March 2016
Queensland Branch Newsletter
Welcome to the first edition of Water Talk for 2016. It will certainly be a busy year for the water sector with plenty of challenges to keep us all busy around the State. The AWA Queensland Branch is very lucky to have Troy Cush on board as our new Queensland State Manager to help us meet these challenges. You will be introduced to Troy later in the newsletter, but the team is very pleased to have Troy on board and he is already making an impact.

Troy will be working closely with the Branch Committee as we continue to implement AWA’s Strategy. Some members might be aware the Strategy revolves around three themes: Relevant Information, Professional Development and Industry Development.

AWA is planning a full range of activities in Queensland for 2016:

- The regular Knowledge Program events, with some excellent technical presentations already held to kick the year off.
- Targeted networking and niche content events for Women of Water and the Young Water Professionals.
- NQWater, this year to be held in Townsville in July.
- Supporting the WaterAid Ball mid year in Brisbane.
- The Queensland Water Awards program, culminating at the Gala Dinner in September.
- QWater to be held in November.
- Targeted work on discussion papers or response to policy issues through our Strategy and Policy team.

You can get your thinking caps on now about what you want to get out of this program, or what you might be able to put forward for conference presentations or award submissions.

The other exciting thing for us in Queensland this year will be the IWA World Water Congress to be held in Brisbane in October. It is rare to have such a high profile international event so close to home and I’m sure our local industry and our state will be proud hosts.

To help ensure the successful integration of the World Water Congress into our local program, we are currently exploring ideas regarding QWater, which will follow soon after the global event. We are still in preliminary planning, but at this stage the event will be outside Brisbane and we are in discussions with the NSW Branch about collaboration with northern NSW members. Watch this space, but we will ensure that it will be a valuable professional development and networking event.

A worrying trend in 2015 was loss of knowledge from our industry through both economic and demographic trends. Hopefully AWA’s efforts can help in sharing knowledge within the industry. I also hope that 2016 is a more positive year for retention of skills in the industry and that you, your colleagues and your organisations achieve your goals in 2016 and together we continue to deliver on the excellent work that our sector is renowned for.
If you are Young Water Professional (YWP), then you will have less than 10 years of experience in the water industry – it’s that simple. If you want to get value out of your membership then you should participate – we are a friendly group. How to kick start your membership value:

- **March** – Discussion Panel on how to improve your Negotiation skills - This is our biggest networking event of the year – 80 people, food, prizes and great discussions. $15 for members.
- **April** – On-line leadership program. This a NEW 4 week on-line course facilitated by the International WaterCentre. This National course is super value and will sell out. $150 for members.
- **May** – Mentoring Program – This is a 5 month program where we will hook you up with a mentor in the industry – invaluable!
- Participate in the Queensland Branch’s Knowledge Program events which occur approximately monthly and are free for members!
- Keep an eye out – The QLD YWP will be looking for a few new committee members – nominate to become part of the committee and become the heart of the industry’s future.

For more information on any of the above events visit the AWA website or contact your QLD YWP President, Alycia Moore, on Alycia.moore@cleanaway.com.au or your Branch Manager, Troy Cush, on TCush@awa.asn.au. Remember, it never hurts to ask your manager to support your professional development, so ask them pay for your registration or negotiate your work time if you need to leave work a little early to attend industry events. We look forward to seeing you engage with
Dave has been one of AWA’s staunchest supporters over the years. At the QWater Conference it is usual to see Dave and his wife Anita and their four children tucked away in a corner at breakfast time all thoroughly enjoying themselves. I don’t know where they all disappeared to during the day but Dave is usually spotted actively participating in the Conference proceedings or welcoming people at the KSB stand.

Dave started his career with an apprenticeship at the steelworks in Newcastle. Whilst there, he spent two years in the Apprentice training centre, before being moving to Blast furnace and the No 2 Merchant Mill for a further three years. During his apprenticeship, Dave studied Marine Engineering at the Newcastle College and achieved the Engineer Watchkeepers certificate. He was anticipating going to sea to get the essential Part B of the Certificate but got distracted when he met the Brisbane based Anita. This was at the beginning of a proposed 12 month working holiday in the UK. He did get to the UK but only for three months before coming back to settle in Brisbane so as to spend more time with Anita.

In Brisbane, Dave initially joined John Crane Seals, a specialist manufacturer of mechanical seals. This prompted his interest in pumps and he joined KSB as a Sales Engineer in 1994. He has been with KSB ever since rising to the Managing Director for the Australian and South Pacific operation, in 2006. Being an international company Dave does extensive travelling for the company. One of his personal highlights working with KSB was the work they did on the Sydney Desalination Plant where KSB supplied the majority of the pumping equipment. Dave says he really gets a kick out of seeing the job go from the preliminary planning phase through to supply, commissioning and running.

What Dave really enjoys about his work is the customer relationships. He says he has developed many longstanding friends in the water industry over the years. He also really enjoys working in different countries and seeing how they do business. Over the years he has continually upgraded his skills doing a number of courses including an Advanced Diploma in Management from the Logan College. He also gained a pilots licence for a short period until he had to relinquish it through limited flying hours.

In his private life Dave has taken up marathon and obstacle course running such as the Gold Coast Marathon & the Spartan Beast. He has now completed five marathons, numerous half marathons & various obstacle courses including the 24hr True Grit. He is currently running marathons barefoot. He says that he finds this more comfortable than running in shoes. Marathon running however does consume a lot of time in training and this he achieves by early morning starts. Apart from marathon running the family really enjoys spending time camping down at Byron Bay or Brunswick Heads.
Alexandra Abedrabbo, Senior Engineer, Water and Waste Water Design Tweed Shire Council

Alexandra did her engineering training in the Ukraine at the Odessa Civil Engineering School. She graduated in 1975 with a Master of Engineering Science degree in civil engineering. Her first job was working for a precast concrete manufacturer, designing precast concrete units. In 1977 she and her husband left Odessa to live in Jordan where she worked with a Swedish consulting engineering company called VBB. VBB was the largest consulting engineering firm in Jordan and mainly worked in the areas of water and sewerage infrastructure planning and design. Alexandra’s interest in water and wastewater design and planning emerged at this time.

Alexandra and her family left Jordan at the end of 1990 and travelled to Australia where they temporarily took up residence in Sydney. She moved to the Tweed Shire approximately six months later to take up a position as Water and Sewerage Design Engineer in the Planning and Design Section of the Engineering Services Department. Alexandra has seen this Water and Sewerage Planning and Design Section grow from an initial two persons to approximately 100 persons over the last 25 years. She attributes this to population growth, increased regulatory and environmental requirements and safety.

Up until recently Alexandra was in charge of the Water and Sewerage Design Section, however as she is moving towards retirement and a part time rather than full time role, she has moved into doing design work and project management. Her main interest however has always been in water and wastewater infrastructure planning.

Alexandra says that her most enjoyable project was the backlog sewerage project where she was responsible for the sewer ing the three small villages of Uki, Tumbulgum and Burringbar/Mooball. The work for these projects was multi-faceted involving planning, consultation, land acquisition, environmental assessments, design, project management and construction management.

Alexandra and her partner Ian Norris, who has retired from engineering much, enjoy time with their families. They jointly have five children and three grand children and this takes up a good deal of their spare time. Travel, theatre, bushwalking, cycling and other fun activities take up the remainder. Their most recent travel adventure was a cruise from Venice to Rio de Janeiro, and then flying to Iguazu falls in Brazil and then Uruguay via Argentina and then bussing 3500 km back to Rio. Some adventure that was.
Whilst desk tops, lap tops and tablets have continued to dominate the business world, mainframe computers have continued to advance. As a measure of the advancement of the main frame computer IBM pitted their Deep Blue computer against the world chess champion Gary Kasparov in the late 1990’s and succeeded in winning. Chess however can be played without knowing anything about the real world. To illustrate the further advancement of their main frame computers another more formidable computer challenge using IBM’s Watson was issued to “Jeopardy” champions Ken Jennings and Brad Rutter in 2011. For computers, Jeopardy! is a more challenging game to master as it requires an encyclopaedic knowledge and an ability to understand all the nuances of spoken language, including puns, metaphors and slang. Again the computer was successful. At that time the IBM computer was powered by 90 servers and a network-attached storage (NAS) cluster with 21.6TB of data. By comparison technology futurist and author Ray Kurzweil cited that the human brain can hold about 1.25TB of data, and performs at roughly 100 teraflops. In comparison, Watson is an 80-teraflop system with 1TB of memory.

The IBM Watson system, commonly referred to as a “cognitive” system is fundamentally different to the system used by traditional computers. Traditional computers, are essentially still based on the blueprint that mathematician John von Neumann laid out in the 1940s. They are programmed by humans to perform specific tasks. Cognitive systems on the other hand are capable of learning from their interactions with data and humans—essentially continuously reprogramming themselves.

Cognitive systems are built to analyze information and draw insights from it. Cognitive computer systems are ideally suited to applications which are highly data driven. The industries that are most ripe for cognitive computing are ones where there is an abundance of multi-structured data, which can drive better business and consumer decisions. These include travel, retail, healthcare and financial services.

So what opportunities are there for these super computers in the water industry. The ability to analyse an extensive amount of data of varying types is ideally suited to managing data intensive systems such as lakes, dams and waterways, managing water water and sewerage systems, and water and wastewater treatment systems. Opportunities in these areas are only just emerging.

An example where “cognitive” computing has been used in the water industry is the Jefferson Project in the State of New York, USA. In 2013, the Rensselaer Polytechnic Institute teamed with partners IBM and The Fund for Lake George, to embark on this project with the goal to understand and manage the complex factors impacting the lake. In such systems, easy correlations may not represent causation.

The project has been named the Jefferson Project, in honor of Thomas Jefferson, who declared Lake George to be “the most beautiful water [he] ever saw.” For the Jefferson Project a state-of-the-art observational system has been established in the lake — including sensors deployed on the lake bottom, on floating platforms and in feeder streams. Some of the sensors are “smart.” For instance, the floating platform is capable of detecting when the weather is changing and adjusts the cadence of its monitoring activities so that we can better capture certain events.

A cutting edge computer modeling system has been developed, as well. Rather than using discrete models for different elements of an ecosystem, the model couples the elements together in the way that nature works. The weather model feeds into the model that predicts run-off from storms, which feeds into the salt model, which feeds into the lake circulation model, which feeds into the food-chain model. Using data from sensors, it is possible to validate and continuously refine the model over time as new sensors and measurement data is added to the information platform.

The end goal is to be able to run simulations to help predict how events such as heavy storms, road salt run-off, and introduction of new plant or animal species would likely affect the entire natural environment. It’s a holistic approach to ecosystem analysis and management.
Sophisticated robots and computing power are transforming workplaces worldwide on a scale and at a speed that's unprecedented. Experts are predicting a major social upheaval as a result of this and compare it to the change resulting from the industrial revolution more than two centuries ago. A study carried out for the World Economic Forum stated that robots will take over jobs that require more “narrow skills” such as administration or clerical work. PriceWaterhouseCoopers has predicted that 44 per cent of jobs will be automated within two decades. The jobs most affected will be sales staff, office staff, receptionists, secretaries, cashiers, plasterers, tilers and farm workers. Another study carried out by UK’s Oxford University has fortunately identified mechanical/civil/electrical engineering and construction management as the least vulnerable occupations.

To illustrate how far robots have progressed, the NTU University in Singapore has developed a robot that is in the image of Professor Nadia Magnenat Thalmann. “Nadine” can shake hands, remember visitors, has her own personality and emotional range and may be soon be ready to welcome clients at reception desks (see picture).

Today, robots can do many things from painting automobiles on the assembly lines to performing surgery on human patients. But one industry that hasn't yet been transformed by automation is the construction industry, which still utilizes humans to perform both the “grunt” work and the skilled labour required to erect houses and multi-storey buildings. So how will engineers adapt to the new world of robots. Anywhere you have unsafe, boring, or drudgery work, or heavy lifting or something else physically demanding, you can have a machine do it.

Robots have now evolved sufficiently where they can be mobile and not anchored to one spot. This will necessitate a whole new approach to the way the construction is carried out. Hence there is likely to be more prefabrication into units that can be assembled on site.

Some examples of recent robotic developments are described following:

The University of Leeds is pioneering a research project to develop small robots to identify and fix problems with utility pipes, roads and street lights with minimum disruption to the public. For the utility pipes the drones would operate indefinitely within the live utility pipes, performing inspection, repair, metering and reporting.

A robotic, fully-automated machine is being developed in Perth to lay bricks. The machine can lay 1000 bricks per hour, work 24 hours per day, 365 days per year and reportedly could build the brickwork for a house in two days.

A Netherlands-based company has developed a multi-axis robot arm that can 3D print metal sculptures in mid-air, and it plans to use two of them to build a bridge over an Amsterdam canal. The robots will start on either side and meet in the middle, printing their own tracks as they move.

Komatsu, a Japanese company that is the world's second-biggest construction equipment manufacturer, is developing driverless excavation equipment. A drone will scan a site sending images back to a computer that will develop a 3D model of the terrain. The computer will use the model to program routes for unmanned bulldozers and excavators.

Google has plans to install crane robots (“crabots”) in its new headquarters, which could reconfigure modular office space in a matter of hours.

Drones are now being used for inspections of water utility assets. Melbourne Water recently trialed the use of drones to complete routine inspections of the Thomson Reservoir spillway and the Main Southern Carrier of the Western Water Treatment Plant. The spillway inspection was completed in two hours whereas a manual inspection would have involved up to six people over an entire day.
The Bundaberg Regional Council awarded the contract for the design and construction of the Rubyanna WWTP to Downer Infrastructure on 4 November 2015 for a total price of $42.9m. The contract also includes an operations and maintenance component for an initial three year period with an option to extend this to ten years. This price for this part of the contract was $2.4 m /annum (additional). The scope of work for the contract includes the design and construction of a 41,700 EP plant with capacity to increase to 50,000 and 90,000 EP. The initial load is approximately 33,000 EP.

The treatment plant is an MBR plant using Koch membranes. Up to 3 x ADWF will be treated by the membranes. The LT median plant effluent targets are:

- Total nitrogen 4.8 mg/L
- Total phosphorus 1.8 mg/L
- Faecal coliforms 1000 organisms /100 mL
- Enterococci 40 organisms /100mL

At the outset approximately 40% of the plant effluent will be supplied to Bundaberg Sugar for irrigation of cane and other crops. The irrigation water will be supplied on demand.

The contract also includes the design and construction of a pump station to transfer raw sewage from the old East Bundaberg WWTP to the new plant. A separate contract is to be called for the construction of an outfall and diffuser system to enable release of excess effluent to the Burnett River.

The delivery method involved an Early Contractor Involvement (ECI) approach with three companies being selected for tendering following an initial registration of interest phase. The three short-listed tenderers had to meet an initial capital cost hurdle of less than $55m. Thereafter the assessment was based on the whole of life cost (65%) and non-price criteria (35%). Innovation was encouraged during the contractor involvement phase. One of the outstanding outcomes was the inclusion of a solar power facility on-site, which will generate 450 kW of power and offset the power demand particularly in peak load periods. There will be 1728 solar panels covering an area of approximately 3500 m2. The other pleasing feature of the delivery process was that the capital cost was more than $10m under the budget.

The plant is expected to be fully operational by December 2017.

For further information contact Council’s Project Manager, Selwyn McFaul on 0412 157 696.
“Double, double toil and trouble; Fire burn, and caldron bubble”. When the “cauldron bubbles” at a wastewater treatment plant, this usually involves biological foams coming down the main access road to the font gate. Most process engineers, including myself, have a favourite photograph of a foaming “event”. I, personally, have a collection including one sent to me (gleefully by a fellow industry specialist) of one of my own plant designs foaming to the max.

So, what can we do; a) in the event of such an event and b) to try and avoid such an event. Well, in the case of such an event, the first thing to do is to find out who the culprit is. I have met many engineers that can spot the dreaded “Nocardia” foaming bacteria from 100 paces. Well, for starters, it was never Nocardia, rather it was Nocardia Amarae like organisms, NALO’s, (a subset of the Nocarioforms) and has since been renamed Gordona Amarae like organisms (GALO’s). Secondly, “foams ain’t necessarily foams”. With the same fellow industry specialist from the above foaming episode, we were called in on a project where severe biological foaming was occurring on the secondary clarifiers (grass was actually growing on the foam layer on the clarifiers and it needed mowing!). We were confident that it was GALO’s or, possibly Microthrix Parvicella (I like to throw the scientific names around to impress microbiologists). Well, low and behold, not only was it not GALO, it wasn’t even any of the foaming filamentous bacteria. It was in fact, a common filamentous bulking bacteria.

All of this is a long winded way to say, first off, if you have a foaming problem, find out who you are dealing with. A lot of severe “foaming” events are caused by a combination of foaming bacteria and a lot of entrained filamentous bulking bacteria. It is often difficult to do something about the foaming bacteria however, often, the bulking bacteria can be addressed once the culprit is identified. This happened on one plant where the mechanical foam harvester could not keep up with the “foam” production. Following identification of the causative organism, the appropriate corrective control action (change of internal recirculation rate) was identified and the filamentous bulking organism eliminated. The foam harvester could then manage the remaining “true” foaming bacteria.

Just a word to the wise, when it comes to managing filamentous bulking bacteria, don’t rely on the “guidelines” for chlorine dosing. Some mates did this at their plant and promptly killed all of the protozoa with pretty disastrous results. So, if using the chlorine sledgehammer approach (I don’t unless in extreme cases), use gentle taps with the sledgehammer and build up slowly.

Okay, it is all very good to have a cure, so how about prevention. Well, how do you keep yourself well? Have a regular check-up! Regularly check the biomass so you can see if the bad guys are there or are increasing. This way you can take a small corrective action rather than the “knee jerk”.

As a last quote on regularly checking the health of your wastewater plant, I defer to the literature;

“In the past 30 years there has been a tremendous amount of research on the fundamentals of the activated sludge process which the engineer has never made use of because he never understood them or the researchers never translated their results into practical terms which the engineer could understand. This vast storehouse of information has lain dormant like the pirate treasure of old waiting for someone to uncover the key to its use in the field”

Written by Prof Ross E McKinney in his book “Microbiology for Sanitary Engineers”- in 1962!!!!!!
Troy Cush has been appointed the new State Manager for Queensland. Troy has extensive experience working for Not-for-profit organisations. He was previously General Manager of the Amusements and Leisure Association and prior to that Regional Manager for the Chamber of Commerce and Industry Queensland.

Troy’s role will be to strengthen AWA’s role as the peak body representing the water industry. His role will involve maintaining regular contact with AWA members and making sure that they are aware of and can take advantage of all the benefits available to them. His role will also be to act as a sounding board to identify issues affecting water businesses and helping to engage with the State and Federal Government’s on critical issues.

In his youth Troy was a keen Aussie Rules player and played for the Brisbane Lions in Reserve Grade. Nowadays he enjoys surfing and golf. Surfing on fine days and golf on every other day. Living on the coast, both these activities are very accessible.

For those who are wanting to meet Troy, he is working at the Trility Office, 217 George Street Brisbane.
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.

Upcoming Events

Wed, 9 March 2016  Gold Coast Long Term Effluent Release Project, Brisbane
Wed, 15 March 2016  YWP Professional Development and Networking, Brisbane
Wed, 13 April 2016  Validation of Treatment Technologies, Brisbane
9-13 May 2016      Ozwater 16, Melbourne
Wed, 8 June 2016    Modelling innovation and Seqwater's Water Security Plan, Brisbane

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

Australian Water Association
PO Box 222, St Leonards NSW 1590
Contact Troy Cush
Mobile 0407 585 052
Email TCush@awa.asn.au