The Industrial Water Treatment Specialists

Issue 21

WATERWIDE

INSIDE THIS ISSUE:

Did You Know?

- The HSE requires that all HSC—L8 Risk Assessments are required to be re-assessed at least every Two Years.
- HSC—L8 requires a detailed managerial line of responsibility to be documented.
- HSC—L8 requires that cooling towers are tested routinely for Legionella every THREE months
- HSC—L8 is enforceable under both COSHH and the H&S at Work Act

THE RISK ASSOCIATED WITH SPRAY IN COOLING WATER TOWERS

The monitoring and control of Cooling Water Systems which incorporate an evaporative cooling tower falls under the HSC's ACOP guidance document HSC—L8.

This document covers the management and control measures required to be put in place in order to demonstrate control of Legionella bacteria.

Legionella bacteria are the micro-organisms responsible for Legionnaires disease, a pneumonia like illness which is carried in water and transmitted by air.

In order for susceptible people to contract the disease, the bacteria must be inhaled into the lungs, which when carried in water is most often achieved by means of atomised water droplets.

Many types of cooling water systems have the capability to produce atomised water and indeed many achieve cooling by way of atomising water as a feature of the tower design.

Effective means of preventing this aerosol leaving the confines of the cooling tower are therefore essential if the Risk associated with the carrying of bacteria in the aerosol are to be minimised.

A typical cooling tower system has some form of drawing air over a cascading flow of water. Design therefore, has to allow unimpeded cool air in to the tower and warm, water vapour saturated air out of the tower, WITHOUT allowing the release of physical water droplets into the environment.

High efficiency drift eliminators are now commonly used in the head and/or sides of the tower. These are generally 'S' profiled moulded plastic strips which force the expelled air to turn abruptly causing the heavier water droplets to hit the 'S' bend and fall back into the system.

As a means of Risk Reduction, the HSE place great emphasis on ensuring drift eliminators are both in good repair and correctly fitted.

LEGIONELLA IN THE ENVIRONMENT

Legionella bacteria are fairly widespread within our environment. Under most conditions these bacteria are found generally in low numbers and do not pose any threat. One of the main reasons for this is that they require stringent conditions for significant numbers to develop. These conditions are not usually naturally occurring.

Found in many naturally occurring waters however, does mean that once conditions are suitable for development, for example where water is drawn for use in industry, rapid growth can occur if not properly kept in check.

The Legionella bacterium requires specific amino acids to be present and available in the environment and a source of iron. Temperature also plays an important part in growth, with optimums being between 20 and 50 C

'The other side' of Faces at Waterwide :

David Baynton. David is 27. married, and a self confessed sports fanatic.

Living currently in Bristol, David works in one of the largest WATERWIDE areas having direct responsibility for many clients in the South West & South Midlands area.

His laid back, friendly, yet focused and knowledgeable approach means he is very easy to get on with. (But don't talk to him about cricket! Unless you have time on your hands....and he doesn't .....*message from the boss*).

Cricket and Rugby run in the family and rumour has it, he can often be found propping up some sports club bar on a Saturday afternoon.....not that he drinks a lot...(so he tells me!)

Cider supplies in the South West however, are often in short supply late on a Saturday night whilst he is around, but by definition, the Cider Companies are doing very well as David keeps most of them going on a day to day basis. They do however dread 'away' games that takes him out of the South West area owing to the accompanying substantial fall in week end takings.

For reference, last years batting average was.....well, average , but he did make it to the final of a local snooker competition.

....And a better one...

Claire Hurley. Claire is 29 and returned to WATERWIDE for a second term following the birth of her second son, Luke.

With a degree in Business Studies, Claire took up a similar position to the one she left before Luke's arrival, that of new sales development. Working closely with Mark Sadowski, WATERWIDE's Sales manager, Claire is a key member of the WATERWIDE team and is responsible for developing and maintaining WATERWIDE's prospect data base.

Being of a very friendly disposition, she is the ideal initial contact for new prospective customers.

Recently relocated to a village not too far from the office, Claire successfully manages to juggle work and children (and to date she hasn't dropped either one!)

I say successfully. Before now, she has been seen leaving WATERWIDE's drive at high speed having been so engrossed in her work that the kids have been left with the child minders a little longer than they anticipated!

A wicked dry sense of humour helps define Claire's character and she also has been known (allegedly) to enjoy one or two 'swift halves' at WATERWIDE functions (A bit like David !!)

"In highly iron bearing waters, certain types of bacteria.....oxidise ferrous iron"

A – Z of water contaminants: Cont next issue

Iron

Iron occurs in three forms naturally. Ferrous Iron (Ferrous bicarbonate), Ferric Iron (Ferric hydroxide) and Heme Iron (Organic iron). Each can exist alone or in a combination with the others.

Ferrous iron can convert to ferric iron on oxidisation with the air, turning a clear water sample distinctly ruddy/brown.

Heme iron is organically bound iron complexed with decomposing vegetation. These organics often give a water a 'weak tea' colour. In highly iron bearing waters, certain type of bacteria (*e.g. gallionella*) are also capable of utilising iron as an energy source, whereby they oxidise ferrous iron to ferric iron which becomes encrusted around the bacteria's protective sheath, giving them a distinct red colouration.

Legionella bacteria also require a source of iron for development and hence, minimising corrosion in water systems is a fundamental approach to minimising Legionella presence.

Technical Forum
Legionella Update*

In 1999 a demonstration Spa Pool was responsible for a Legionella outbreak at a Dutch flower show. More recently, there was a smaller outbreak under similar circumstances in a West Country Hotel where 20 cases were identified resulting in 2 deaths. Contributory factors included design errors where by the pool could not be drained fully and poor on going monitoring where correct halogen treatment levels were not met routinely.

In a further survey of 50 public spa pools in London, Legionella pneumophila was found in 24% of the samples of which one in three of those testing positive for Legionella had acceptable TVC, E.Coli and Pseudomonas results. A clear indication that testing for general bacteria cannot be taken as a guide to the likely presence of Legionella and that regular Legionella testing should be carried out in its own right.

In 2002, the 18th meeting of the European Working Group on Legionella Infections (EWGLI) took place. In total 30 countries reported 4679 cases of Legionella cases contracted, which resulted in 283 deaths. This is circa double the figure presented at the same meeting in 1999 and indicates a rate of about 10 cases per million of the population. Improved diagnosis is a major contributory factor in this increase together with improved reporting systems. Even given this, feeling amongst experts is that the actual incidence rate is nearer 20 cases per million of the population.

2002 also saw the first year of the definition of a Legionella 'cluster'. (2 or more cases associated with a specific site within a period of 24 months). During this period 94 clusters were recognised.

Travel associated cases were up on previous years and it is noted that any hotels now associated with 'clusters' must now undertake a Risk Assessment and initiate preventative measures within 6 weeks. Failure to do so results in the hotels being named and shamed on the EWGLI web site. (Again, in 2002, 27 hotels were listed as NOT complying...23 in Turkey and 4 in Greece. Worth checking out your summer holiday hotel you might think!)

In the majority of cases where Legionella is identified, poor house keeping and maintenance are often significant factors.

WATERWIDE have specialists involved in carrying out Legionella Risk Assessment programs. For more information, please contact us (Info on back page).

** Information kindly supplied by Dr J Kurtz.. OBS*

"...survey of 50 public spa pools in London....24% of the samples....positive for Legionella"

WATERWIDE Reporting Systems

Policy at WATERWIDE has always been to deliver the best possible service at an affordable cost.

We take pride in looking after our smallest clients with the same degree of interest and integrity as we do our largest customers.

Many of the site reports written up are produced from a laptop computer and portable printer, thus ensuring that writing is legible and professionally presented.

Having information stored on computer data base means that a sites unique critical parameters (for a cooling plant or boiler or effluent plant) can be accessed easily and trend information produced at the click of a few keys.

Many clients already utilise this facility on a week to week / month to month basis, whereby WATERWIDE produce critical data graphs as an integral part of the reporting system.

In many instances, the role of the critical data graphs has been expanded to incorporate tangential information about a water using plant.

For example, oil or gas usage meter readings on a boiler plant are sometimes taken, or water make up usage to a specific cooling tower can be monitored with respect to other cooling towers on the site.

In short, if the data is a number, then a critical graph can easily be drawn up as part of the WATERWIDE report.

To see an example of a typical boiler water or cooling water report, please contact us via any of the means on the back page.

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WATERWIDE

Biofilm

A biofilm is a complex mass of organic and inorganic material resulting from the infestation, colonisation and development of bacteria in a system. In its early stages, the biofilm is predominantly organic, being a produce of adherent sessile bacteria. The bacteria produce a polysaccharide coating which acts as a protective sheath around the bacterial cells wall. In numbers, this sheath manifests itself as a slimly material which can cause operational problems such as physical blockages of pipework and reduced heat transfer.

The slimy nature of the deposit lends itself to attracting other types of material such as inorganics like sand, water salts and other particulates. Thus within a relatively short period of time, the once 'pure' polysaccharide material, becomes a homogenous mix of accumulated debris which serves to both protect the further developing bacterial cells and also provide a source of nutrient.

Pin Hole Corrosion as a result of anaerobic bacterial activity

As time passes, so the inner most areas of the biofilm can become devoid of oxygen resulting in anaerobic conditions being set up in the biofilm. This has the result of killing off some of the bacteria which were involved in the initial formation of the biofilm, and also allowing new anaerobic tolerant bacteria to take over and develop. On particularly troublesome type of anaerobic bacteria are termed Sulphate Reducing Bacteria (SRB's) which, as the name suggests, utilise the reduction of the Sulphate molecule as a means of metabolism. This causes significant problems in localised areas through pin hole corrosion, a direct result of the action of active sulphide being produced as a bye product of metabolism. This sulphide then reacts with water to produce a very corrosive liquor based on Hydrogen sulphide gas and/or Iron to produce Iron Sulphide.

Legionella in Hot Water Systems

The presence of bacteria in hot water systems is a bit of an anomaly, given that water over 50 C does tend to kill off most types of water borne bacteria. However, experience over the years has shown that the presence of micro-organisms in such systems is a real problem which requires attention and management.

The 50 C rule only works if the bacteria are in the water at this temperature.

Most calorifiers and hot water cylinders, by their very design, have cold incoming water which is heated up before being discharged. This inevitably means that there are fixed points in the calorifier which are 'below' temperature.

If theses areas produce consistently moderate temperatures (25—40 C) bacteria can live in these areas and positively develop in the 'warm' environment.

Calcium salts which are present in most waters (to a greater or lesser degree) further promote the ability of micro-organisms to colonise a hot water system. Calcium salts are inversely soluble with temperature, meaning that as a water temperature increases, so calcium salts tend to precipitate out as sludge. This sludge can collect at the base of the cylinder and act as a protective environment in which bacteria can grow. Typically, even given 50—60 C in a cylinder, the temperature in these sludge's rarely reaches any where near these figures and hence colonisation occurs. At times of high water usage, these sludge's can be disturbed ending up in the bulk water. With the sludge particulates harbouring the bacteria, dissemination is complete. To counter this, the use of destratification pumps are now widely used and accepted as a means of keeping water temperatures consistent throughout the cylinder. Regular flushing and where possible, cleaning, should also be in place.