our canals and rivers are open for navigation. Our towpaths are also open for exercise or journeys to undertake essential work, but please try to avoid any stretches with boats moored against the towpath. Strictly observe social distancing at all times, following the latest advice from the government. Before you go by boat, bike or boot, remember to check your route. Any stoppages on our network relating to coronavirus restrictions will be listed on this page.

Each winter, when fewer boats are cruising our waterways, we usually carry out essential repairs and maintenance. In many cases we need to close the waterway completely, and sometimes even the towpath.

Before we carry out our winter works programme we like to consult the people who use our waterways to make sure our stoppages cause as little disruption as possible. The impact of coronavirus on our planned construction and repair works for spring 2020 will have a knock-on effect throughout the rest of the year and over next winter. All of our work will have to be re-prioritised once we know when we can return to a normal level of operation. Taking the current uncertainty into consideration, we've decided to postpone the public consultation on our winter programme until we have a better understanding of what work can be achieved in that period.

Further information:
canalrivertrust.org.uk/notices

Lake Victoria's surging water levels threaten hydro-dams

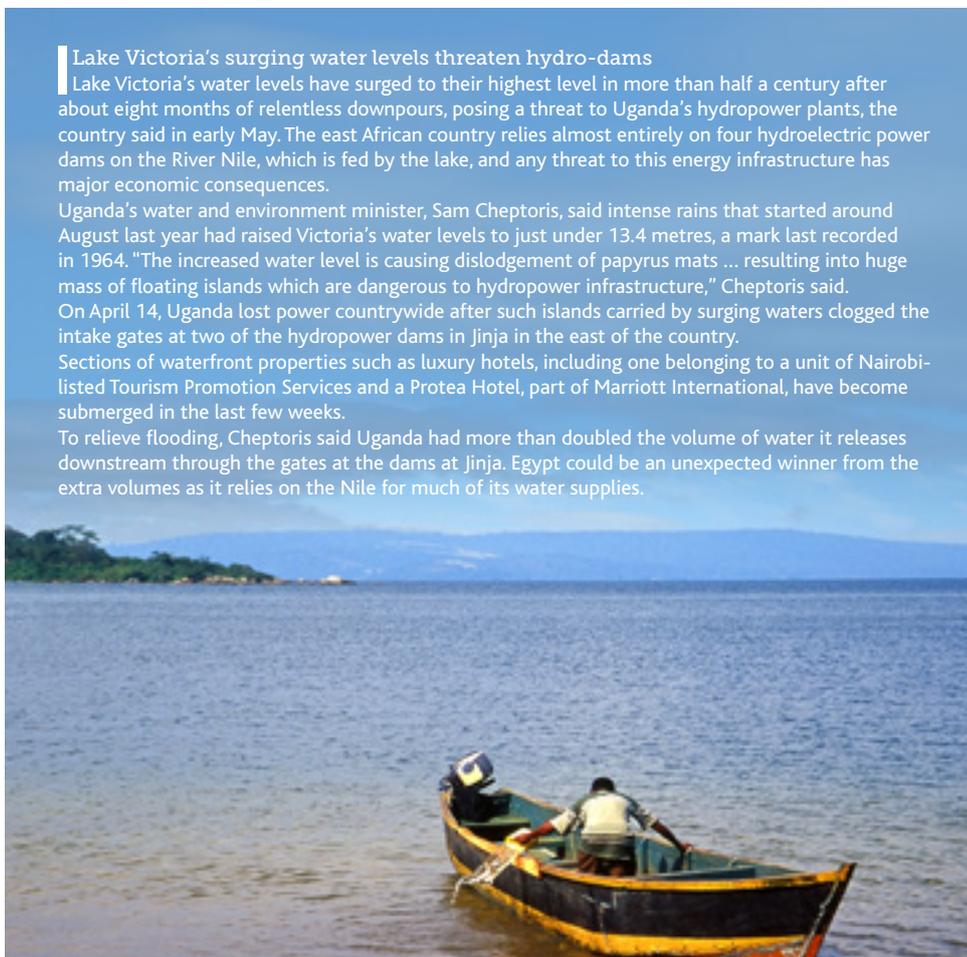
Lake Victoria's water levels have surged to their highest level in more than half a century after about eight months of relentless downpours, posing a threat to Uganda's hydropower plants, the country said in early May. The east African country relies almost entirely on four hydroelectric power dams on the River Nile, which is fed by the lake, and any threat to this energy infrastructure has major economic consequences.

Uganda's water and environment minister, Sam Cheptoris, said intense rains that started around August last year had raised Victoria's water levels to just under 13.4 metres, a mark last recorded in 1964. "The increased water level is causing dislodgement of papyrus mats ... resulting into huge mass of floating islands which are dangerous to hydropower infrastructure," Cheptoris said.

On April 14, Uganda lost power countrywide after such islands carried by surging waters clogged the intake gates at two of the hydropower dams in Jinja in the east of the country.

Sections of waterfront properties such as luxury hotels, including one belonging to a unit of Nairobi-listed Tourism Promotion Services and a Protea Hotel, part of Marriott International, have become submerged in the last few weeks.

To relieve flooding, Cheptoris said Uganda had more than doubled the volume of water it releases downstream through the gates at the dams at Jinja. Egypt could be an unexpected winner from the extra volumes as it relies on the Nile for much of its water supplies.



Nant Ltd – An innovation in Water Safety – Press Release

Long-standing water safety and Legionella control company, Nant Ltd has brought a new wave of technology to the field which has had significant benefits during the access restrictions imposed in some nursing and care homes by COVID 19. Using Internet of Things technology, Nant's latest L8 remote water monitoring system has reduced manual visits by up to 33% enabling clients to remain compliant and safeguard their residents, even during lockdown.



The L8 Remote devices, powered by Wavetrend, are capable of remotely monitoring water temperature from any number of pipes and outlets across the UK, simply attach the units wherever needed and sync them to the cloud-based system to receive a live feed of information. By utilising the Sigfox network for wireless communication, the L8 Remote has a far longer battery life (up to 5 years) than devices using Wi-Fi connections and won't interfere with any existing networks. The longstanding method of manual temperature monitoring is prone to human error and offers little in the way of prevention, putting both carers and residents at risk. Although, checking temperatures once a month is enough to meet HSE and CQC requirements, this fails to truly represent the water system as a whole. Temperatures can drop out of acceptable range between monthly checks and that provides the perfect opportunity for Legionella to thrive and pose a health risk. The constant surveillance provided by L8 Remote means you'll be notified the moment the safe temperature range is exceeded, meaning you can react and prevent issues before they have a chance to develop. The devices can also be used to track water flow meaning those wanting a closer eye on their control measures can monitor when outlets have been flushed and how much water has been used.

For Press enquiries contact:

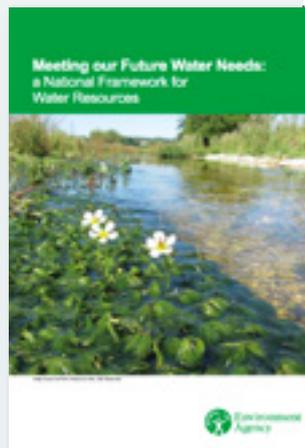
Imran Ishaq,
Im1@nantltd.co.uk,
01902 636355

Coronavirus: 'Church' ordered to stop selling bleach-based COVID-19 cure

A federal judge in the US has ordered a self-described church to stop selling a bleach-based product that it claims cures coronavirus. The Florida-based company, Genesis II Church of Health and Healing, is alleged to have improperly marketed its "Miracle Mineral Solution" as a treatment for COVID-19. The product contains chlorine dioxide - a chemical compound that the Food and Drug Administration (FDA) has warned will turn into a dangerous bleach when it is mixed with other things, making consumers ill. Prosecutors in the US Attorney's Office in South Florida filed a civil complaint against the company and said its claims were "unsupported by any well-controlled clinical studies or other credible scientific substantiation". It came after the FDA sent a warning letter to the company on 8 April over its claims, ordering it to respond within 48 hours about what corrective measures it planned to take. Prosecutors also argued that the company is secular despite having the name "church" in its title. The firm's executives - Mark Grenon, Joseph Grenon, Jordan Grenon and Jonathan Grenon - hold titles of "bishop" or "archbishop".

EA launches National Framework for Water Resources

Published on the 16th March 2020 the document explores England's long term water needs, setting out the scale of action needed to ensure resilient supplies and an improved water environment. The framework is the result of collaboration across the water sector bringing together representatives from the water industry through Water UK and regional groups, agriculture, power generation, industry, drainage authorities, navigations, environmental NGOs, regulators and government. The EA has said that households will need to cut per person usage from 143 to 110 litres per day, and are encouraging investment in water butts, dual-flush lavatories and eco-friendly showers. The department worked with Waterwise to find ways that the average person can reduce water usage. Recommendations include reducing shower use time by one minute, invest in a low-flow showerhead, reuse bath water to feed plants in the garden and use a watering can instead of a hose pipe. The Government will pay farmers to store water on their land, and other options include the creation of new reservoirs. **Publication free to download:** www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources



Evoqua's CoMag® System selected by Severn Trent – Press Release

Evoqua Water Technologies has been selected by Severn Trent and its design and construction partner, MWH Treatment, to supply its CoMag® ballasted clarification system for the Cannock Sewage Treatment Works, in the West Midlands. This system will be the second tertiary treatment system supplied by Evoqua for Severn Trent. The system will help the Cannock Sewage Treatment Works reduce both total suspended solids and phosphorus before the treated water discharges into a local river. Algal blooms and poor river ecosystems are triggered by high levels of phosphorus in rivers. To combat the blooms and restore water bodies to "good" status, the UK Environment Agency's National Environment Programme (NEP) is imposing low phosphorus limits on many wastewater treatment plants, including Cannock. The CoMag system will significantly decrease the amount of phosphorus that the works discharges and ensure compliance with the new phosphorus limit of 0.30 mg/l of total phosphorus (T-P).

"For Cannock, the system has been designed to achieve phosphorus limits of less than 0.24 mg/l T-P," said Simon Radford, UK Sales Manager of Evoqua's Municipal Wastewater Treatment business. "This capability gives Severn Trent the confidence that the system can meet the 0.3 mg/l limit in the future, even if there are increased demands on the facility from population growth or greater amounts of industrial discharge."

The design of the system will allow for future treatment expansion by a further 12% by 2033. The system uses magnetite to enhance the clarification process. The system settles chemical floc up to 30 times faster than conventional clarification.

For more information, contact: Jennifer Owen
Marketing Communications Manager, EMEA
jennie.owen@evoqua.com
Mob.: +447802 921449

Virus Hunters Find Coronavirus Clues in Sewage

Even before it was confirmed by medical tests of infected individuals, the story of the new coronavirus in the city of Amersfoort was being recorded in water. Scientists from KWR Water Research Institute in the Netherlands detected genetic traces of the SARS-CoV-2 virus in wastewater samples from Amersfoort's sewage treatment plant on March 5, a day before the first confirmed case of Covid-19 in the city. Covid-19 is the disease caused by the virus. They further found that even when there were few people with reported cases of the deadly coronavirus in the country, traces of it were still present in the sewers. The researchers say it is unlikely that coronavirus is spread through sewers, but the discovery may mean that urban sewage systems could function as "a sensitive tool" for monitoring the spread of the virus through a city before it is detected in individuals. Similar sewage-sleuthing methods have been used to detect polioviruses or to assess illegal drug use.

For more information:
www.kwrwater.nl/en/actueel/covid-19-publicaties/



DOWNLOADABLE RESEARCH PAPERS:

Plumbing of hospital premises is a reservoir for opportunistically pathogenic microorganisms: a review

Margaret M. Williams (a) Catherine R. Armbruster (b) & Matthew J. Arduino (a)

(a) Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, GA, USA

(b) Department of Microbiology, University of Washington, Seattle, WA, USA

Biofouling: The Journal of Bioadhesion and Biofilm Research Publication.

Abstract: Several bacterial species that are natural inhabitants of potable water distribution system biofilms are opportunistic pathogens important to sensitive patients in healthcare facilities. Waterborne healthcare-associated infections (HAI) may occur during the many uses of potable water in the healthcare environment. This review describes several infections, and remediation steps that have been implemented to reduce waterborne HAIs.

Link: pubmed.ncbi.nlm.nih.gov/23327332/

Large community-acquired Legionnaires' disease outbreak caused by Legionella pneumophila serogroup 1, Italy, July to August 2018

Marino Faccini, Antonio Giampiero Russo, Maira Bonini, Sara Tunesi, Rossella Murtas, Monica Sandrini, Sabrina Senatore, Anna Lamberti, Giorgio Ciconali, Serafina Cammarata, Eros Barrese, Valentina Ceriotti, Sonia Vitaliti, Marina Foti, Gabriella Gentili, Elisabetta Graziano, Emerico Panciroli, Marco Bosio, Maria Gramegna, Danilo Cereda, Carlo Federico Perno, Ester Mazzola, Daniela Campisi, Gianuario Aulicino, Silvana Castaldi, Antonietta Girolamo, Maria Grazia Caporali, Maria Scaturro, Maria Cristina Rota, Maria Luisa Ricci.

Abstract: Bresso is a town located near Milan in Lombardy, the region with the third highest LD incidence in Italy. In 2014, an LD cluster occurred in Bresso involving six cases within a period of 20 days. All cases were men aged 58–78 years, one of whom died. The only clinical isolate available was typed as ST23. The source of infection was not identified. In July 2018, a new and larger outbreak of LD occurred in Bresso, involving 52 cases. The aim of this paper was to report epidemiological, microbiological and environmental investigations and describe factors that contributed to the outbreak.

Link: www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.20.1900523

Guide to the design and installation Press Tap hand washing facility

Ababu Teklemariam Tiruneh 1, Tesfamariam Debessai 2, Stanley Nkambule 1, Gabriel Bewmbya 2
1 Department of Environmental Health Science, University of Eswatini, Swaziland
2 Department of Chemistry, University of Eswatini, Kwaluseni, Eswatini, Swaziland

Abstract: The importance of hand washing is getting increasing attention at present with the global pandemic of the Corona virus, COVID-19. The Press Tap hand washing facility is a low cost, hygienic device that operates by pressing a foot lever. It can be easily constructed using locally available materials and is an appropriate device in schools, households and communities where running supply of water is not available. The same technology and principle of the Press Tap is used also to squeeze liquid soap from a container while washing hand.

Link: www.researchgate.net/publication/304015048_Development_of_Press_Tap_Hand_Washing_Technology_Design_Construction_and_Operational_Aspects

Health Risks Associated with the Use of Water Mist Systems as a Cooling Intervention in Public Places in the Pilbara Region of Western Australia

Edmore Masaka 1, Sue Reed 1, Jacques Oosthuizen 1, Margaret Davidson 1, 2

1 Edith Cowan University; emasaka@our.ecu.edu.au
2 Western Sydney University; ma.davidson@westernsydney.edu.au
*Correspondence: emasaka@our.ecu.edu.au

Abstract: The exposure of people to opportunistic premise plumbing pathogens (OPPPs) such as Legionella, Mycobacterium and Pseudomonas in aerosolised water has been linked to opportunistic infections. Water mist systems (WMS) that are used to cool public places by flash evaporation of tiny water aerosols are gaining prominence in hot climatic regions of Australia. Their potential to be colonised by OPPPs has not been adequately studied. This review highlights the potential public health risks of using WMS as a cooling intervention in public places and advocates for their regulation in places of public assembly and entertainment.

Link: www.preprints.org/manuscript/201909.0167/v1

Paradoxical Pro-inflammatory Responses by Human Macrophages to an Amoebae Host-Adapted Legionella Effector

Christopher Price 1, Snake Jones 1, Mirna Mihelcic 2, Marina Santic 2, Yousef Abu Kwaik 1, 3

1 Department of Microbiology and Immunology, College of Medicine, University of Louisville, Louisville, KY, USA.
2 University of Rijeka, Rijeka, Croatia.
3 Center for Predictive Medicine, College of Medicine, University of Louisville, Louisville, KY, USA.

PMID: 32220647 PMCID: PMC7224327 (available on 2021-04-08)

DOI: 10.1016/j.chom.2020.03.003

Abstract: Microbiologists at UofL have found that Legionella pneumophila uses a "tool" that allows it to thrive in an amoeba host and in human lung cells, but with very different results. In the amoeba, considered the bacterium's natural host, it results in coexistence, making the amoeba host a suitable, safe home for the bacteria's proliferation. In the human, however, it leads to a deadly form of pneumonia and a paradoxical inflammatory response in the lungs.

Link: pubmed.ncbi.nlm.nih.gov/32220647/

Fatal Case of Legionnaires' disease after Home Exposure to Legionella pneumophila Serogroup 3 - Wisconsin, 2018

Schumacher A, Kocharian A, Koch A, Marx J. MMWR Morb Mortal Wkly Rep. 2020 Feb 28;69(8):207-211.

DOI: 10.15585/mmwr.mm6908a2

Abstract: Health care facility water samples tested negative for Legionella, so water sources in the patient's home were tested. These were positive for Legionella pneumophila, and the bacteria remained after an attempt to remediate. The patient and home isolates were identified as L. pneumophila serogroup 3. This case highlights the potential for immunocompromised persons and others at risk for Legionnaires' disease to be exposed to Legionella through home water systems containing the bacteria and demonstrates the difficulty of home remediation.

Link: www.cdc.gov/mmwr/volumes/69/wr/mm6908a2.htm

Precautions Needed for COVID-19 Patients with Coinfection of Common Respiratory Pathogens

Quansheng Xing, Guoju Li, Yuhan Xing, Ting Chen, Wenjie Li, Wei Ni, Kai Deng, Ruqin Gao, Changzheng Chen, Yang Gao, Qiang Li, Guiling Yu, Jianning Tong, Wei Li, Guiliang Hao, Yue Sun, Ai Zhang, Qin Wu, Zipu Li, Silin Pan

Not peer reviewed so should *not* be used to guide clinical practice.

Abstract: With the ongoing outbreak of Coronavirus Disease 2019 (COVID-19), infected patients within and beyond the epidemic area, Wuhan, China, showed different epidemiological and clinical characteristics. There is a paucity of data concerning coinfection with other common respiratory pathogens in COVID-19 patients outside of Wuhan. Methods: We conducted a double-centre study recruiting 68 patients with severe acute respiratory coronavirus 2 (SARS-CoV-2) infection.

Link: www.medrxiv.org/content/10.1101/2020.02.29.20027698v2

Veolia Water Technologies UK provides Severn Trent ammonia solution – Press Release

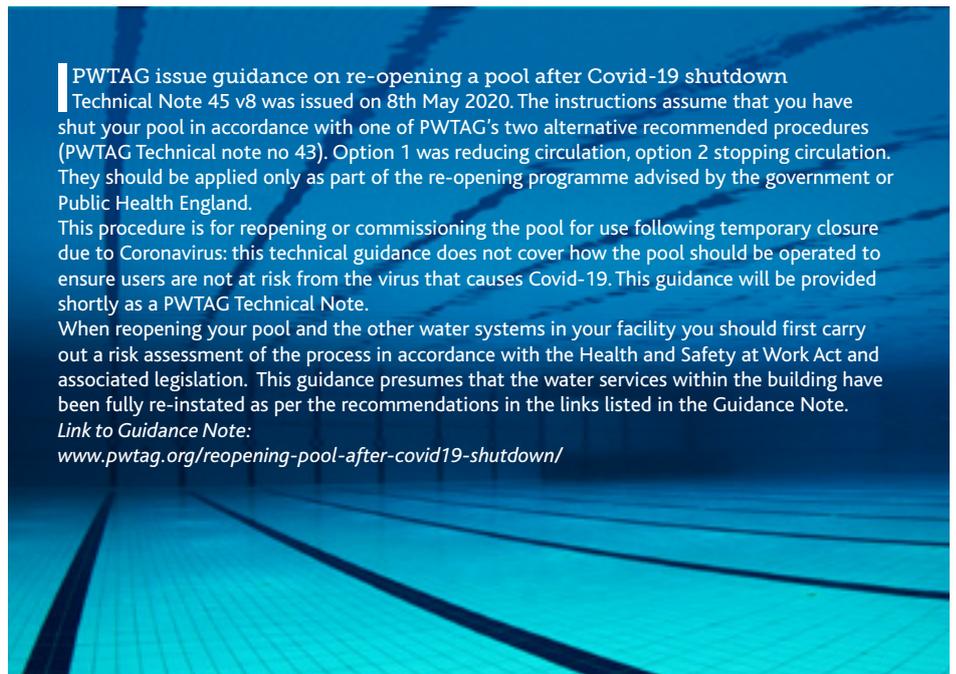
Veolia Water Technologies UK (VWT UK) has delivered new Moving Bed Biofilm Reactor (MBBR) plants to five Severn Trent sites, allowing all to achieve tighter ammonia discharge consents as required by the Water Framework Directive. Severn Trent, and its main contractors, nmcM and Mott MacDonald Bentley (MMB), were looking to upgrade an existing asset at one site in Hodsock and install four new build tertiary plants at four other Severn Trent sites – Boughton, Lichfield, Trescott and Little Aston. Four of the five plants required a solution that would produce an ammonia consent of less than 1mg/l as a 95th percentile. VWT UK was asked to design a bespoke solution for the sites, due to their history in pioneering MBBR technology solutions over the last 30 years.



A new patented configuration of Veolia's AnoxKaldnes™ MBBR technology was developed, to achieve the required low ammonia discharge consents whilst also combating any spikes in ammonia load that may be received by the plants. MBBR systems are particularly efficient at the removal of biochemical oxygen demand (BOD), ammonia and nitrogen. The large surface area of the carriers in the AnoxKaldnes™ patented MBBR systems enable the treatment of a high quantity of wastewater using a very small footprint. Lance Mott, Contracts Manager – Water at nmcM, commented: "Severn Trent Water was initially looking for an activated sludge plant (ASP) but after successful cost benefit analysis and stakeholder management we had Severn Trent Water's approval to use VWT UK's MBBR plant which was our preference. The process plant on Boughton is saving Severn Trent £250,000 per year (in operating costs). From the original design criteria of 1.2mg/l of NH₃, it is actually now working at 0.01mg/l. We have witnessed the same results at the Lichfield plant, with the existing works previously operating to meet its consent of 17mg/l of NH₃. Since the plant has been in operation it is now meeting 1.5mg/l of NH₃ and it is still not fully matured."

For more information on VWT UK, please visit: www.veoliawatertechnologies.co.uk

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PWTAG issue guidance on re-opening a pool after Covid-19 shutdown. Technical Note 45 v8 was issued on 8th May 2020. The instructions assume that you have shut your pool in accordance with one of PWTAG's two alternative recommended procedures (PWTAG Technical note no 43). Option 1 was reducing circulation, option 2 stopping circulation. They should be applied only as part of the re-opening programme advised by the government or Public Health England.

This procedure is for reopening or commissioning the pool for use following temporary closure due to Coronavirus: this technical guidance does not cover how the pool should be operated to ensure users are not at risk from the virus that causes Covid-19. This guidance will be provided shortly as a PWTAG Technical Note.

When reopening your pool and the other water systems in your facility you should first carry out a risk assessment of the process in accordance with the Health and Safety at Work Act and associated legislation. This guidance presumes that the water services within the building have been fully re-instated as per the recommendations in the links listed in the Guidance Note.

Link to Guidance Note:

www.pwttag.org/reopening-pool-after-covid19-shutdown/

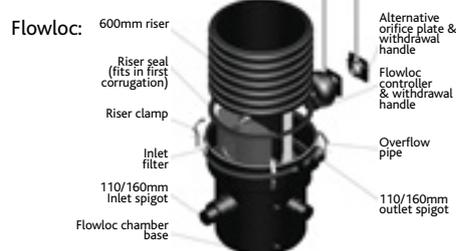
Sustainable drainage covered with Marley's Flowloc – Press Release

Marley Plumbing & Drainage has relaunched its Flowloc system. Designed to work in conjunction with a stormwater attenuation tank, the system helps to control and manage the rate at which stored water is released into natural water courses or underground sewer systems, during a heavy rainfall or storm event.

Able to accommodate flow rates ranging from 2.5 l/s to 18 l/s, Flowloc comprises a Vortex flow control unit and pre-fitted inlet filter – designed to provide protection against potential blockages or silt build-up – all supplied within a chamber base. The system is also available with an extensive range of orifice plates, enabling housebuilders to provide tailored control over the water discharge rate, as will be required and stipulated by the approved planning application or local water authority.

It is available as a pre-packaged 'drop-in' with the polyethylene chamber containing the riser kit, heavy-duty aluminium flow control unit, inlet filter and overflow pipe. Flowloc provides housebuilders with a more cost-effective, lightweight and efficient means of installation, compared to alternative concrete solutions. The system is also manufactured with a withdrawal handle and chain attached to the control unit and filter, enabling local authorities and maintenance contractors to easily carry out any required maintenance from the surface level, without man entry being required. Tailored solutions are also available, which customers can learn more about by speaking to the Marley sales team.

For more information, please visit: www.marleypd.co.uk



Master Plumbers' Association of Queensland, Australia – Press Release

Consumers are being warned not to install DIY hoses and bidets during the global COVID-19 crisis, after an article titled "Australian Ingenuity Saves the Day Again" was published in the Sunday Mail on 5 April highlighting a DIY toilet conversion. The article states "with all the toilet nonsense going on at the moment, my partner attached a simple hose to our toilet (in flow) tap, so we now have a hose rather than wipe – a bit like a bidet." Master Plumbers' Association of Queensland (MPAQ), the peak industry body representing the plumbing industry, warns Queenslanders that this type of installation is illegal and could put the health and safety of the family at risk. Plumbing, drainage and gas work is not DIY.



MPAQ has advised the Queensland Building and Construction Commission (QBCC), the regulator for plumbing and drainage work in Queensland, about this matter and it has been referred to the nonconforming building products team to review. Plumbing, drainage and gas fitting work is essential to ensuring the health and safety of the community, and this is particularly important given the viral pandemic that is currently being faced. MPAQ's President, Kent Vickers, said "We understand that consumers might have more time to do work at home at the moment, but plumbing or gas work cannot be one of those tasks. It must be completed by licensed plumbers and gasfitters." More information: www.mpaq.com.au/news-media/press-releases/2020/public-warned-to-not-install-diy-hoses-or-bidets



Tom Laffey Director and Chairman Water Treatment Group

Many younger members of the Water Management Society may wonder what BACS is and how it is linked to the society. For some the BACS logo will be familiar as it appears on LCA literature. The British Association for Chemical Specialities (BACS) is a trade body whose members operate in the speciality and performance chemicals sectors of the chemicals supply chain. BACS has been involved in the water treatment sector for many years, founding the LCA in 1999 with the Water Management Society.

The water hygiene and chemical sector has seen growth driven by compliance with 'L8' but to run a compliant business a company has to meet the requirements of a broad range of legislation which can be difficult to keep track of whilst doing the day job. BACS assists members by providing a wide range of timely, targeted and relevant information to help them keep abreast of industry and regulatory developments through its programme of sector group members' meetings, open meetings, specialist training courses, supported by alerts, events bulletins, a website members' area library, a confidential helpdesk and access to the Yordas Hive database.

In addition, the BACS Water Treatment Group (WTG) provides a forum for member companies supplying speciality chemicals, equipment and support services for all aspects of water treatment to discuss relevant regulatory issues, industry standards and codes of practice. The WTG also seeks to provide the industry with a focal point for dialogue with the Health and Safety Executive (HSE) and for input to the work of other organisations such as the British Standards Institution (BSI), BSRIA and the International Standards Organisation (ISO). WTG meetings are held quarterly with the agenda driven by members' interests. Recent WTG meetings have discussed closed systems standards, the BPR, particularly how it relates to PT5 drinking water disinfection (which, unlike other guidance, includes water within a building), and in situ generation (such as chlorine dioxide generation, two pack bromine, electro-chlorination and so on).

Members find the BACS Regulatory Updates of particular value as they summarise, in an easily digestible form, information they could easily miss. For example, information on the Offensive Weapons Act 2019 was included in a recent BACS Regulatory Update. This Act includes legal requirements for suppliers of several chemicals commonly used by companies in water treatment, chemicals such as sodium hypochlorite, sodium hydroxide and hydrochloric acid. The WTG meetings and the confidential helpdesk provide members with opportunities to explore information in these updates in more detail.

As well as providing information to help keep abreast of developments, BACS provides a strong collective voice for members, representing their interests at the UK and international levels by working to shape and mitigate the impact of legislation on their businesses. Particularly relevant at the moment with the uncertainty for business about future arrangements, BACS continues to work with Government and other organisations to shape the post-Brexit negotiations and regulatory landscape to support members' interests.

Membership of BACS is open to companies in the water treatment sector.

If you would like more information, please contact the BACS office at enquiries@bacsnet.org.



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BS 8680:2020 Water Quality. Water Safety Plans. Code of Practice. NOW AVAILABLE

It's often thought water systems in buildings are safe when connected to public supplies – but this ignores the potential for contamination (both chemical and microbial) and the growth of waterborne opportunistic pathogens within building water systems. BS 8680:2020 sets out guidance and recommendations for developing a Water Safety Plan (WSP) for building water systems. This brand new British Standard gives recommendations and guidance on the development of a Water Safety Plan (WSP). The standard is intended to be used as a code of practice to demonstrate current good practice and compliance.

Intended users include all of those involved in ensuring water is safe and fit for purpose at the point of use, including those responsible

for:

- Design and specification
- Construction and installation
- Commissioning
- Maintenance
- Operation
- Alteration and refurbishment
- Deconstruction

NOTE: This British Standard does not give recommendations for the development of WSPs for regulated drinking water supplies from either a public or private supply, as these are covered in national water quality regulations. For risk assessment for *Legionella* or *Pseudomonas aeruginosa*, see BS 8580.

Waterborne contaminants in air handling and ventilation systems

Paul Downing MIFSM, MWM Soc (Snr) Owner and Principal Consultant Compliance (Air and Water) Limited

Although most commercial heating, ventilation & air conditioning (HVAC) systems do not use a direct water supply, it is possible for legionella to grow in the moisture that builds up in the systems. Most industrial HVAC systems operate at temperatures that are ideal for Legionella to grow. Therefore, HVAC systems should be designed in a way that allows for ease of monitoring and cleaning. They should also be constructed in a way that will effectively minimise moisture build up and the potential for microbiological colonisation and Legionella growth.

Organic contamination within air handling units and ventilation systems pose a serious risk. The primary cause of air conditioning and waterborne contamination is poor cleanliness, maintenance and design.

Microbiological aspects of ventilation hygiene are covered in CIBSE Guidance document TM26: 2000 which states the classification of surface sampling microbial limits.

In order to minimise the risk of waterborne contamination in air handling and ventilation systems it is important to ensure that air handling and ventilation fresh air intakes are located in a safe position that limits the potential exposure of legionella organisms, for example away from cooling towers, condensers and areas of still or stagnant water. Adequate access should be installed to system components at risk and maintenance procedures should also be implemented to limit the growth, transmission and exposure of Legionella bacteria.

System component's where moisture is present with risk of microbiological growth include: -

1. Fresh air intakes
2. Filtration
3. Cooling coils (Condensate drain trays & pipework)
4. Humidification
5. Insulated linings
6. Terminal items (Fan coil units)

BESA TR/19 Guide to Good Practice – Internal Cleanliness of Ventilation Systems States: - *Biocidal treatment should be carried out in conjunction with removal of the source of contamination, e.g. dirt and/or moisture. Biocidal treatment must not be used as a substitute for physical cleaning and removal of any deposits.*

Biocidal treatments should be subject to specific risk assessments taking into account at least the following procedures: - Nature of microbiological hazard, nature of treatment, protection of operatives, isolation of third parties, protection of site. In order to avoid any possibility of adding to the indoor air chemical contamination active biocide should not normally remain within air distribution systems.

It should be noted that health Technical Memorandum 03-01: Specialised Ventilation for Healthcare Premises Part B: Operational Management and Performance Verification States: - *On completion of cleaning the ductwork should not be "fogged" with chemicals". It does however recommend that "AHUs should be vacuumed out and/or washed down internally as necessary to remove obvious dust and dirt"*
The legal duty associated with ventilation hygiene

is that it is a requirement of the **APPROVED CODE OF PRACTICE & WORKPLACE (HEALTH, SAFETY & WELFARE) 1992 (modified 1996) REGULATIONS**

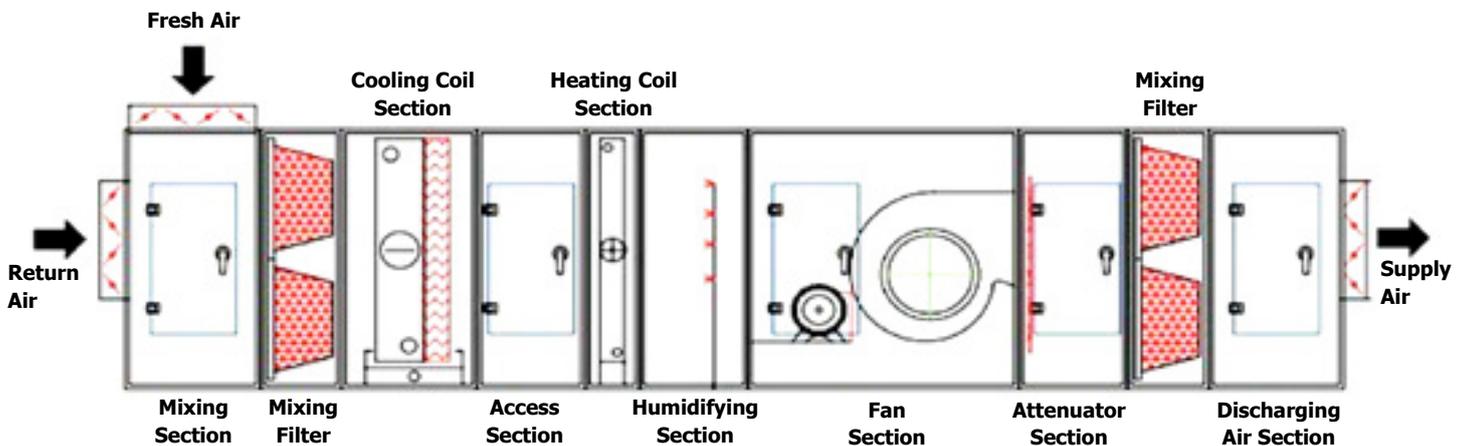
Effective provision should be given to ensure every enclosed workplace is ventilated by a sufficient quantity of fresh or purified air.

It clearly states under ACOP 33 that mechanical ventilation systems should be regularly and properly cleaned, tested and maintained to ensure that they are kept clean and free from anything which may contaminate the air.

Guidance 6 (58) reminds that some ventilation systems are water based and that suitable legionella precautions need to be taken in line with L8 legionnaires disease Approved Code of Practice and Guidance *The Control of Legionella bacteria in water systems.*

Standards and guidance associated with the ingress of waterborne contaminants within air handling and ventilation systems includes, but is not restricted to, the following: -

BS 15780: 2011 – Ventilation for Buildings Ductwork Cleanliness of ventilation systems – States specific guidance for Air Handling Unit components in reducing microbial colonisation to a defined level. Furthermore BS 15780 provides specific guidance for the cleanliness of AHUs or/ and ducting that is critical to good hygiene and cites the recommendations of **EN 13053:2006**. That prescribe the requirement for inspection and cleaning specific to humidifiers including water treatment.





Health & Safety Executive HSG202: 2000 – "General Ventilation in the Workplace Guidance for Employers" - describes general ventilation and fresh air requirements for ordinary workplaces. It states the legal requirements and cites the HVCA and CIBSE as able to provide information on testing for likely contaminants in ductwork and on cleaning.

Quote: "As a general rule, if you run your finger along the opening of a duct and it collects dust, then it probably needs cleaning."

HSE HS(G) 132 Guidance Note – How to deal with Sick Building Syndrome - Cleaning can be a major factor in preventing Sick Building Syndrome (SBS). The recommended frequencies of cleaning for ventilation systems including: -

Wet areas of plant including cooling coils and humidifiers – Annually.

CIBSE TM26 – Hygienic maintenance of office ventilation ductwork - Provides professional guidance for building managers. It sets out procedures for addressing the microbiological cleanliness of ductwork systems when included within the manager's normal good practice provisions, such as those set out in the BESA Guide to Good Practice. (TR/19)

Paul believes that from a Legionella management perspective building with air handling and ventilation installations should be classified in

accordance with HSG 274 guidance as Part 3 that offers variation on guidance for "other systems" that could pose a risk.

Further verification that air handling systems and in-line components should be included in buildings legionella risk assessments in accordance with: -

BSRIA BG57 – 2015 Legionnaires Disease - Risk Assessment

4.3.18 Air handling units, air conditioners and fan coils - Air handling Units and fan coils without humidification can accumulate condensate in drip trays if badly installed, subject to rainwater ingress or when drains become partially blocked.

Stagnant condensate and drip trays that become colonised with bacteria and mould potentially creating a risk to health. It is therefore recommended that this equipment be inspected as part of the legionella risk assessment, particularly if issues have been reported in maintenance records or statutory air conditioning inspection.

In 1998 Paul was instrumental in the development and was a co-author of HVCA TR/17 Guide to Good Practice - *Internal Cleanliness of Ventilation Systems*, recognised as the ventilation hygiene industry benchmark. Further upgrades were published and rebranded by the BESA TR/19 in 2002, 2005, 2013 and 2019.

A revised edition of the current TR/19 guidance for general ventilation and air handling systems is scheduled for review and amendments will also include good practice with associated water hygiene maintenance.

Profile

Paul Downing MIFSM, MWM Soc (Snr) is the owner and Principal Consultant at Compliance (Air and Water) Limited and has also held Board positions on behalf of companies trading within UK mechanical and environmental service Industries.



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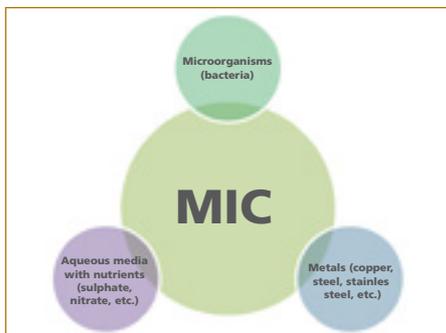
MIC IN BUILDING WATER SYSTEMS - WHAT SHOULD YOU DO?

Martin Ronceray - BSRIA



Steel tube covered with biofilm and subject to localised MIC – © BSRIA

Yes, another article on MIC - Microbially Influenced Corrosion, Microbial Induced Corrosion, or shortened sometimes to "biocorrosion" in continental Europe. This time the article presents some key findings from a recent paper¹ on progress made on MIC research that did an overall review of the development in the understanding of mechanism, mitigation measures and remaining unknowns on MIC. For anyone not too familiar with this particular type of corrosion, here is a simple summary of the required elements for it to occur:



The "MIC triangle" – © BSRIA

It looks a bit like the "fire triangle" where if you remove one element, then nothing happens. Although the difference here is that even if you remove the microorganisms, there is still a risk of other types of corrosion when an aqueous media is in presence of metals (oxygen corrosion, pitting corrosion, to name only a couple). Another important point to notice is the presence of an aqueous media which indicates that pretty much any metallic water systems operating at a temperature below 100°C could be at risk if there are some bacteria ingress.

The actual mechanisms involved in MIC are much more complex to explain in detail and make it particularly difficult to predict reliable corrosion rates in the field due to a myriad of variables to consider. Here are only a few of them:

1. Count of bacteria on metal surfaces

This should consider bacteria in biofilms and bacteria which have anchored on surfaces, typically referred to as sessile bacteria. Be aware then when taking a water sample, the floating bacteria that can be counted in it are planktonic bacteria, not sessile ones. So, a reasonable guess must be made to estimate what proportion of detected floating bacteria could have also settled on the inside of the water system.

2. Water quality



Example of micrograph of biofilm formation on steel surface – © BSRIA

This should consider physical, chemical and microbial parameters as presented for instance in BSRIA guides BG29/2020² or BG50/2013³. The selected water treatment will also have an effect on the water quality. It is reminded here that application of "broadband biocides" intended to kill as many organisms and as many species as possible are only killing microorganisms and not cleaning them out of the system. The remaining biomass, even inactivated, can influence corrosion abiotically (in absence of living organism), and the few surviving cells may also be able to multiply by "cannibalism" of the biomass and rapidly regrow. It is furthermore challenging when biocide and sanitizing treatments cannot fully penetrate through biofilm layers and inactivate all living cells in the water system.



LTHW water samples where over 10,000 cfu/100ml of pseudomonads, NRB and SRB were detected – © BSRIA

Injection of a nitrate-based corrosion inhibitor will stimulate nitrate reducing bacteria (NRB), and these bacteria are supposed to outcompete with sulphate reducing bacteria

(SRB) since the energy yield of nitrate reduction is greater than that of sulphate reduction.

3. Environmental conditions

Temperature, flow regime, surface profile, surface contaminants and to a lesser extent pressure, will have an influence on the rapidity bacteria could attach to the metal surface and proliferate to corrode it.

Despite the above complexity, field measurements exist for monitoring MIC rate. They typically consist of corrosion coupons installed at point locations in-situ of the water system. However, as they are installed only in discrete locations, they can only inform on a localised corrosion rate and generalising it to the entire system could provide an erroneous reassurance that the system is under control. It is similar to testing for legionella bacteria in a drinking system by sampling only certain outlets, and there could be some omitted where legionella bacteria have grown inside their pipework locally. So, the general assessment of the drinking system is only based on a discrete number of results, and the industry accepts this as being reasonably practicable (as per Health and Safety at Work etc Act 1974⁵ clause 2 paragraph 1). Therefore, a risk of still having bacteria in the water system may remain and MIC may occur.

What should you do to mitigate this remaining risk?

Being proactive is definitely a better approach than reactive, and the research paper did acknowledge that root cause analysis of past MIC incidents identified the adoption of a reactive rather than proactive approach, lack of detailed follow-up investigations, lack of internal policy or regular wall thickness inspections were some of the causes that could have prevented such incidents.

Too many times I have come across systems that were not adequately managed and failed in service dramatically, because MIC does not just limit itself to one location in the system, it goes widely wherever bacteria can anchor themselves. Thus, the building owner or operator ended up with a complete system being affected and potentially needing to be replaced when cleaning and disinfection regimes were found limited in their efficiency to provide a satisfactory and long-term result. A number of companies have started developing risk-based models to screen and rank potential MIC threats seeking to combine field measurement results with risk-based inspection programmes.

There are different models for a risk-based approach and they are usually implemented to meet a safety objective, such as Hazard Analysis and Critical Control Point (HACCP) in the food sector, Hazard and Operability Analysis (HAZOP) in the industrial sector, or Water Safety Plan (WSP) in the healthcare sector. For the building sector, there is already business-focused maintenance as a methodology to determine the optimum



maintenance and inspection regime to ensure business continuity. This method is based on research conducted by BSRIA and is available in the publication BG 53/2016⁴.

In a nutshell (or cell), MIC is a complex corrosion mechanism which is difficult to predict and challenging to control. However, by adopting a proactive approach with a risk-based evaluation of field measurements, you should achieve a reasonably practicable picture of how safe your water system is from MIC.

Author: Martin Ronceray, BSRIA Engineering Investigation Lead, investigations@bsria.co.uk

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BSI EH 3/4 - 18/03/20

Meeting Update

Technical Committee EH/3/4 recorded their thanks to Howard Barnes for his longstanding attendance at committee meetings and also as an active panel member for the drafting and revision of several British Standards. WMS would also like to extend their thanks to Howard for his input on behalf of the Society and are hugely grateful to Sophia Kloda for taking over this activity.

National Work

BS 8680 - Water Safety Planning: Published 29th May 2020 (see separate article in this edition - Page 37)

BS 8580 part 2 – Risk assessments for *Pseudomonas* and other organisms. Code of practice: The standard is underway and work being progressed successfully via remote meetings.

BS 7592: 2008 - Sampling for Legionella bacteria in water systems. Code of practice: Approval for revision has been given by the Planning and Approval Team at BSI. The panel is in the process of being set-up and suitable experts are invited to apply to BSI to be a panel member.

BS 8221-1: 2012 - Code of practice for cleaning and surface repair of buildings. Cleaning of natural stone, brick, terracotta and concrete: EH/3/4 committee members will review the specific clauses that may need amendment with regards to *Legionella* risk assessment. When the standard is revised there will need to be representation from the EH/3/4 committee.

BS 8551:2015 Provision and management of temporary water supplies and distribution networks (not including provisions for statutory emergencies). Code of practice: Due for systematic review later this year.

European work – CEN/TC 230

CEN has advised their working groups to meet virtually. The next face to face meeting is under review.

International work – ISO/TC 147

Next plenary meeting Finland April 2021.

ISO 11731 – there is an issue with the performance criteria section. NEN have issued a document (TR6278) to its users in the Netherlands and BSI will contact NEN regarding the possibility of a translation for users of the standard in the UK.

Any Other Business

EH/3 and EH3/6 are circulating a questionnaire regarding the "use of single-use plastics" in water quality sampling.

Next meeting September 2020

From the Archive: This paper first printed in **Waterline** Spring 2008

Biocide optimisation and Legionella prevention by using an on-line biofilm monitor

Lars P. Venhuis & Maarten C.M. Bruijs

Abstract

Microbial fouling, the formation of biofilms, in cooling water systems can lead to reduced heat transfer in condensers and heat exchangers. Microbial Induced Corrosion (MIC) is also a result of biofilm. Piping replacements due to MIC have cost utilities millions of dollars. Biofilms also serve as nutrient rich habitats for pathogenic micro-organisms such as Legionella and protect the micro-organisms from biocides and strongly fluctuating circumstances.

In order to prevent biofilms from creating these problems, a number of oxidising and non-oxidising biocides are being used. Application rates and frequency are often based on general appearances or sampling techniques that focus on the number of planktonic bacteria instead of the presence of biofilms. Since the effects of under treatment are so dire, plants often develop excessive dosing regimes which lead to extra costs, unnecessary environmental impact, and an increased corrosion rate on equipment.

On-line monitoring of biofilm formation on metallic surfaces provides key inputs to automatic control equipment and system operators. Thereby mitigation activities can be initiated well before the structural integrity of piping or components is jeopardized. Tracking biofilm activity on-line also provides feedback useful for evaluation the effectiveness of biocide additions and other control chemicals. This article concerns the BioGeorge™ system an on-line electrochemical biofilm monitor. It has been developed to provide information on biofilm activity in cooling systems that are common in power plants and industrial facilities. The system has also proven its value in HVAC-systems of large buildings, shopping centres and hospitals for the control against Legionella. The system makes it possible to attune dosing regimes specifically to local conditions and provides direct insight in the formation and activity of biofilms and the effectiveness of the applied dosing regimes. With BioGeorge™ it is possible to apply an optimal biocide dosing regime to keep biofilms under control.

In this paper we discuss three case histories of the system's application to monitor biofilms, monitor the effectiveness of the applied water treatment, and monitor biofilm for Legionella prevention.

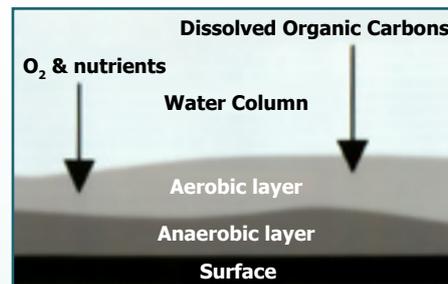
Introduction

Biofilm formation in cooling water systems

Surface water used for cooling industrial processes contains many organic and inorganic substances as well as micro-organisms. Surfaces that come in contact with this water will be directly conditioned by absorption of the organic materials and bacteria. Mobile waterborne bacteria migrate to surfaces and attach by excretion of exo-polysaccharides (xPS), forming gel-like matrices in which the bacteria are

enclosed. Eventually areas will join together and form a contiguous biofilm (**Figure 1**). Microbial multiplication in the biofilm and incorporation of organic material and micro-organisms leads to an increase in the size and stability of the biofilm.

Figure 1. Side view of a biofilm with aerobic and anaerobic zones.



Many types of micro-organisms can prosper in the range of environmental conditions (temperature, levels of aeration, and pH) provided by most cooling water systems. Micro-organisms can sense conditions that are amenable to their life processes and are motile. As a result, they produce "living crevices" where crevices otherwise would not be formed by purely chemical or mechanical action. The sticky xPS that provides protection to the micro-organisms in a biofilm also produce a more occluded creviced environment and a crevice that is more resistant to mechanical action.

Although initially thought to be more or less uniform, recent imaging with confocal microscopy has shown that a biofilm is full of channels and voids where water, ions, suspended solids, and metabolites can accumulate. The xPS also acts as a trap for nutrients that are dissolved in the bulk cooling water. The net effect is that conditions inside the biofilm can be significantly different than in the bulk cooling water.

By buffering their bacterial occupants from the bulk water, biofilms provide shelter and protection for micro-organisms against varying physical environmental circumstances and biocides [1]. The biofilm can also act as a diffusive barrier, by which an oxygen gradient is developed. The oxygen is used on the surface of the biofilm, leading to an anaerobic environment on the conditioned surface as shown in **Figure 1**. As these various areas (better: micro-environments or micro climatic areas) become established, there is an increased development of specific micro-organisms that cause and promote corrosion of the metallic surfaces.

Effect of microfouling

The following operational problems in cooling water systems occur due to biofilm development.

1. *Increased corrosion*
Deposition of micro-organisms on metallic

surfaces can lead to an increase in the speed of corrosion of these metals. This form of corrosion is called Microbial Induced Corrosion (MIC). Application of noble materials (such as Monel) and bio-toxic materials (such as copper) in practise does not give any guarantee for MIC resistance, with the exception of titanium. Estimations show that 20% of all corrosion damage in heat exchangers are caused or influenced by micro-organisms [2].

MIC involves interaction between microbial activity and corrosion processes and has been observed in essentially all raw waters including soft and hard freshwater, brackish water, and seawater [3-9]. Microbial activity can induce corrosion processes where they would otherwise not occur or influence the initiation or propagation of corrosion. Several different types if interactions between microbial activity and corrosion processes may produce the accelerated localised corrosion typical of MIC. Accelerated corrosion may occur as the result of corrosive metabolic products such as sulphides, ammonia, organic acids, or mineral acids. Micro-organisms may actively participate in the reactions that produce corrosion; for example by catalysing the reduction of oxygen on surfaces or by utilising chemical species such as nascent hydrogen that otherwise would polarise the corrosion cell and cause the overall corrosion process to stop or slow down significantly. The xPS that holds the biofilm together can also participate directly in the corrosion process by complexing metal ions that would otherwise inhibit further corrosion. In still other cases, biofilms may do nothing more than produce a crevice where it would not otherwise exist thus creating a site of other corrosion mechanisms to begin.

In many of these situations, the microbial activity serves to initiate corrosion and can influence propagation. Once established however, other corrosion mechanisms can often proceed without further microbial activity. The economic impact of MIC can be enormous. For example, down time for large nuclear units is often of the order of \$1,000,000 per day. In many cases, corrosion resistant alloys have experienced rapid, through-wall penetration when exposed to potable waters from rivers, lakes, estuaries, and ponds; environments that would normally be considered benign. The influence of biofilms in establishing corrosion initiation sites and in providing conditions for the propagation of pits has been clearly demonstrated. Power plants have been required to modify, repair, or replace such lines in their entirety. Repair or refurbishment costs for large nuclear service water systems can be \$30,000,000 or more [10].

MIC mitigation treatments themselves are expensive in terms of capital equipment,



downtime for mechanical treatments, chemical delivery systems, training, permits, and the chemicals themselves. In addition, over-treatment of water to mitigate MIC is costly in terms of the chemical and delivery system as well as the potential environmental penalties, as environmental requirements on discharges have become increasingly restrictive.

2. Decreased efficiency of heat transfer

Deposition of biofilms on the walls of a heat exchanger impairs the heat transfer and stimulates the deposition of calcium salts. The thermal conduction of a biofilm (0.6 W/m.K) is comparable with that of water [11] (biofilms are over 95% water). By comparison, the thermal conduction at 20°C of aluminium-alloys is 190 W/m.K, of brass 120 W/m.K, copper 385 W/m.K, and of titan 17 W/m.K. Siemens Kraftwerk Union (KWU) calculated that the formation of a 26 µm thick biofilm in a heat exchanger of a 740 MWe plant, results in a loss of 2 MWe. For a 1300 MWe plant this loss amounts to 5MWe [12].

3. Increased risk of macro-fouling

Moreover, biofilms stimulate the settlement of macro-organisms like mussels, oysters and barnacles [13]. The settlement of these macro-organisms leads to substantial decrease in diameter of cooling water piping, thereby leading to even higher pumping costs and eventually leading to a forced outage so that the macro-fouling can be removed.

4. Increase of human health risks

Biofilms can also serve as hosts for numerous pathogenic micro-organisms. Mainly in open recirculation systems, the activity of micro-organisms (by an increased water temperature and sufficient oxygen and nutritional supply) can increase to such an extent that it can cause increased health risks for employees and neighbours. The threat is particularly acute as biofilms can suddenly slough off the substrate and be released in massive amounts into an area such as a cooling tower, where the pathogens can become airborne through aerosols and come in contact with people. Human pathogens often connected with cooling towers are *Neagleria spp.*, *Acanthamoeba spp.*, and *Legionella pneumophila*. Numerous outbreaks of Legionnaire's Disease have been tied to outbreaks from cooling towers and HVAC (air conditioning) units.

Control of biofilms Biofilm mitigation

Microfouling in cooling water systems is often mitigated by chemical water treatment. Biocide dosing is mostly carried out by general dosing regimes, which in most cases are not attuned to the mitigation of biofilms for the specific conditions of a specific cooling water system. Also, treatment with oxidising biocides is the most common approach for mitigation of MIC based upon its ease of use. These general dosing regimes may be many times what is necessary to control biofilms resulting in extra costs for biocides, unnecessary environmental impact, and increase corrosion by the excess of oxidising biocides.

Under treatment can also be a problem. Micro-organisms in biofilms are less sensitive to biocides than waterborne micro-organisms. Concentrations of some biocides must be elevated 10 to 100 times, in order to reach the same effectiveness [14].

By the time biofilms have significantly affected condenser cleanliness (decreasing heat transfer and increasing pressure drop) the biofilm is mature and difficult to remove. These established biofilms can be very difficult to remove even with large biocide dosages. Also, in heavily fouled systems, corrosion that was initiated by micro-organisms can be exacerbated by the use of certain biocides. The biocide may prevent further infestation but will provide alternative and stronger half-reactions that fuel the corrosion activity. Non-oxidising biocide treatments also are only likely to be effective when micro-organisms actively participate in the corrosion process (e.g. by catalysis of the reduction or oxygen, or by cathodic depolarisation in anaerobic systems), or when micro-organisms provide alternative reactions that increase corrosion.

Many biocides have poor penetrating power and are far less effective on mature biofilms than while the biofilm is still thin and spotty. Improving the penetrating power of biocides, by means of chemical agents such as surfactants, dispersants, or flocculants that soften pre-existing deposits or which help to eliminate or remove them, is a primary factor in improving the effectiveness of a biocide in such cases.

Such enhancements have been demonstrated to be effective in mitigating the propagation of deep pits due to MIC [16-17]. These chemicals are often expensive and grab samples or other periodic biofilm monitoring techniques are often inconclusive and inadequate to justify the expense.

Monitoring

Monitoring is particularly important when water treatment is the primary approach to prevention of biofouling and MIC. Much of the inspection and monitoring of activity related to MIC has relied upon testing for the presence of micro-organisms, either on surfaces or in cooling water. Microbial counts from grab samples of the fluid provide a measure of the planktonic, or free-floating organisms. However, it is the sessile organisms, those attached to metallic surfaces that influence corrosion. Little [18] showed that there is no relationship between planktonic counts and sessile counts or MIC. Continuous, on-line monitoring provides a tool for the operator to modify systems operation and to take actions to mitigate microfouling and MIC or other degradation, using inexpensive samples or sensors to protect his much more precious system.

Many of the same methods used to monitor system performance or system corrosivity can be used to monitor microbial effects. Commonly used corrosion monitoring methods include corrosion coupons, electrical resistance probes, linear polarisation resistance methods, and advanced methods such as electrochemical noise or electrochemical impedance spectroscopy. Prototypic materials exposed to typical water

chemistries and treatments should provide an indication of the effectiveness of the treatment after some treatment period. These methods are good for monitoring corrosion but are not specific to MIC.

System performance monitoring, either from pressure drop devices, from operating system heat exchangers or from model heat exchangers in side streams, can provide a useful indicator that system surfaces are becoming fouled. However, they do not provide a complete picture of the source of the fouling and provide no information on corrosion. Plants have detected the microbial fouling of critical heat exchangers using pressure drop and heat transfer rate instrumentation [19-20]. Heat transfer resistance is affected by a variety of other parameters, including changes in flow, steam side conditions, drift in the sensors and data collection instruments, cooling water temperature, and perhaps most importantly, calcium carbonate scaling.

Methods for monitoring microbial content, such as water sampling, the use of flow-through samplers to collect sessile organisms as a biofilm, or the Robbins device give information on the types and numbers of microbes but do not necessarily provide insight into biofilm activity or provide any information on corrosion. Field test kits [21] extend microbiological analysis capabilities to system and water chemistry personnel who have minimal training in microbiology. All of these methods essentially can only take snapshots of the system and do not provide continuous monitoring.

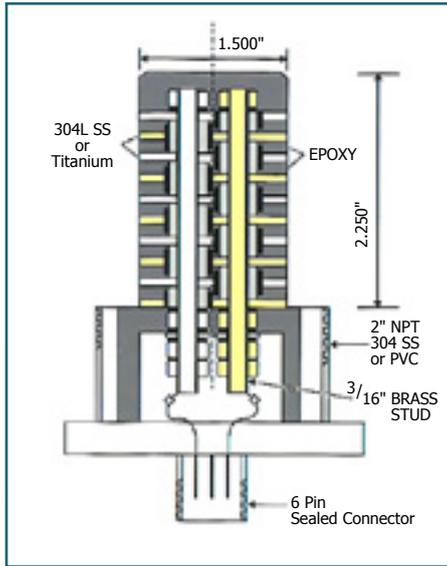
The on-line monitoring system

The BioGeorge™, an electrochemical biofilm activity monitoring system [22-24], has been developed to monitor biofilm activity on-line. It has been shown effective for predicting biofilm activity and as a continuous measure of biocide effectiveness [25].

The probe consists of a series of metallic discs comprising two nominally identical electrodes (**Figure 2**). The electrodes are electrically isolated from each other and from the stainless steel plug that serves as the body of the probe. An epoxy resin fill between the electrodes produces a right circular cylinder of metal discs and insulating resin.

Figure 2. The BioGeorge™ probe.





One electrode (set of discs) is polarised relative to the other for a short period of time, typically one hour, once each day. This applied polarisation potential causes a current, designated as the “applied current” to flow between the electrodes. When a biofilm forms on the probe, it provides a more conductive path for the applied current than the general cooling water increasing the current flow significantly over the baseline value. Metabolic processes in the biofilm, many of which involve oxidation/reduction reactions, also appear to enhance the applied current. The applied potential also produces slightly modified environments on the discs that are conducive to microbial activity and thus biofilm formation [26-28]. This will produce a biofilm on the probe sooner than on the general piping.

As the probe is repeatedly polarise, it created conditions over the cathodes which are chemically different than those over the anode. These differences create areas that are more conducive to one type of bacteria over another and cause a detectable current flow between the cathode and anode even when no potential is applied. This current has been designated as the “generated current”. Depending on the type of bacteria in the biofilm, the age of the biofilm, and the relationship between the biofilm and the bulk cooling water, the generated current can be positive or negative. The polarity of the current can even change from positive to negative as conditions change in the biofilm. The generated current is monitored every ten minutes.

Deviations of either the applied or generated currents from their steady baseline values (i.e. when the probe is known to be clean) provide an indication of microbial fouling. For freshwater applications, stainless steel disks have been used successfully. Titanium discs have been shown to provide excellent service in both fresh and saline waters.

Field Cases

Case history 1 – water treatment optimisation

An incinerator plant cooled by brackish water (salinity:2.49-8.40%; turbidity: 2.49-22.28 NTU; pH:7.50-8.40) in a once-through cooling water

system. System piping is carbon steel. Condenser tubes are made of titanium. Average cooling water flow is 11,000 m³/h, producing a fluid velocity through the condenser tubes of 2.0m/s. The plan successfully applies sodium hypochlorite for control of macrofouling and microfouling.

In summer, the focus of the biocide dosing is control of mussel macrofouling (*Mytilopsis leucophaeata*). Sodium hypochlorite is added to a concentration (TRO) of 0.60 mg Cl₂/L, measured in front of condenser. Summer additions are made using Pulse-Chlorination®-regime when the inlet water temperature exceeds 12°C; typically, June through October.

Pulse-Chlorination® [29,30] is based on the principle that mussels have a recovery period of about 10 to 30 minutes after exposure to a chlorination period. Pulse-Chlorination® takes advantage of this recovery time by using short successive periods of chlorination, alternating with periods without chlorine. Next to the effect of the chlorine, the bivalves are physiologically stressed as they are forced to open and close continuously. This has a maximal stress effect on the mussels and clams and appears even to have a larger impact than the effect of continuous dosing. To determine exactly the behaviour of the mussel, the valve movements are monitored with a special device, called a MusselMonitor®.

The objective of the initial dosing regime for the winter, when no macrofouling is present, is control of microfouling. Again, sodium hypochlorite is dosed, but now for 75 minutes each day to a TRO-concentration of 0.60 mg Cl₂/L, measured in front of the condenser. A BioGeorge™ system was added to the system to provide an on-line capability to evaluate biocide effectiveness and a tool for biocide optimisation. The probe was installed directly in the cooling water flow at the outlet of the condenser using a blind connection (Figure 3). The titanium probe was polarised to 400mV for 1 hour daily. Biofilm monitoring started with the initial sodium hypochlorite dosing regime of 75 minutes (TRO 0.60 mgCl₂/L) each

day. As would be expected, both the applied and generating currents remained low during this dosing regime.

Figure 3. BioGeorge™ probe installation.



After 2 months sodium hypochlorite dosing was stopped and after approximately 10 days exposure, both the applied and generated currents for the probe exhibited a very definite increase. After some biofilm build-up, the sodium hypochlorite dosing was optimised using different dosing periods, (Figure 4). For all dosing periods, the TRO-concentration of sodium hypochlorite was constant 0.60 mg Cl₂/L, measured in front of the condenser. Results showed effective biofilm degradation using a dosing regime of 30 minutes, twice a week. Implementation of the new winter dosing regime resulted in a sodium hypochlorite reduction of 89%.

Case history 2 – water treatment effectiveness control

A chemical installation cooled by surface water in a recirculation cooling water system using two forced air cooling towers. System piping is carbon steel. Average cooling water flow is 1,3000 m³/h, operated in a concentration rate of 1.8 to 5.6, on the basis of chlorides. The utility successfully applies sodium hypochlorite for control of microfouling. Dosing of TRO-concentration 0.50 mg Cl₂/L, three times a week for one hour was applied.

Figure 4. Presentation of biofilm activity monitoring during sodium hypochlorite (TRO-0.6 mg Cl₂/L) optimisation. Temperature shown is cooling water temperature after condenser. Status Code: 1=Clean, 2=Waiting to establish baseline, 3=Fouled/Alarm

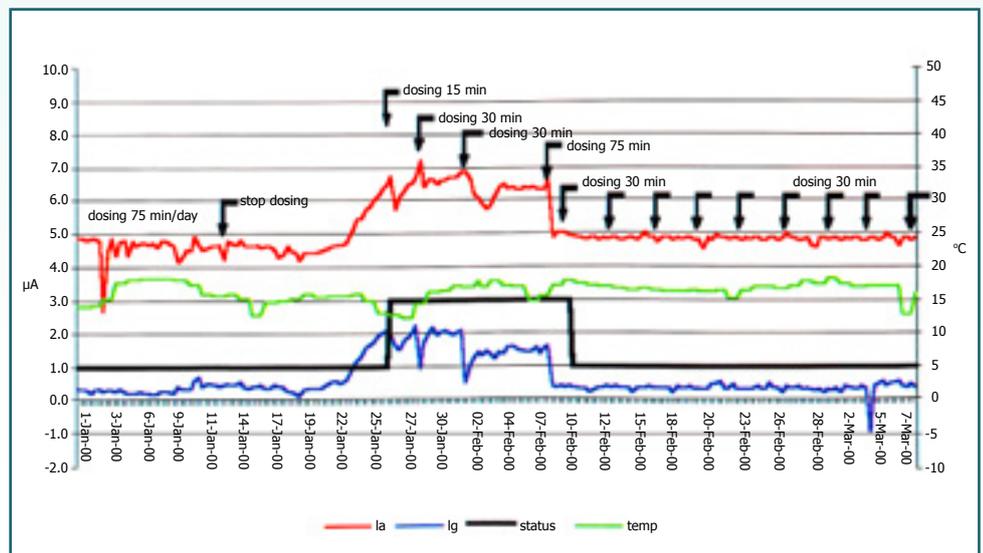




Figure 5. BioGeorge™ probe installation in the hot return of the cooling tower.



For the control of microfouling the cooling water is tested for waterborne micro-organisms by using the ATP-technique ATP stands for Adenosine Triphosphate, and is the primary energy transfer molecule present in all living biological cells. ATP cannot be produced or maintained by anything but a living organism, and as such, its measurement is a direct indication of biological activity. If the ATP level exceeds the 3000 Relative Light Units per ml the sodium hypochlorite dosing is increased. The main advantage of ATP as a biological indicator is the speed of the analysis – from collecting the sample to obtaining the result, only minutes are required. The technology to measure ATP is already widely utilized to verify disinfection efficacy in the

food industry and is also commonly applied in industrial water processes such as cooling water systems to monitor microbial growth and biocide effectiveness.

A BioGeorge™ system was added to the system to provide an on-line capability to control biocide effectiveness. The titanium probe was installed directly in the cooling water flow at the hot return of the cooling tower (Figure 5). Results showed (Table 1 and Figure 6) BioGeorge™ alarm in the summer of 2007, caused by malfunction of the sodium hypochlorite dosing pump and significant increase of ATP values within the cooling water.

Table 1. ATP values in cooling water indicating monitor microbial growth.

Date	ATP-value (RLU/ml)
14 June 07	2570
21 June 07	3380
29 June 07	11135
2 July 07	3055
4 July 07	2970
6 July 07	4680
9 July 07	2780
12 July 07	3050
16 July 07	4805
19 July 07	2370

Case history 3 – Legionella prevention

A HVAC-system cooled by potable water located at a hospital has a history of Legionella presences. The system consists of two Polacel XE2.600L cooling towers with a cooling water flow of respectively 490 m³/h and 250 m³/h operated in a concentration rate of 3.0, on the basis of chlorides. System piping of the 15-floor building is 30 years old and consists of coated steel, carbon fibre and SS. Microfouling is mitigated by using

bromochloro-dimethylimidazoline-dion (BCD), dosed for 20 minutes daily.

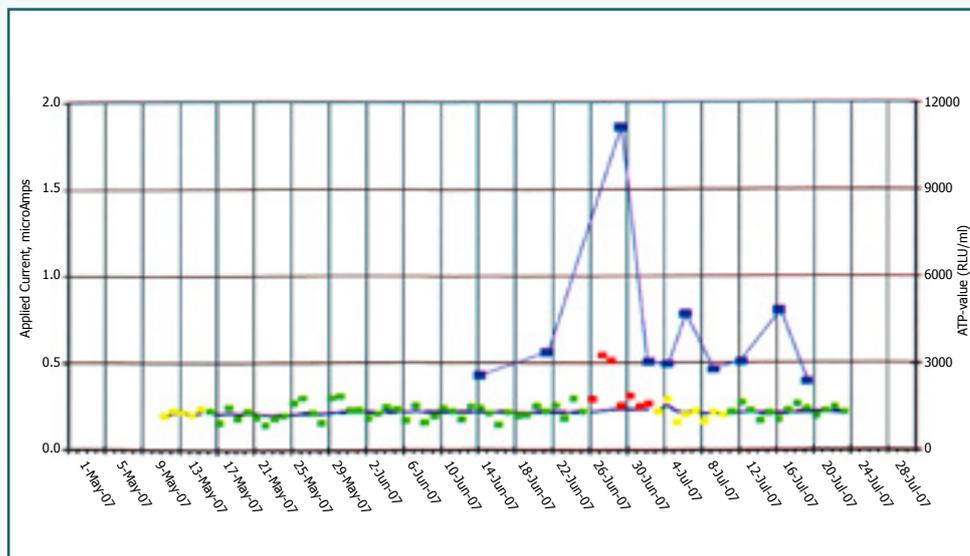
Figure 7. BioGeorge™ probe installation in the cooling tower return of a HVAC-system.



Figure 8. BioGeorge™ controller installation including RS-232/4-20 mA converter for alarm indication at HVAC PI-system.



Figure 6. Presentation of biofilm activity monitoring during sodium hypochlorite (TRO=0.5mg Cl₂/L) treatment. BioGeorge™ signal (microAmps) status indication: Yellow (establishing baseline), Green (no signs of microbial activity), Red (Alarm, probe surface is fouled, indicating microbial activity). Blue line indicated ATP values (in RLU/ml) given in Table 1.



Although severe amounts of oxidative and non-oxidative biocides were dosed, Legionella was difficult to control. KEMA performed its 'Legionella Risk Classification' for ranking the cooling tower system in an optimal maintenance and control program. For this ranking the critical risks criteria for Legionella growth like; Stagnant Water, Nutrient and Growth, Poor Water Quality, Cooling Tower System Deficiencies, Location and Access are evaluated. This evaluation is based on European Reference Documents (IPPC) and International guidelines like the Health and



Safety Commission and Executive (HSE) and the Australian Guide on risk management in cooling towers by the Department of Human Services (DHS) [31-33].

Because of the fact that the cooling towers were located on a hospital's roof, the highest Risk Category was recommended, resulting in: weekly inspection, fortnightly service, and a minimum of monthly microbial count testing. Because of the significant increase in maintenance and control costs the owner decided for microbial biofilm monitoring for continuing control and *Legionella* prevention.

The choice for this system was made because of its early warning of the onset of biofilm, which is essential for effective *Legionella* control. The system also provides an indication of the effectiveness of treatments and provides the user with a powerful tool to control microfouling in HVAC-systems.

A BioGeorge™ system was added to the system to provide an on-line microbial control. The titanium probe was installed directly in the cooling water flow after cooling tower (**see figures 7 and 8**). The controller valves were converted to a 4-20 mAmps signal and presented at the HVAC PI-system for alarm indication. Because of the current winter period, low water temperatures within the HVAC-system and more careful biocide dosing by the water treatment company, no alarm indications occur. Periodical *Legionella* detection showed no presence of *Legionella* bacteria.

Conclusions

The application of the on-line monitoring system as an early warning system, has proved to be a practical tool to assess an early warning of biofilm formation. By this, it is possible to operate a preventative management to improve the general 'hygiene' of the cooling tower and cooling water system. This approach has been implemented in various industrial and municipal recirculating cooling water systems. Application has so far led to improved biocide dosing, resulting in cost reductions and increased effectiveness, as well as to better insight into the cleanliness of the cooling water system, and improved biofilm control. As the biofilm is the main environment in which *Legionella* propagates, mitigating biofilm development is a first and preventive step in mitigating *Legionella* bacteria in cooling water systems. On-line monitoring and application of the BioGeorge™ system is a valuable tool in addition to a proper management and control program.

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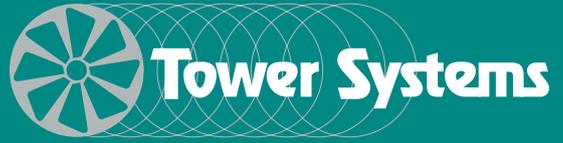
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INDUSTRY UPDATES

Legionella Control Association



Since March, the LCA has published regular guidance summaries for LCA members to assist in understanding the implications of legionella control in the current pandemic. These are intended to signpost existing guidance and assist LCA members in their risk assessment process for managing mothballed or under occupied premises and reopening premises. Topics include safe management of water systems in buildings during COVID-19, implications for samples, management in dental surgeries and the process of reopening buildings. The information is freely available to all on the News page of the LCA website: www.legionellacontrol.org.uk

The LCA currently have 377 full members, 19 applicants and there are 3 LCA members suspended and not listed on the LCA website. We have also terminated 3 members in the last three months due to their failure to reach LCA standards after non-conformances being identified at audit. During the lockdown we have received a record number of applicants and new members as companies find the time needed to document their working processes and make the application. We have welcomed 10 new members to the LCA in the last three months.

The LCA has moved to remote auditing for members and has made great progress in streamlining this process and achieving effective meaningful audits. In line with most other organisations, the pressures of the pandemic have led us to appreciate the value of remote working and we are likely to continue to perform a proportion of LCA audits remotely in the longer term.

The LCA Standards Sub Committee have completed the review of the Code of Conduct and have almost completed the service delivery standards. The focus of the group is now moving to the supporting and auditing documents.

The Spring conference has been postponed to the autumn and is titled 'Times They Are Changing'; which in hindsight was quite prescient! Tickets are on sale and the event is proving to be one of the most popular the LCA have organised including a networking dinner at Drayton Manor Hotel, Tamworth on 13th October 2020.

SoPHE (Society of Public Health Engineers)



SoPHE represents practicing Consultant Public Health Engineers working within the built environment. As a Society that is supported by and sits below the wider CIBSE umbrella, we have approximately 1,245 members, including 73 Industrial Associates and 6 Contractor members. Last year came to a close with the society Blue Ribband event - the SoPHE Annual Dinner, held at the Royal Garden Hotel - Kensington in London. Over 300 guests across 30 tables attended the event, enjoying the proceedings that included the Chairman's annual address, a guest speaker (a prominent female adventurer who has lead expeditions across the world) and the Young Engineers award. I am pleased to say that 2020 continued with similar vigour in the first quarter, having held the SoPHE Young Engineers and Havering Plumbing Centre of Excellence (NVQ Level 1, 2 and 3) practical competition at Havering College (East London) on 4th February. The overall winner from the PCE will be awarded the Chris Sneath Bursary which provides funds for the student to support them with Educational material.

Sadly, you will not be surprised to hear that the onset of COVID-19 has plagued many of the Society's planned events for much of 2020, resulting in a number of them being cancelled. The first event on the 'chopping block' was unfortunately the SoPHE North West group 'Northern Dinner' in Manchester, scheduled for 1st May which would have marked their 10th year of the event. We have seen this event successfully grow over the years in stature and popularity so look forward to reinvigorating it in

2021.

Further postponed events included a 'joint badged' SoPHE Young Engineers training evening with WMSoc and Ideal Standards covering the maintenance and correct installation of TMV's in addition to an Industrial Associates Trade Show event incorporating technical guest presentations at the Building Centre in London. We look forward to being able to reschedule these events in the near future – watch this space!

With Covid-19 restrictions remaining in place, the Society has joined a long list of other organisations turning to software such as Zoom. We have started to hold member technical CPD evenings online with an attendance of 54 at the first event – a good start!

Further technical events are planned for Autumn, including SoPHE presence at the Healthcare Estates Conference in Manchester on 6-7 October which we hope will be able to go ahead but await confirmation during these uncertain times.

If you would like to learn more about SoPHE and perhaps join the society, please visit:

www.cibse.org/Society-of-Public-Health-Engineers-SoPHE

UKAS



UKAS has been closely involved in supporting Public Health England, the NHS and the Department of Health and Social Care in developing COVID-19 accreditation processes. To help the government's effort to ensure patients and the public have access to reliable testing, UKAS is implementing a simplified fast track application process for existing accredited laboratories to extend their scope of accreditation.

Accreditation for COVID-19 introduces a vital level of quality assurance to the process and demonstrates the competence of a laboratory to perform valid test procedures and provide reliable results.

UKAS is receiving applications and enquiries from laboratories that wish to gain accreditation for COVID-19, both for the antigen and antibody testing.



ESGLI ESCMID

The ESCMID Study Group for Legionella Infections (ESGLI) have published a number of documents related to the management of buildings during and post COVID-19. A webinar is also available: www.escmid.org/research_projects/study_groups/legionella_infections/

WRAS WRAS

Following Water Saving Week in May, WRAS is continuing to reiterate the importance of using compliant water saving devices as we move into a period of the year associated with high water usage and potential drought conditions. WRAS is also promoting caution with plumbing work before re-opening premises after lockdown.

WRAS recently launched its Approvals Newsletter for subscribers to stay up to date with the latest approved product news. You can sign up for the newsletter at: www.wras.co.uk/approvals/subscribe-approvals-news/.

RSPH RSPH

All webinars are free to access, providing essential learning opportunities for water safety professionals including question and answer sessions from our international speakers and chairs. CPD points will also be available following each webinar.

To view the full list of webinars visit our webinar listings page at: www.rsph.org.uk/events.html?category=webinars.

HSE HSE

The HSE have been working hard to keep everyone up to date on changes and important information during the COVID-19 ongoing situation.

To ensure you have access to the latest information visit their website at: www.hse.gov.uk

or sign up for their newsletter at: www.hse.gov.uk/news/subscribe/index.htm



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TIMES THEY ARE A CHANGING!

LAUNCH OF THE NEW LCA STANDARDS

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SUMMER PROGRAMME 2020

Tuesday 7th July	Legionella Risk Assessment of Water Systems – Basic
Wednesday 8th July	Temperature Monitoring, Sampling & Inspection of Water Systems for Technicians ●
Tuesday 21st July	Legionella Training for Duty Holders & Responsible Persons incorporating L8
Tuesday 28th July	Foundation Course in Water Treatment Chemistry
Wednesday 29th July	Cleaning & Disinfection ●
Tuesday 4th August	Practical Legionella Risk Assessment ** ●
Wednesday 12th August	Management and Control of Closed Systems ●
Tuesday 18th August	Temperature Monitoring, Sampling & Inspection of Water Systems for Technicians ●
Wednesday 19th August	Cleaning & Disinfection ●
Tuesday 25th August	Legionella Training for Duty Holders & Responsible Persons incorporating L8

AUTUMN & WINTER PROGRAMME 2020

Tuesday 15th September	HTM 04-01 Water Hygiene Training: Managing & Controlling Risk of Waterborne Pathogens in Healthcare Water Systems ●
Tuesday 22nd September	Practical Legionella Risk Assessment ** ●
Wednesday 23rd September	Legionella Risk Assessment in Cooling Systems **
Tuesday 29th September	Cooling & Boiler Water Chemistry Part 1
Wednesday 30th September	Boiler Water Chemistry (Follow on) *
Thursday 1st October	Cooling Water Chemistry (Follow on) *
Tuesday 6th October	Cleaning & Disinfection ●
Wednesday 7th October	Foundation Course in Water Treatment Chemistry
Tuesday 13th October	Legionella Training for Duty Holders & Responsible Persons incorporating L8
Wednesday 14th October	Legionella Risk Assessment of Water Systems – Basic
Tuesday 20th October	Landlords & Letting Agents Legionella Risk Assessment Training ●
Tuesday 3rd November	Temperature Monitoring, Sampling & Inspection of Water Systems for Technicians ●
Wednesday 4th November	Spas and Swimming Pool Chemical Control and Management
Tuesday 17th November	Managing the Risk of Legionella in Cooling Towers Systems
Wednesday 18th November	Management and Control of Closed Systems ●
Tuesday 24th November	Practical Legionella Risk Assessment ** ●
Wednesday 25th November	Cleaning & Disinfection ●
Tuesday 1st December	Legionella Risk Assessment of Water Systems – Basic
Wednesday 2nd December	Legionella Training for Duty Holders & Responsible Persons incorporating L8

* Delegates attending these courses should first attend the Cooling & Boiler Water Chemistry Part 1 course or have a good working knowledge of basic terminology.

** Delegates attending the Practical or Cooling Systems course will be asked to prove that they have previously attended the Legionella Risk Assessment of Water Systems – Basic course or equivalent.

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

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The Water Management Society, 6 Sir Robert Peel Mill, Hoyer Walk, Fazeley, Tamworth, Staffs B78 3QD