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A Message from the Chairman

A very warm welcome to this SUMMER edition of the Societies’ newsletter. We continue to raise the high profile issue of our newsletter which is issued to our Members’ on a quarterly basis during the year. We within the Society are very proud of this production and our flagship newsletter shows our continued professionalism within the building services sector as a whole and also raises the profile of the Public Health Engineer within the Construction Industry.

The first half of 2014 has seen a great improvement in the overall economic output and the outlook is very much improved, with a great deal of optimism and confidence as more and more projects, particularly within London are given the ‘green light’ in terms of design. I very much hope that this continued improvement in the UK’s economy can be sustained in the medium and long term outlooks. I now hope that investment can be found to continue to train the next generation of Public Health Engineers, which is vital to our continued success within the industry which we serve.

As I write this article I am very pleased to inform our members that the Society has seen a great rise in the overall Membership base. Our Membership now stands at 245 individual members. This is a triumph for the Society through the year as we now approach 250 individual members. My overall aim is to see the Society grow to 300 members and beyond and we have made a great step towards achieving this.

Our industry working group is also a key to our continued success. I am pleased to announce that this group has now reached 56 members in total and we are indebted to each and every industry member for the support that they continue to offer the Society.

In May of this year I was honoured to attend the 4th SoPHE Northern Dinner in Manchester. This was again a highly successful event with a total of 117 guests in attendance. This is a very important occasion which has now become an established event within this part of the Societies’ network.

Our AGM took place in July whereby the 4 Serving Officers and Steering Committee Members were elected. I am delighted to inform you that the 4 serving officers have been elected for another year and we along with steering committee hope to continue our success as part of the Society.

Our CPD technical seminars which are at the heart of our activities have continued to take place during the year which offer a range of technical subjects to our members. We have a total of 5 technical presentations so far this year which have taken place on behalf of the Society. These CPD events have also been carried out around the SoPHE Regions to all members. Once again a very special thanks to all of those who have contributed to these successful events. As part of our continued review within SoPHE, the new Technical Committee Structure has continued to be developed. This new structure has already reinforced the good work of the Society as we have welcomed a host of new members that have volunteered to support its’ initiative. Further details can be found on the SoPHE website.

Chris Northey
Chairman, SoPHE
Water storage cisterns serve several purposes. They are used to meet peak demand for drinking water in premises where the incoming flow is insufficient or to provide backup in the event of mains supply failure. Cisterns also serve as reservoirs or suction tanks for supplying systems boosted by pumps e.g. fire-fighting systems and as break tanks to prevent backflow from hazardous downstream outlets, processes or appliances.

Some of these uses require the stored water to be wholesome – suitable for domestic purposes including drinking, cooking or washing. Too often water supply inspectors find examples where the design or maintenance of cisterns has been lacking, resulting in contamination. In some of the worst cases, described below, this has resulted in closure of premises and criminal prosecution.

In a busy English seaside hotel town, dead pigeons were discovered in the storage cisterns. In the Fawlty Towers sketch it was funny, however this hotel management’s failure to respond adequately resulted in the Environmental Health authority shutting the hotel, which went out of business. Figure 1 shows the contamination found.

Figure 1 Storage cistern with dead pigeons including one trapped beneath the float.

In Luton bad design and installation led to two property development companies being fined £25,000 for the illegal connection of drinking water cistern overflow pipes to the foul waste pipe. The offence was discovered when the foul pipe blocked, allowing raw sewage to back up and enter the cistern via its overflow pipe. Families in the premises had been drinking water from a cistern with faeces and toilet paper floating in it (Figure 2). The illegal installation had been repeated multiple times at residential apartments developed by the two companies and each offence was prosecuted successfully by the water supplier.

Insects and debris can enter cisterns through poorly fitting lids and un-screened vents or overflows. Unsuitable materials of construction can affect water quality by providing nutrients for bacterial growth or leaching out chemicals causing unpleasant tastes.

Cisterns need to be maintained throughout their life and vigilance is required at all times. Older galvanised cisterns may require refurbishment, but incorrect use of modern epoxy resins has caused contamination. Contractors who were working in winter applied the resin to storage cisterns in several blocks of residential apartments and, ignoring the manufacturer’s instruction regarding minimum curing temperature, refilled the cisterns before the resin had ‘cured’.

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water leached harmful chemicals from the uncured resin, until frothing and unpleasant taste caused the residents to alert the authorities. The remedial work was very expensive, with residents being temporarily re-housed until allowed home, as well as being provided with alternative water supplies until the cisterns were fit to be used.

To prevent contamination by backflow, cisterns incorporate air gaps which are rated by ‘fluid category’ to provide different levels of protection. For protecting wholesome water against the highest level of risk (fluid category 5) Type AA, AB or AD airgaps are required. Details of these are given in the WRAS Water Regulations Guide and in the Government’s Regulator’s Specification for Backflow prevention arrangements and devices: (http://webarchive.nationalarchives.gov.uk/20080305115859/http://www.defra.gov.uk/environment/water/industry/wsregs99/guide/section6.htm)

The Type AA airgap has the discharge point completely above the spillover level (SL) of the cistern (Figure 3).

The Type AD airgap is described as the ‘jump jet’ because the inlet water is projected horizontally across an airgap (Figure 4).

The Type AB air gap is achieved by having a weir overflow located so overflowing water will pass through it, leaving the discharge point clear (Figure 5).

The design of weir size for Type AB airgaps is made easier by using the AB airgap calculator spreadsheet on the WRAS website – (http://www.wras.co.uk/Air_Gaps/DEFAULT.HTM).

Cisterns play an essential role in water supply plumbing, however the principles of good design, workmanlike installation and adequate maintenance need to be understood and followed by those who design, specify, install and maintain them.

For technical advice or copies of the Water Regulations Guide, contact WRAS via info@wras.co.uk or telephone 0333 207 9030.

Figure 3: Type AA airgap

Figure 4 ‘Jump jet’ Type AD airgap

Figure 5: Type AB airgap

Young Engineers Award 2014

The Challenge
In peri-urban areas of developing cities, the use of decentralised wastewater treatment systems, such as baffled reactors and small-bore sewers, can be threatened by flooding, occurring increasingly frequently due to climate change. Can you find ways to adapt such systems for flood prone areas?

Submissions
Demonstrate your idea on one A1 poster.
Please refer to the SoPHE website

Entrants
Teams of up to 3 people aged 18-25

The Award
An in-country trip to verify the applicability of the design

in association with

www.cibse.org/sophe
Having worked for 5 years in the UK as an Environmental Services Engineer on various projects around the world, I was offered an opportunity to move to Los Angeles and work on projects in this sunny, dry and seismically active environment.

The American culture of ‘bigger is the better’ applies to engineering too. Big cars, big buildings, big stores, big roads, big infrastructure... However, you wouldn’t necessarily overdesign, as ‘Money is King’. Engineers focus on a design which is good enough to satisfy clients’ needs as well as it being a cost-effective solution – there seems to be a much greater emphasis on cost than in the UK and designs are trimmed back to the minimum.

When working in a new environment such as the States, it is important to ensure that you use the appropriate terminology and communication style. There are many terms in engineering that are used differently in the US such as “wet stand pipe” instead of “wet riser”, “faucet” instead of “tap” etc it can be very easy to confuse the “locals”! Terminology used can sometimes limit people’s understanding if appropriate terms are not provided on drawings and reports.

The engineering design varies based on the project’s location in the United States. You are required to follow the State’s rules and regulations as well as the City’s requirements. For instance, it can sometimes be tricky to decide which rainfall intensity should be used for a particular project.

Particularly in California, recent research suggests that it is currently experiencing the worst drought in the last 100 years and some areas could run out of water within 3 months. (refer to Fig 1)

Water is generally supplied from the dams and reservoirs located in the valleys and these reservoirs are able to meet 40% of the State’s demand in a normal year.

Due to the drought, the State started reviewing the potential alternative water supply resources and started drilling new wells (and this time it is not for oil, it is for water). Groundwater is an important alternative water supply resource and mostly used for irrigation and occasionally for drinking. Agriculture including fruit, vegetables, dairy and wine production is one of the main industries in the region and contributes to the majority of the exports in the world. Therefore, the drought and the need for reliable water supplies have a big impact on the State’s economy.

Drilling new wells may sound like a sustainable solution, however, new studies indicate that this process is putting pressure on the existing San Andreas fault line, as the existing water table level goes down in the ground. Even though depleting groundwater and then injecting back into the ground through watering plants will recharge the ground with water, this approach results in movement between the tectonic plates as the liquid acts as a lubricant.

In order to avoid this happening, desalination water supply can be considered instead to provide water to the local communities. In simple terms, desalination is a...
process of removing salt and other minerals from water. Due to its expensive design and treatment costs, even though desalination is a reliable source, it is seen as the last resort. Some would argue that treating wastewater is much more cost effective than drawing large amounts of water from the ocean and processing it.

Despite the fact that desalination is still an energy intensive water supply method in comparison to conventional water treatment methods, and it harms the marine environment if the removed brine cannot be disposed of correctly and instead discharged back to the source, it still could be one of the inevitable water supply solutions for the areas suffering from lack of fresh water.

California did not miss the chance of exploring desalination to fight against drought conditions. Privately owned Carlsbad Desalination Plant, San Diego, is under construction and expected to be completed by early 2016 (Fig 2). Currently the construction cost is estimated as $1 billion and it will provide 50 million gallons (190,000 cubic meters) of water per day. The supply can meet 7% of the demand in the area.

Besides desalination, municipal wastewater treatment is not unusual in California, however it is not commonly incorporated at a local building-scale. As, the natural resources are limited and the price of water supply is continuously increasing, the cost of water treatment or desalination will be comparable in the near future.

Apart from water scarcity, the State, especially the City of Los Angeles, is striving against the worst smog conditions in the country. Sunny and warm climate and the low rainfall causes ozone formation and high amount of dust.

Based on Environmental Protection Agency’s report called “The inventory of U.S. Greenhouse Gases and Sinks”, while the transportation is the major source of the air pollution, the buildings contribute 10% of the greenhouse gas emissions by burning fossil fuel for heating.

California is seeking the opportunities to incorporate wind turbines or photovoltaic panels, using biofuels to help preserve the natural resources and improve the air quality.

Overall, California dreaming in Sustainable Engineering based on the Environmental Protection Agency’s report called “The inventory of U.S. Greenhouse Gases and Sinks”, while the transportation is the major source of the air pollution, the buildings contribute 10% of the greenhouse gas emissions by burning fossil fuel for heating. (Fig 3)
Maintaining a safe and efficient hot water system

By Kevin Potter, Business Development Manager – Hot Water Solutions, Hamworthy Heating

Hot water systems need to be designed and maintained to ensure they deliver safe and efficient hot water.

In order to comply with regulations and gain maximum operating efficiency from hot water systems you need to be aware of the water quality, understand the effects of scale and adopt a tailored water treatment regime that is relevant to the type of system, location, application, and hardness of the water.

What effect does scale have?
In traditional atmospheric water heaters the gas burners are located below the cylinder, making them susceptible to scale dropping and settling to the base of the unit. This creates an insulation barrier to the heat source, just a 1mm build-up of scale can reduce the efficiency of the unit by 7.5%. This can also cause excessive expansion of the heat transfer plate which can result in cracking ending the water heater’s life. (refer to Fig 1)

An accumulation of scale in a hot water system can reduce the inside diameter of water pipes or block them completely. This will affect the water pressure and flow within the distribution circuit, increasing the work and energy required for pumps, and leading to unsatisfied customers.

The presence of scale in the system provides the right conditions for the proliferation of legionella bacteria.

Why do anything about it?
Providing safe hot water is the most important reason for maintaining a clean system, but cost and efficiency are also of paramount importance – particularly as running costs are ever increasing and Government targets and regulations are getting stricter. The more scale present in a system the more energy used and more CO2 created.

Prevention is much better than cure and normally cheaper. Ensuring hot water systems are clean and serviced regularly helps maintain efficiency and longevity of appliances and keep running costs to a minimum.

An unplanned maintenance cost as a result of untreated water can lead to system down time. If it is critical hot water supply, such as healthcare premises and hotels, then it can lead to closure of the premises. An unbudgeted distress purchase usually replaces equipment like for like rather than reviewing the system and seeing where changes and improvements can be made for greater efficiency in the future.
What can you do to reduce scale?

Physical water conditioners alter the physical structure of hard water crystals, making them easier to dispose of, without the use of chemicals.

In water treated by a physical water conditioner, previously separate positive and negative ions are brought together into clusters of at least one positive and one negative ion. The clusters of ions attract and hold the hardness minerals (calcium and magnesium) meaning that most are discharged with the water. Those that remain form the softer, far less problematic, type of scale that can be easily wiped away.

Water softeners also work on ions contained within the water. Hard water contains calcium and magnesium ions and water softeners use resin beads, which hold sodium ions. When hard water passes through the resin beads inside the softener, the beads attract and hold the calcium and magnesium ions and give off the sodium ions. After this ion exchange process, the water leaving the softener is soft.

Once the resin bead is loaded with calcium and magnesium ions, salt water is used to wash the resin beads. The salt water solution (brine) loosens the hardness ions which have built up on the resin beads and the system then backwashes and flushes the hardness minerals away. The resin beads, once again hold the sodium ions and the system is ready to soften more water.

An ongoing regime is vital for combatting scale and lowering the chance of legionella bacteria forming and spreading in the system.

Increase in use of condensing water heaters

Newer models of water heater such as the Dorchester condensing water heaters from Hamworthy Heating are fitted with a down firing pre-mix modulating burner. This eliminates the risk of scale build up impacting on the heat transfer (an issue evident in atmospheric water heaters).

This is just one of the benefits in using condensing water heaters over atmospheric models. We are seeing more systems specified with condensing units – namely due to the increase in regulations and greater efficiencies. With heating loads getting smaller it is often now the case that a higher percentage of energy in a commercial building will be used for hot water.

Compliance with regulations

The Building Regulations Part L 2013 are enforced from 6th April 2014 and for new buildings states that water heaters above 30kW using natural gas and LPG will need to achieve a thermal efficiency of 90% and 92% respectively – something that is really only achievable with condensing units.

The Energy Related Products Directive (ErP) published in September 2013 aims to help government achieve its 80% carbon reduction target by 2050. The impact of ErP for hot water appliances will be phased in using several stages up to September 2018, at which point higher efficiency condensing products will become the norm.

ErP also imposes stricter control on NOx emissions requiring levels no greater than 56mg/kWh for gaseous fuels and 120mg/kWh for liquid fuels. These levels are too stringent for gas atmospheric appliances, whereas pre-mix condensing appliances with efficient combustion control will be capable of meeting the requirement. The higher levels for liquid fuels acknowledge that achieving low NOx emissions with oil based fuels is more complex and costly than for gas.

Although the impact of these regulations will eventually force people to switch to condensing water heaters it also makes good economic sense. The ease of integration with condensing boiler systems, as well as all the associated benefits of increased efficiencies, better control, lower emissions and lower running costs will all help to provide customers with the safest and most efficient hot water systems.

Fig 1 - A build-up of scale at the bottom of a water heater
The next IG sponsored event is planned for October when the guest speaker from Julie, Mark and the SoPHE Industrial Associates Group for a very successful event. While the food and drink flowed freely courtesy of the SoPHE IG. Many thanks to had finished their formal presentations a Q&A session continued for some time for example, a specification please email technical@sophe.co.uk. Once Julie and Mark were completed so we learned that in 1886 links were found set early on in the evening when we also learned that in 1886 links were found between ill health and contaminated water supplies. Surprisingly for once, there was no one in the room that remembered that year! Julie also highlighted some of the challenges that we as consultants, contractors and clients are frequently facing, particularly with the use of water conservation and reclaimed water systems with regard to compliance was also discussed. Julie highlighted the Approved Contractors Schemes and “WaterSafe” which is the umbrella company for the seven approved contractor schemes in the UK. If you would like a copy of the presentations or require further advice with regard to including details for this requirement to be included within for example, a specification please email technical@sophe.co.uk. Once Julie and Mark had finished their formal presentations a Q&A session continued for some time for example, a specification please email technical@sophe.co.uk. Once Julie and Mark had finished their formal presentations a Q&A session continued for some time while the food and drink flowed freely courtesy of the SoPHE IG. Many thanks to Julie, Mark and the SoPHE Industrial Associates Group for a very successful event.

The next IG sponsored event is planned for October when the guest speaker from WRAS will be presenting on Domestic Water Pipeline and Joint Failures.

In May we reverted to the traditional CPD venue in Holborn where Lutz Johnen from Aguality presented on Greywater Recycling Systems. More than 30 people attended the interesting talk which covered legislation, definitions, water recycling hierarchy, design considerations and common problems. Lutz went on to present project case studies where centralised greywater recycling systems have been successfully installed and operating within Germany and the UK.

To close the London events before the summer holidays got into full swing we held another technical forum which followed after the AGM on the 3rd July. The topic for discussion on the evening was “Domestic water demand diversity forum”. Chris Grubb kindly chaired the event with Martin Shouler providing an insight into the collaborative work between CIPHE and SoPHE as part of the LUNA project and explained where Loading Units are derived from as well as other methods that are used within the UK and throughout the world. Shaun Howe from AquaTech Pressmain then presented a case study for 113 residential apartment development where recorded data over a 9 year operational period of almost full occupancy indicated that the booster pump set was massively oversized. The discussions continued with many questions from the audience and at the time of writing we are compiling the minutes for issue to all members. Many thanks to all those who attended and provided valuable input into the forum.

With regard to future London events we start the Autumn season with the second sponsored IG evening as described earlier. Following this we plan to hold an Installation Best Practice Forum on 11th November, chaired by Sanjay Modiasia who leads the newly formed Contractors Group. The forum will discuss the pro’s and Con’s of crimped fitting pressure pipework systems and highlight, amongst other things, the requirements for rigorous workmanship and audit system. Manufactures, contractors, consultants and clients will have the opportunity to examine, use and discuss the issues associated with such systems.

On 2nd December, Baxi Commercial will present a CPD on Heat Interface Units and District Heating Plant Load Diversity and in January we plan to hold a one day conference on building drainage venting (as held in Manchester in January this year), the exact date is to be confirmed.

If you would like a copy of any of the regional presentations or are able to support at any level, please get in touch via technical@sophe.co.uk.

NEW MEMBERS

- Arcangel, Lagos: Affiliate
- Michael, Lloyd: Affiliate
- Peter, Weatherall: Affiliate
- John, Fisher: Affiliate
- Siu Fai, Wat: Affiliate
- David, Buisson: Affiliate
- Michael, Melluish: Member
- Michael, Mulroe: Affiliate
- Rickesh, Miyangar: Member (transfer)
- John, Arrowsmith: Affiliate
- Roman, Weglarz: Affiliate
- Simon, Russell: Affiliate
- John, Curley: Affiliate
- Stuart, Birkett: Affiliate
- Chris: Rhodes: Affiliate
- Roodrasingh: Sookun: Affiliate
- Peter: Alexander: Affiliate
- Tamer: Sonay: Affiliate
- David: Morton: Affiliate
- Daniel: Collins: Member (transfer)
- Thomas: Lyons: Affiliate
- Barbara: Valente de Sousa Ramos: Affiliate
- Stephen: Brookes: Affiliate
- Farah: Cuswell: Affiliate
- Jeffrey: Walker: Member
- Georgios: Nikas: Associate Member
- Callan: Heggie: Associate Member
- Trevor: Wijekoon De Silva: Affiliate
Such a lot has happened since our last update (or at least, that is how it feels!), I’m not sure where to start. As always, our technical evenings occur on the third Wednesday of every other month; therefore, following on from our March evening, the next one was held on Wednesday 21st May. The presentation was by Honeywell Eng. Ltd entitled “Domestic Hot Water – inline thermal balancing”; we were privileged to have Arnd Burschgens, Honeywell’s Application Engineering & Training Manager who flew over especially from their Mosbach manufacturing facility in Germany to do the presentation in which there were approximately 23 people who attended the evening & despite the potential “language barrier”, some interesting and thought-provoking questions were asked during & after the presentation.

Prior to this evening, there was (of course!) our 4th Northern Dinner which was held on Friday 9th May at the Midland Hotel in Manchester. I’d like to thank personally everyone who came, & of course to the table sponsors, and I hope you all had a great time – I certainly did! Having taken “a month off”, the organising wheels are already starting to turn with regards to next year. All I can say at the moment is that it’ll happen on Friday 8th May 2015; please make a note in your diaries. If anyone has any ideas as to what we can do, at what will be our 5th Dinner, please let me know. This is also applicable to ideas regarding the Guest Speaker – suggestions gratefully received.

Even though we normally have our technically evenings every other month, we were fortunate to be able to provide an extra one, which took place on Wednesday 25th June. This was presented by Julie Spinks, the Managing Director of WRAS; her presentation was entitled “Keeping Water Safe in Premises” (this was also provided by her to SoPHE members in London in September 2013). It was an interesting evening in which she described the function of WRAS in conjunction with the requirements of the Water Regulations as well as the various Approved Schemes that are currently available including WaterSafe.

At the time of writing, our next scheduled technical evening will be on Wednesday 16th July 2014 and will be presented by Armstrong International & is entitled “Digital Control of Domestic Water Systems”; the evening after that is on 17th September 2014 to which Delabie will be presenting – the presentation is entitled “Conservation & Control of Water in Commercial Installations”, As always, these evenings are held at The Rain Bar on Great Bridgewater Street in Manchester where everyone & anyone is warmly welcome (members & non-members alike).

As some of you may – or may not – know, Steve Ingle & myself are members of the committee for CIBSE NW so, if there are any issues to which you’d like us to raise on your behalf, specifically for CIBSE and maybe which is applicable for the north west of England please let either of us know either via email or the telephone.

As I indicated last time, if there are any “younger” engineers out there who would like to get more involved in the organisation of various events in the SoPHE NW region – not just the technical evenings – please do not hesitate in contacting me to discuss further.

For details of contacting your regional contact please refer overleaf.
THE STEERING COMMITTEE

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FEEDBACK

We would welcome any comments on this newsletter or contributions to future editions, in particular with regards to:

- Future events for consideration
- What should SoPHE be providing to our members
- Items or comments you think may be worth raising or informing your fellow members
- Technical articles from members, giving situations encountered and how they were overcome

Please email comments to Jonathan Gaunt or Paul Angus at
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paul.angus@erbas.com.au