June 2016
Queensland Branch Newsletter
Well doesn’t time fly when you’re having fun? It is with some sadness that I near the end of my term as AWA Queensland Branch President. It really has been a rewarding and satisfying experience and reinforces for me the leadership role that Queensland plays, both within the AWA and in the Water Sector more generally.

At this stage though I am reminded of some long distant high school biology lessons where we discussed that natural systems need to either grow and regenerate while at the peak of a cycle, otherwise they risk entering a state of decline and regrowth becomes much harder. Apologies to those more experienced in the sciences than I am for ruining a very refined theory with my rough recollection. Some might even recall some wonderful curves that go with this lesson, which I wont attempt to recreate!

I think that as a Branch, we are at the right time to grow on a new cycled and regenerate again and continue to with AWA’s mission of collaboration and advocacy on water sector issues. The Branch is in a very sustainable position with regards to member engagement, quality of the program, strength of the committee and sub-committees and the state of the finances. Our State Manager, Troy Cush is settling into the rhythm of the branch after starting earlier in the year and getting to know many of our members and we are currently in the process of electing the next branch committee, which will bring a balance of continuity and fresh perspectives. We are also continuing to work closely with like minded industry bodies such as the Queensland Water Directorate (qldwater), WIOA and WSAA to ensure services are as coordinated as possible across the State.

Importantly to lead this next phase of growth for the Branch, our next Branch President, Dr Sandra Hall will take up the reins from July. We will be lucky to have the North Queensland Regional Conference in Townsville in July, which will serve as a great formal handover point. Sandra brings a strong academic and research perspective to the role, and is certainly better placed than I to use science analogies! I am excited about the perspective and energy that Sandra will bring and also the likely diverse sectorial make up of the new branch committee. Combined, these will continue to ensure a strong representation of our entire member base in Queensland.

In other news, many Queensland members will have attended the recent OzWater conference in Melbourne. As well as an excellent program and huge trade exhibition, some notable congratulations are due to Queensland members who were successful in winning National Awards and Prizes. The Queensland awardees are shown on the next two pages.

In other recent events, I would like to offer a vote of thanks to:

• Queensland Urban Utilities who hosted a tour of the Innovation Centre at Luggage Point and facilitated a fascinating workshop on “The Utility of the Future”.
• The Young Water Professionals committee who have successfully kicked off another mentoring program with more than 30 pairs of mentors and mentees established.

The back half of the calendar year is traditionally busy for the Queensland Branch of AWA and the water sector generally in Queensland and this year will be no exception. We still have some highlights to come including:

• The North Queensland Regional Conference, which will be held in Townsville in July. Be sure to check the web site for details on this fast approaching event, which has a fantastic program lined up.
• The WaterAid Ball in Brisbane, also in July, which raises funds for a cause close to all water professionals’ hearts.
• The Queensland Water Awards program, culminating at the Gala Dinner in September. The call for award nominations will be coming out very shortly so start preparing for this.
• The QWater conference to be held in November. This year the conference is being run as a joint event with our colleagues from the NSW Branch and we are venturing (just) across the border to be hosted Tweed Shire. The call for papers is out at the moment, so check the web site for details.

Of course, let’s not forget the honour of Brisbane hosting the IWA World Water Congress in October.

Let me finish by thanking all AWA Queensland Branch members for making our industry such a collegiate and inclusive one to be a part of. It really does feel like a big team with a common purpose of providing high quality services to the people of Queensland and I have been honoured to play my part in facilitating knowledge sharing and networking within the team and advocating for some of our key issues. Please join me in welcoming Sandra to the role of Branch President and I look forward to continuing to catch up with many of you at upcoming events.
Ozwater’16 Queensland Winners National Awards and Prizes

Scott Roy Undergraduate Water Prize (Pictured with AWA Federal President Peter Moore)

Unity Water Team – Infrastructure Innovation Project Award

Dr Helen Stratton Honorary Life Member (Pictured with Qld Branch President Matt Dawson).
Mohamed Jakaria was announced the winner of the Australian Stockholm Junior Water Prize at Ozwater’16 in Melbourne. Mohamed’s entry involved research that he did whilst in Year 12 at the Queensland Academy for Health Sciences, which is located on the Gold Coast. Mohamed studied the efficiency of Elodea canadensis in removing nitrate from effluent discharged from a wastewater treatment plant. The idea for the research came from Mohamed’s visit to India in 2014. There he noted the lack of good quality water and wondered whether there was a low cost way of treating wastewater that could utilise naturally occurring microalgae that can be found on readily available macrophytes such as Elodea canadensis.

Prior to carrying out his experimental work he researched other work done in this area and found little that was directly relevant. He then carried out his experimental work at the school laboratory using samples of effluent taken from the Beenleigh Wastewater Treatment Plant. He tested the efficiency of removal of nitrate for various lengths of Elodea over a period of up to 48 hours, the time limit being constrained by resources available at the school.

He used the length of the Elodea as a measure of surface area. For the maximum length of Elodea tested (120 mm) the nitrate concentration was found to reduce from 25.1 mg/L to 21.9 mg/L over the 48 hour period. This compared with control sample that showed no nitrate reduction over a similar period. Lighting on the test samples was adjusted to simulate natural lighting conditions.

Time limits on his work precluded Mohamed developing his hypothesis further, however he was pleased with his findings which indicated a positive reduction in nitrate levels for the plant effluent tested.

Mohamed is now at the University of Melbourne studying for a degree in Bio-medicine. We wish him well with his entry for the International Prize which will be announced during his visit to Stockholm in August 2016.
The QLD YWP Mentoring Program 2016 kicked off on the 26th of May at the Jacobs office in South Brisbane. The program was a sell-out event. Sixty mentors and mentees gathered as the 2016 Mentoring program cohort and met the mentor/mentee with whom they had been matched.

The night started with some food and drinks, followed by a presentation on mentoring by Dr. Brian McIntosh, from the International Water Centre, who kindly returned to facilitate the program once more. Brian guided participants through a fun speed dating activity; and group activities, which were designed to help develop mentoring goals and raise awareness of problems and solutions encountered in some mentoring relationships. Mentor Jim Fear and mentee Michelle Strathdee were a major highlight of the night. They formed a pair from the previous program and shared their reflections and experiences.

Assigned mentors and mentees were revealed by asking participants to find a matching surprise symbol they had on their name tags! It was an exciting atmosphere as mentees had their first conversation with their mentor. The QLD mentoring program has not been run for 2 years and the atmosphere buzzed with new, fresh-faced mentees. Many of the mentors were returning from previous programs; these mentors are true assets to the future of Australia’s water industry! A few mentors took the big step from being mentees in previous programs to becoming mentors for graduates in this year program – well done and good luck!

Organising this year’s mentoring program would not have been possible without Thakshila Balasuriya and Alex Wise who volunteer on the QLD YWP committee and are responsible for coordinating this year’s program. A massive thank you also goes out for the kind sponsorship from City of Gold Coast Council, Nalco, Eurofins, the International Water Centre and Jacobs who provided the venue.

Author: Thakshila Balasuriya
John Graham has been one of AWAs devout supporters. He says that he has been on AWA Branch Committees for over 30 years apart for about 18 months when he moved from Victoria to Queensland. Prior to AWA being restructured he was on the AWA Board for several years and was appointed to the Board in its new form in 2012. He was on this Board for two years from 2012 to 2014. He is also a Past Branch President for both the Queensland and Victorian Branches.

John gained a Diploma of Civil Engineering from the Swinburne College of Technology (now Swinburne University of Technology) in 1971. His first job was with consultant Garlick and Stewart (later to become Fisher Stewart) working on roads and drainage design. He then moved on to become a resident engineer managing the construction of sewerage reticulation. John then joined Camp Scott Furphy in 1972 and in 1975 was appointed to work as Resident Engineer with the Lilydale Sewerage Authority (LSA) to provide assistance for an extensive program of sewerage reticulation expansion. The LSA was owned by the Lilydale Council but was run by a Board of Directors.

As it turned out, John eventually took up the newly created position of Authority Engineer with the LSA in 1977 and got caught up in the period when Victoria’s 350 plus water utilities were under pressure to restructure. At one stage it was proposed that the LSA be core of a proposed regional Water Authority for the whole of the Yarra Valley but this was later changed and LSA was merged into the Melbourne and Metropolitan Board of Works (MMBW later to become Melbourne Water) in 1984 as part of the first restructuring of the Victorian water industry following the Public Bodies Review Commission inquiry (1980 to 1984). It was during this period that John became an Engineer Water Supply (EWS), a then essential qualification for managing construction of water and sewerage works in Victoria. A number of years later John was appointed by the Governor in Council to the EWS Board of Examiners.

When the MMBW took over the LSA, John was appointed to the position of Areas Engineer (Deputy Head) of the Property Services Department and later became the Construction Manager of the then MMBW Southern Region.

In 1987 John joined the Geelong District Water Board (later to become Barwon Water) as Executive Manager Operations. He was there for just over thirteen years before taking up a position as General Manager with Redland Water in 2000. John left Redland Water and Waste as it later became in 2005 and worked for Cardno, Monadelphous and BECA before joining SUEZ three years ago. John will be retiring in July and says that he has really enjoyed working with SUEZ. He says that he has found SUEZ to be one of the best companies he has worked for.

John identified a number of career highlights including his early days at Lilydale (early 1980’s) when his organisation was identified as a model for future water utilities in Victoria by the public Bodies Review Commission because of its systems, innovation and approach to customer relations. Another highlight was being part of a Cultural Change program the Executive implemented at Barwon Water. The process, focussed on “changing the way the Organisation did things at every level”. The longer term vision was to move from being a bureaucratic, inwardly focused organization to one driven by quality customer service delivery and business efficiency.

John is married to Lyn and has three adult children, Christie, Bradley and Andrew. Outside of work he enjoys tennis, travel, golf and fishing. Living at Redland Bay gives him good access to the water for boating and fishing. In his retirement he has plans for travelling both overseas and around Australia. If you drive past John’s house you will see a caravan, boat and motorbike eagerly awaiting his retirement.
Abraham was elected to the Vice President of the Young Water Professionals this year. Abraham says he is passionate about providing the opportunity and guidance for the younger water professionals in order to enable them to better connect with the older water professionals. He says that he was lucky in that by the time he had moved out of university life into industry he was relatively mature having completed both Master of Engineering and PhD degrees at the University of New South Wales. He says that younger water engineers often lack the confidence to talk to the more senior engineers and often miss out on opportunities for learning advancement for this reason. He has therefore been working with other younger water professionals in the committee to organise events where young people could network with the more experienced professionals in a friendly environment.

Abraham completed his bachelor of chemical engineering degree in Iran in 2004. He was then fortunate to be offered the opportunity to study for a Master of Engineering degree at the UNESCO Centre for Membrane Science and Technology at the UNSW. On completion of this degree he went on to do a PhD at the same university. His thesis topic for his PhD was on membrane technology. As part of his thesis he studied membrane options for improving water quality for effluent from a paper mill treatment plant in Albury, NSW. The purpose was to increase water recycling within the plant and reduce reliance on external sources of water. The project also involved the construction of a pilot plant. This proved successful however as is usual, the advent of rain put any further development on the back burner.

On completion of his doctorate, Abraham was offered a position with GHD in Brisbane. He worked there for a year before taking up a position with MWH also in the Brisbane office. He was fortunate to work on two very interesting projects whilst at MWH, both involving membrane technology and ion exchange treatments for coal seam gas applications. He considers the experience gained on these two projects will add to his experience with advanced treatment processes.

His opportunity to come to Australia was somewhat fortuitous as he had applications in with a number of countries and the Australian opportunity came up first mainly because of the different semester starting dates. He has been subsequently extremely happy with this decision to come to Australia as he has found that he really enjoys living here because of the people, the culture and the weather.

In his spare time Abraham enjoys the beach, swimming, going to the gym and generally enjoying life. He has recommenced learning the violin, something he started learning just before he left Iran. He says he is still a bit squeaky and is selective as to the time he does his practising.
I was fortunate to be invited to the Water Leaders Forum at Ozwater to hear Charlotte Morgan talk about a new delivery model for infrastructure projects. Charlotte is a Partner in the UK legal firm Linklaters and she spoke about her work in setting up the financial model for the proposed Thames Tideway Tunnel project. This project will divert sewage and stormwater overflows from 34 overflow outlets that currently discharge to the Thames River to a new 25 km long by 7.2 m diameter tunnel to be constructed along the banks of the river.

Flows will be diverted to Abbey Mills to the east of London and thence via the currently being constructed Lee Tunnel to the Beckton Sewage Treatment Works. The project is expected to be completed by 2023. As Charlotte noted the conventional financing method would have cost each Thames Water customer about £80 annually (over the whole service area, not just the immediate areas of London benefitting from the project). However the innovative funding model developed for this project enabled this to be reduced to no more than £25 per Thames Water customer annually.

The project will be financed and delivered by an independent infrastructure provider (IP), regulated by Ofwat under a ‘Project Licence’ arrangement, rather than by Thames Water itself. The weighted average cost of capital (WACC) for the £4.2 billion project will be 2.497% until completion of construction and testing, according to Ofwat’s announcement. Economic regulation of the TTT project will be split between a construction period and an operational period. The 2.497% WACC will apply only during the construction period of the project, whilst during the operational period, Ofwat will set an allowed cost of capital, similar to the approach it applies to other water and sewerage company licensees. There was much work done in structuring the risk allocation between parties to allow this lower construction phase WACC to occur.

The regulatory framework and processes during the construction period are built around ensuring that the IP has sufficient funds to meet IP’s debt servicing costs etc. and even allow investors access to some return during the construction period.

This is recognised in Ofwat’s economic guidance for the TTT where it notes that: “As the Project will spend a number of years in construction before becoming fully operational, we have agreed to a number of regulatory adaptations that are designed to support the Infrastructure Provider (IP) in financing the construction of the Project at an efficient cost to customers.”

Charlotte said that in order to reduce the WACC and hence the cost to customers it was necessary to make the project attractive to “blue chip” investors rather than just the traditional public private partnership (PPP) investors who are used to higher risk, higher return models. These were investors such as companies managing superfunds. Such investors would traditionally not consider a high risk construction project such as a tunnel during the construction phase. The funding arrangement involves the UK government providing protection against certain risks including insurance, cost overruns and termination compensation. This combination of regulatory and specific protections enables the project to be financed with lower WACC than would be available without this protection.

The project was broken up into three main contract packages, with the packages being determined according to the geographic location. All three contracts have been let under the NEC3 Engineering and Construction Contract option C (target contract with activity schedule) with 50/50 pain/gain share arrangements. These are being delivered by three design and construction consortiums. Charlotte noted that the pain was capped at 40% above the agreed target price and that an additional allowance of 30% contingency was provided, which would be paid for by equity, should the need arise.

A lively discussion was held after the presentation about the applicability of this approach to different types of projects around the water industry in Australia and smaller scale projects. Charlotte stated that she thought that it could be applied to smaller projects and forum attendees entered into some discussion about how it could apply to projects in different states around Australia. An over arching conclusion was about the need for consistent and predictable economic regulation to help reduce the cost of funding Australian water sector projects, whatever combination of public and private funding is used.
Townsville City Council has embarked on a $60m four-year program of work to upgrade the central CBD water supply network. The work will also include upgrade to parts of the sewerage network, some stormwater infrastructure improvements, a new water reservoir and road and footpath works. The main driver for the work is replacement of aging pipes, some up to 60 years old and consisting of unlined cast iron and galvanised iron pipes. These pipes have a build up of corrosion on the inside which severely restricts flow and thus the ability to deliver water to customers at the desired pressure.

With the growth of development in and around the CBD area it has been necessary to replace and upgrade these existing water mains. Where possible the upgrades will be co-ordinated with major re-developments. Other providers of utility services such as Ergon, Telstra and the NBN have also been contacted to ensure that any upgrades proposed by these utilities can be incorporated in the proposed program of works.

The design of the work was managed by Council utilising local consultant GHD prior to calling of tenders for the construction of the work. Council elected to deliver the project using a bespoke Construction Manager delivery model. BMD was appointed as the Construction Manager through a process of competitive tendering. BMD is responsible for parcelling up the work packages to achieve efficient and cost-effective delivery, delivering the work to meet Council targets dates for delivery and managing each contract package on behalf of Council.

One of the requirements of Council was to ensure high local involvement in the construction works. This was achieved through the development of strong tender selection criteria, structuring the contract to promote local involvement and was supported by the development and implementation of a KPI driven incentive pool.

Because of the nature of work, which involved construction in high traffic areas with numerous services of uncertain location, workshops were held with tenderers during the tendering stage to identify the best way of managing the risk. This enabled the risk to be allocated to the parties best able to manage it. Risk management was also included in the Construction Manager’s incentive pool.

One of the major challenges of the project was and will be managing and minimising disruption to stakeholders, which include many businesses. A number of workshops have already been held to keep stakeholders informed and to obtain feedback on issues of concern.

Other major projects have already been carried out or are planned to be carried out and will revitalise the city centre. These include the Flinders Mall Redevelopment, the Strand Waterpark renewal and the proposed Waterfront Promenade.
MY PLANT IS OUT OF CONTROL-AND I DIDN'T EVEN KNOW IT!!!!!
Periodically I get called into review a plant that is considered to “be doing pretty good” and “not much room for improvement here”. At one plant, they were quite happy with their effluent ammonia that was typically 0.2 to 0.4 mg/L as nitrogen. Although this was within licence, it may indicate an underlying problem. We did hourly grab samples and found that, as the morning peak passed through the plant, the effluent ammonia increased from less than 0.1 mg/L to over 3 mg/L.!!! For the evening peak we had a sample with 2 mg/L of ammonia nitrogen.

Following on from this, we found that the plant was using a somewhat higher than expected chlorine dose for disinfection. Explanation: The high morning peak of ammonia was reacting with the chlorine and reducing disinfection effectiveness for the last, and, occasionally, the second last, coliform grab sample (you have to take five samples over several hours in sterile bottles), resulting in high coliform counts. The solution was to increase the chlorine dose rate for the whole day to compensate for a few hours of problem ammonia levels. Thus there were issues with high free chlorine residuals let alone the cost of chlorine and the safety risks associated with more frequent changeover of drums.

So, we went back to the root cause. Like most WWTP’s world-wide, the aeration system was based on using Proportional Integral Derivative (PID) control for the aeration control valves. PID was developed to respond to a “step change” where the required output value goes from one constant number to another constant number. Our output value (the required air flow) is constantly changing over the entire day. =

So, inherently, PID control is not well suited to aeration control and we only persist in using it since it was originally the only form of control available and we haven’t questioned it since.

Now, imagine you are having a shower and you have finally adjusted the hot and cold just right. Then someone gets in the second shower and starts fiddling with the hot and cold taps. You need to readjust and this causes the other shower to need readjustment that interferes with your shower again. Toss in two more showers and you can see that the situation is getting complex. Meanwhile, someone is outside on the main tap to the house adjusting it to maintain a constant pressure just downstream of the main tap. Taps are getting adjusted like mad to compensate for everyone else adjusting taps!!! This is exactly what happens in aeration control with PID. The output for each control loop becomes an input for every other control loop.

Matters are made worse by the system response. We have timed how long it takes for an aeration cell to respond to a change in the control valve setting. Delays of up to 10 minutes can occur. So imagine if you turned the tap and had to wait 10 minutes to see if you got it right. The control system doesn’t and it keeps turning things up and then overshoots. It then turns down and undershoots. We call this hunting. To compensate, you either put in a big “deadband” (inaccurate control) or, the control response is “damped” to become very sluggish. Control then becomes a bit like a broken analogue watch; it is correct twice per day!!! There are ways around this using PLC control however, time and page limit has run out of room for explanations here.

Moral of the story. Control logic is probably the easiest and cheapest thing to change on a plant. It may also be the cause of many of your problems and the best fix for many of your problems. Check out control first!!!
This newsletter has been compiled from information supplied; hence AWA cannot accept responsibility for the accuracy of any information so supplied or for any loss or damage, which may arise, from errors or omissions.

Editor: Rod Lehmann
We are looking for articles on your projects. Please contact Rod at rod.lehmann@bigpond.com or Troy Cush

Upcoming Events

Wed 13 July 2016     Optimisation of Operating Costs, Mike Thomas Unitywater, Brisbane
July 21-22 2016     North Queensland Regional Conference, Townsville
Wed 10 Aug 2016     Biosolids and Anaerobic Digestion, Kelly Hopewell, Brisbane
Thur 18 Aug 2016    Breakfast Meeting, Jim Reeves, Brisbane
Nov 4-25 2016      Qwater annual industry conference, Tweed Heads

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