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FROM THE LABORATORY SERVICES MANAGER

Welcome to AQUATALK, Newsletter of the Australian Water Quality Centre. There's certainly been much activity across the AWQC since relocation from the Bolivar site to our new CBD location over February to April of this year. Having now settled in, we're keen to share news on our new laboratory facilities, and keep you up to date with recent advances in analytical service capabilities and research achievements.

I hope you find the articles interesting and that the newsletter provides you with a further insight into our services and people.

Karen Simpson
Manager Laboratory Services, AWQC

TECHNICAL SUPPORT

The sampling process is an important step in the analysis of samples. Should customers need information on the required bottle types, collection and preservation techniques, please contact AWQC Customer Services Unit on 1300 653 366.

AWQC SETTLES INTO ITS NEW VICTORIA SQUARE FACILITIES

Earlier this year the AWQC moved to new facilities in SA Water House Victoria Square. Taking over two years to plan and nine weeks to complete, the phased approach to the move caused minimal disruption to services during a time of peak activity. A significant amount of planning went into ensuring a smooth and seamless transition from the Bolivar site to the new laboratories. Maintaining the continuity, quality and efficiency of our services has been of paramount importance.

Given the critical nature of our services in the assurance of water quality to the State and other national water utilities, the AWQC's services were maintained in the lead up, during and post the relocation.

And the activity continues as you'll read in the coming stories included in the first AQUATALK newsletter.



Above: The new SA Water building at Victoria Square Adelaide.

Left: Phil Thomas displaying the broad range of samples received by the Wastewater Laboratory at a recent open day

AWQC staff have settled into the convenient CBD location. Many are using public transport or making use of bike, shower and locker room facilities.



FACILITIES ON SHOW

A special customer event to showcase AWQC's state of the art facility was held in June. Over 100 internal and external clients visited over two days. Guests were particularly impressed with the new facilities commenting about the size of the labs, ergonomic sustainable design and sophisticated equipment. Some great feedback was received from visitors who enjoyed the opportunity to view our facilities first hand and learn more about the vital services that the labs provide.

The event included presentations by Karen Simpson (Manager Laboratory Services) Chris Saint (Manager Research Development and Innovation) and Dennis Steffensen (Principal Scientist) about the AWQC and research projects with Warwick Grooby (Manager Microbiology) and Phil Thomas (Manager Inorganic Chemistry) taking guests for tours of the labs including some great interactive displays set up by laboratory staff. The tour also took in the metropolitan view from the tenth floor laboratory terrace. For those of you who missed visiting the AWQC labs, further sessions will be held later in the year.

DEVELOPING OUR SEAWATER AND DESALINATION EXPERTISE

The AWQC's greatest strength is in its ability to respond to ongoing challenges to produce safe drinking water. AWQC is able to quickly mobilise and develop new methodologies for various chemicals and microbial contaminants to low levels of detection.

With the emergence of desalination as a key treatment solution, the AWQC recognises the importance of providing a service that can accurately and reliably detect the presence of contaminants in a variety of matrices. The AWQC has applied its knowledge of saline matrices to determine the right method for each parameter and ensure any interferences are mitigated.

Analytical techniques developed in this area include:

- The use of Flow Cytometry for seawater bacteria enumeration as a more sensitive measurement of biological particle penetration during desalination pre-treatment
- Bacterial Regrowth Potential (BRP) for the measurement of relative growth of indigenous bacteria and predicting the onset of Reverse Osmosis fouling
- Water quality monitoring to provide a baseline assessment and to inform treatment plant design
- Establishment of pilot plant programs and analysis of samples to ensure effectiveness of treatment processes
- Assessment of Disinfection By-products (DBPs) to include brominated and iodinated DBPs produced as a result of treatment processes of saline waters
- Extraction of trace metals in saline water by chelation and preconcentration to obtain low levels of reporting
- Using a variety of techniques, the Nutrients Laboratory is able to analyse for many nutrient species for all water matrices
- Specialised analyses for Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC) in seawater and concentrated seawater from various stages of the desalination process
- Analyses of Organochlorine (OC) and Organophosphates (OP) pesticides and herbicides in seawater
- Microscopic analysis of the composition and abundance of marine phytoplankton in untreated waters and spectrophotometric analysis of chlorophyll 'a' as a measure of phytoplankton biomass

An aerial view of South Australia's Remote Communities



FIELD SERVICES FOR REMOTE REGIONS

Ensuring that remote communities receive safe drinking water is a very important challenge. For the past 6 years, every 3 months a select group of our Field Laboratory Services unit provide sampling and analysis of water for our Aboriginal communities in South Australia.

The communities covered include

- Maralinga and Tjantja (MT) Land out from Ceduna
- Anganu Pitjantjantjara (AP) Lands North West of SA
- Nepabunna, Gammon Ranges

To ensure we meet the strict holding time guidelines of AS/NZ 5667, travel involves a light aircraft, a 4WD and a small laboratory based in the town of Marla. Samples are also transported to Adelaide by various couriers including Bush Logistics.

This service has involved the collaboration of many parties including SA Water, Aboriginal communities and the Essential Services Officers of the associated regional towns.

VARIATION TO CHLOROPHYLL METHOD

The concentration of algal biomass in phytoplankton samples is analysed in the Biology Unit at AWQC by the spectrophotometric determination of chlorophyll *a*, the dominant photosynthetic pigment in plants. The existing method reports concentration of both chlorophyll *a* and *b* and provides results of total algal biomass that are complementary to microscopic identification and cell counts.

Validation of a modified method, based on the International Standard ISO 10260 (1992), is currently underway and once adopted, will also enable reporting of phaeophytin *a*, a degradation by-product of chlorophyll *a*.

Results for the alternative chlorophyll method will be more comparable with the microscopic cell count result as it provides information on the proportion of chlorophyll that can be attributed to a healthy algal population. The new NATA accredited test will be available to customers in the latter half of 2009.

PRODUCT TESTING TEAM IN HOT WATER

Over the past 12 months the AWQC has received an increase in the number of water heating systems for testing to AS/NZS 4020. The increase is mainly due to regulatory changes for the use of energy efficient environmentally friendly water heating systems including, solar heating units, heat pumps, hybrid systems and natural gas hot water systems.

The changes in regulation coincided with the relocation of the AWQC's Product Testing laboratory to the new analytical facility. The new analytical facility provides the capability to test multiple systems (at any one time) and also caters for systems that are for use internally or externally, in domestic environments. In addition to the testing of water heating systems, the Product Testing laboratory continues to test a range of coatings, tapware items and cement lined pipes for manufacturers in Australia and New Zealand and also for manufacturers in China, Spain, Germany, Switzerland and Israel. It is expected the number of products provided for testing will grow in the next year as the water industry's requirement for approved/ certified products increases.

COLLABORATIONS

Singapore Fling

Mike Burch, Lionel Ho, Justin Brookes and Chris Saint made a flying visit to Singapore for a 1 day workshop with members of the Public Utilities Board to discuss possible collaborations on R&D. The main thrust of the workshop was work on blue-green algae. Interestingly, although species such as **Microcystis**, **Cylindrospermopsis** and **Anabaena** are prevalent in Singapore reservoirs the levels of toxin at present appear low. Also there have not as yet been any significant problems with taste and odour events.

Strong areas of mutual interest are being developed for collaboration including: modelling of cyanobacterial blooms, novel methods for blue-green algae control and molecular methods for the early detection of blue-green algae and their toxins. Other areas of mutual interest included: membrane fouling in desalination processes, and detection of nitrifying bacteria.

Alex Visits Greece

Alex Keegan attended the 15th International Symposium on Health-Related Water Microbiology Conference in Naxos, Greece, in June 2009. Alex presented a poster on 'Critical evaluation of pathogen indicators in wastewaters', a project completed at AWQC and funded by Water Environment Research Foundation.

AWARDS



The 2009 Michael Flynn Award for Best Platform Presentation during Ozwater'09 was awarded to Jim Morran for his presentation on '*Factors affecting NDMA formation in treated drinking water*' by J Morran, N Slyman and G Newcombe. Jim is a Senior Research Officer at AWQC and this is a great achievement considering there were around 300 entries.

Nitrosodimethylamine (NDMA) is a probable human carcinogen with evidence of potential toxicity and is formed as a by-product of processes using nitrates or amines and in the manufacture of polymers, fibres and plastics. NDMA can also form in water treatment processes, particularly when chloramination is employed for disinfection control. Chloramination is widely practiced in South Australia for disinfection of our longer country water supplies as it provides a more persistent residual than chlorine.

Researchers at AWQC have investigated NDMA formation in these chloraminated systems and in a recent study of five water treatment plants identified potential sources of NDMA precursors as well as operational factors that can affect the amount of NDMA formed. These findings will now be applied in a full scale plant trial aimed at minimising NDMA levels in the chloraminated supplies. This award is testament to the group's outstanding research achievements and acknowledges their operationally focussed investigative work to address knowledge gaps in water treatment.

AWQC offers NDMA analysis in water samples for more information contact Customer Services on the number below.

AWQC IS 'SPOT ON' IDENTIFYING PRIORITY PROJECTS FOR INDUSTRY FOCUSED RESEARCH AND DEVELOPMENT.

Water Quality Research Australia Limited (WQRA) is a national research centre established to succeed the Cooperative Research Centre for Water Quality and Treatment when it ended on 30 June 2008. WQRA will coordinate collaborative research of national application on drinking water quality, recycled water and relevant areas of wastewater management. The focus of their research program will be on urban water issues related to public health and acceptability aspects of water supply, water recycling and wastewater management.

The AWQC has been successful in forming collaborative partnerships which have led to 'in principle' WQRA support for 12 projects. The high success rate of our proposed projects indicates AWQC's Research and Development Teams beneficial collaborative approaches which have practical industry relevance.

The WQRA Board have ratified the following project concepts and the proponents have now been invited to submit detailed proposals for:

- Chlorine disinfection of human pathogenic viruses in recycled waters (\$350k) - Alex Keegan - AWQC, DHS Victoria, Water Futures, DHS (SMART Water funding)
- Epidemiology of *Cryptosporidium* and *Giardia* species and genotypes in animals in drinking water catchments using molecular tools (\$240k) - Paul Monis – AWQC/ Murdoch Uni, SCA, Water Corporation
- Use of on-line surrogate parameters for rapid hazard detection and improved system performance (\$100k) - Chris Chow - AWQC, SA Water, Water Corporation, Curtin Uni, Uni SA, Adelaide Uni
- Characterisation of THM formation for water quality management (\$230k) - Mary Drikas - AWQC, United Water, SA Water, Melbourne Water, Water Corporation
- Implementation of biological filtration for the treatment of cyanobacterial metabolites (\$206k) - Gayle Newcombe - United Water International and with potential collaborators: Barwon Water, Melbourne Water, Central Highlands Water, Hunter Water and Sydney Water.
- Capacitive deionisation for high recovery and low energy desalination of brackish water supplies (\$70k) - Linda Zou – SA Water CWMR and Uni SA
- Evaluation and validation of rapid molecular methods for the detection and identification of pathogens in water \$350k - Paul Monis – AWQC, Melbourne Water, Sydney Water, Flinders University
- Implementation of biological filtration for the treatment of cyanobacterial metabolites \$177k – Gayle Newcombe – AWQC, United Water International and other Industry Partners
- Cyanosurvey: A national update on toxic cyanobacteria and their distribution \$359k – Andrew Humpage – AWQC, Griffith University (Glen Shaw) and other Industry Partner.
- Safety of recycled water for end-users determined in a mouse in vivo multigenerational study \$340k – Flinders University, AWQC, Melbourne Water, Griffith University, Yarra Valley Water
- Nitrosodimethylamine (NDMA), other nitrosamines and N-DBPs in Australian drinking waters \$258k - Gayle Newcombe – AWQC, CWQRC, Curtin University, Monash University.
- Emerging disinfection by-products: toxicology and chemistry (ARC) \$160k – Curtin Water Quality Research Centre, AWQC, Water Corporation WA.

Further Information and Feedback

For further information on any of the articles in this newsletter please email awqc@sawater.com.au or phone 1300 65 33 66 or fax 1300 883 171. Any comments or suggestions for future newsletters are welcome by contacting Lena Marchesan, AWQC 61 8 7424 2124.