

2013/14

# ANNUAL REPORT

WATER RESEARCH AUSTRALIA LIMITED



Water  
Research  
Australia

## **PROFESSOR MICHAEL R MOORE (1944 – 2014)**

Professor Michael R Moore was appointed Chair of the newly created Water Quality Research Australia in August 2008. It was immediately clear that Michael was energetic, genial and engaging – and had an eye for a good tie. At the time of his appointment, Michael was Director of the National Research Centre for Environmental Toxicology (EnTox), Professor of Medicine, at University of Queensland, Adjunct Professor at Griffith University, the University of the Sunshine Coast and Queensland University of Technology, and Co-director, Australian Centres for Human Health Risk Assessment.

Michael was awarded a PhD in Medicine and a Doctorate in Science in the field of Biochemistry in Medicine. He trained in Clinical and Chemical Pharmacology in the Royal Postgraduate Medical School in London.

In Scotland Michael worked at the University of Glasgow, as Reader in Medicine and Therapeutics. He was a Director of Monklands and Bellshill NHS Hospital Trust in Scotland and Justice of the Peace in Cumbernauld and Kilsyth. Michael wrote several books, numerous book chapters and over 550 refereed research publications. His fields of interest included the toxicology of metals, risk assessment, air quality, alcoholism, cyanobacteria and disorders of porphyrin metabolism. His expertise in these areas resulted in his involvement in a great number and variety of international and Australian expert panels, task forces, steering, advisory and other committees.

During his career he had a long association with the University of Cape Town in South Africa, and was also a visiting fellow in Argentina.

Michael came to Australia in 1994 to take up the post of Professor of Medicine at the University of Queensland. Michael was a past member of the Advisory Board of Australian Pesticides and Veterinary Medicines Authority and a foundation director of the Australian Centres for Human Health Risk Assessment.

Michael enjoyed photography, and his trusty Nikon chronicled many WaterRA events. He also enjoyed climbing and walking, cycling, yachting and motor sports (he was a member of MGCC, Morgan SCC). He had been an active member of Rotary since 1992.

Michael was a warm, positive and enthusiastic Board Chair, delivering reports to Members with his thick Scottish burr and with humour. His enthusiasm shone through in every endeavour he undertook. He enjoyed interacting with WaterRA students and was unfailingly supportive and encouraging to all.

# ANNUAL REPORT 2013-14

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# VISION, MISSION AND STRATEGIC PILLARS



**OUR VISION**  
Water for the wellbeing of all Australians



**COLLABORATION**  
Address national priorities in water with the best research and industry teams

## OUR MISSION

To lead and facilitate high quality and collaborative research of national significance and to ensure implementation of outcomes to address current and emerging issues in water.



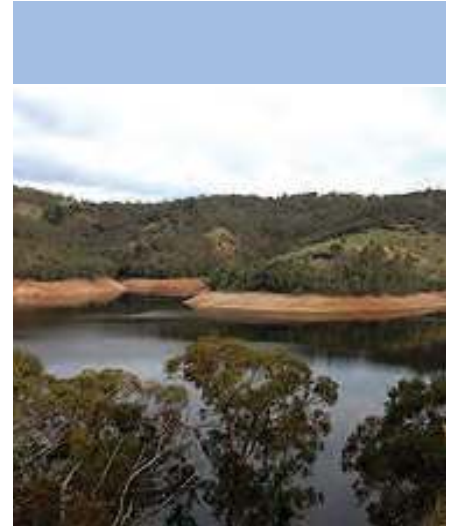
**ADVOCACY**  
Promoting the importance of safe water on the national agenda



**SCIENTIFIC EVIDENCE**  
Trusted science to underpin decision making



**BUILDING CAPABILITY**  
Building research capacity and capability and facilitating uptake of outcomes



## WHAT WE DO

- Coordinate, prepare and deliver water industry-driven research projects on behalf of Members
- Manage research projects
- Assist with technical queries from Members
- Prepare fact sheets on specific topical matters
- Assist with networking across the industry, research and government sectors in water related matters
- Make submissions on behalf of the water community in response to discussion papers
- Build future industry capability and capacity by supporting student projects
- Facilitate water industry employee higher education degrees
- Liaise on behalf of water community around water research issues, nationally and internationally
- Advocate the importance of safe water on the national agenda
- Provide a body of technical knowledge that is freely available to Members via the website or on request



Dr Michael Storey, Project Manager, Science and Technology at Sydney Water, and CRC WQT PhD graduate, was a guest speaker at the student orientation day at UNSW in Feb 2014. Pictured here with Dr Louise McKenzie, Hunter Water Corporation, Richard Connor, Honours student University of Newcastle and Yufei Wang PhD student at RMIT University.



## PROJECTS COMPLETED IN 2013-14

Surrogate parameters for rapid hazard detection and improved systems (Chris Chow, Australian Water Quality Centre, SA Water 1020/09)

Optimum control of chloramine in water distribution systems (Graeme Dandy, Adelaide Research and Innovation Pty Ltd 1032/10)

Rapid molecular methods for microorganism detection & identification (Paul Monis, Australian Water Quality Centre, SA Water 1035/10)

Cause of low recovery of *Cryptosporidium* oocysts and *Giardia* cysts (Christobel Ferguson, ALS Global 1044/10)

Capacitive deionization (CDI) in inland brackish water desalination (Linda Zou, University of SA 1047/10)

DBP Formation - Stage 2 (Mary Drikas, Australian Water Quality Centre, SA Water 1061/12)

Real time integrity monitoring for high pressure membrane systems (Stephen Gray, Victoria University 2018/10)

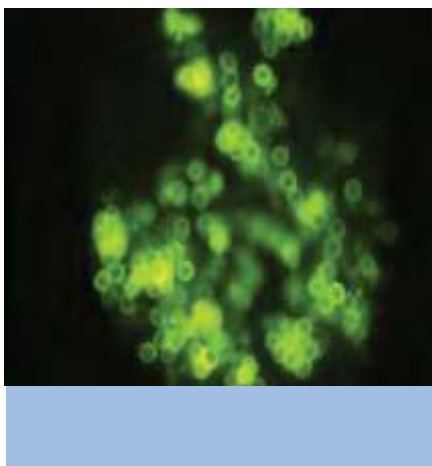
Removing chemicals of concern using advanced oxidation in wastewaters (Cynthia Joll, Curtin University 2019/10)

Fate and effects of DOM in recycled water (Beate Escher, University of Queensland 3003/09)

Safety of recycled water for end users - Mouse *in vivo* multi-generational study - Phase 1 (Fiona Young, Flinders University 3004/09)

Resilient desalination pre-treatment of secondary effluent by ceramic membranes (Mikel Duke, Victoria University 3020/12)

Quantifying indirect ingestion of recycled water (Martha Sinclair, Monash University 3021/12)



# 2013-14 HIGHLIGHTS

## SCIENTIFIC EVIDENCE

Trusted science to underpin decision-making





### Fact Sheet

#### Log removal values in wastewater treatment

**Pathogen management in wastewater**  
Effective management of waterborne pathogens in wastewater to safe levels is critical to protect human health and the environment. Pathogens in this context include certain species of virus, bacteria, protozoa and helminths. The effectiveness of wastewater treatment processes is measured using a concept called 'log removal values' (LRVs), which are applied to each collective 'group' of pathogens (i.e. LRV for virus, LRV for bacteria, etc.).

**What is a log removal value?**  
A log removal value (LRV) is a measure of the ability of a treatment process to remove pathogenic microorganisms. LRVs are determined by taking the logarithm of the ratio of pathogen concentration in the influent and effluent water of

**Fit for purpose treatment and acceptable risk**  
When designing a treatment scheme, treatment processes (also known as process barriers) are selected to satisfy diverse water quality requirements influenced by environmental risk (e.g. nutrient removal), aesthetic issues (e.g. colour removal) and risks posed to human health (e.g. pathogen removal).  
The difference between the initial wastewater quality and the target water quality required to comply with the health, environmental and aesthetic requirements determines the level of treatment required (Figure 1). The treatment requirement target is expressed as an LRV for each pathogen group, with the system treatment processes needing to provide at least the specified LRV for each pathogen group. In practice, because of the differential response of pathogen




### Member Update - March 2014

#### Mycobacteria in drinking water

**Mycobacteria – what are they?**  
Mycobacteria are single-celled, rod-shaped, aerobic bacteria. They are related to the antibiotic-producing streptomycetes. The mycobacteria have a very thick cell wall that prevents them drying out. Many mycobacteria are harmless and useful because they degrade organic matter in soil. Some are used industrially to help convert cheap plant starches into useful steroid hormones. There are a few pathogenic mycobacteria which cause the ancient disease tuberculosis (*M. tuberculosis*, *M. africanum*, *M. bovis*) or leprosy (*M. leprae*).  
Many mycobacteria are considered to be opportunistic pathogens – which generally cause disease in people whose defences are weakened in some way such as immune

unlikely source of *M. kansasii* and *M. fortuitum*. Dr Thomson found that the most common causes of mycobacterial disease in Queensland, *M. abscessus* and *M. avium*, were infrequently detected in water.  
As mentioned previously, the greatest risk is to people with compromised immunity such as the elderly and very young, people with lung conditions, people with diseases such as HIV or those undergoing chemotherapy. The recent findings in Brisbane raised concern because Dr Thomson has reported that a growing number of middle-aged women – generally slender and slightly above average height, and seemingly otherwise fit and healthy – are getting the disease.  
**How can the risk be reduced?**



### Optimum Control of Chloramine in Water Distribution Systems

Research Project 1032

## 12 PROJECT FINAL REPORTS

See opposite

## PUBLICATIONS - GENERAL

- More than 900 documents available for download from WaterRA website
- 41 peer reviewed journal publications in 2013-14

## 4 Fact Sheets

- Mycobacteria in Drinking Water
- Log removal values in wastewater treatment
- Research Update - Cyanobacteria
- Research Update - Membranes

## SCIENCE REVIEW AND ANALYSIS

- 4 Health Stream issues delivered to subscribers
- Health Stream downloaded 11,884 times (all issues)
- Update of the Research Showcase document
- Research Impact Study - *Reflections on the past forty years*, by K Cadee
- Research Impact Study - *The evolution of the Australian Drinking Water Guidelines*, by D Sheehan
- Research Impact Study - *Why water quality research remains a vital priority in Australia today*, by J Dawe and J Bowman

# 2013-14 HIGHLIGHTS

## COLLABORATION

Address national priorities in water with the best research and industry teams



Expert panel at hypothetical for project 1063/12 in Brisbane, May 2014

### RESEARCH COLLABORATIONS

- Total number of Member agencies in 2013-14 = 43
- Total number of non-Member collaborating agencies (since 2008) = 193
- Average no of collaborators per project = 5.42
- Twelve new projects initiated/awarded in 2013-14
- Total value of Research Member corporate in-kind = 22.9 FTE

### CONSULTATION WITH MEMBERS

- National industry workshop to prioritise issues for future work
- Three Members meetings (October 2013, Feb 2014, May 2014) 157 attendees

### WEBSITE USAGE

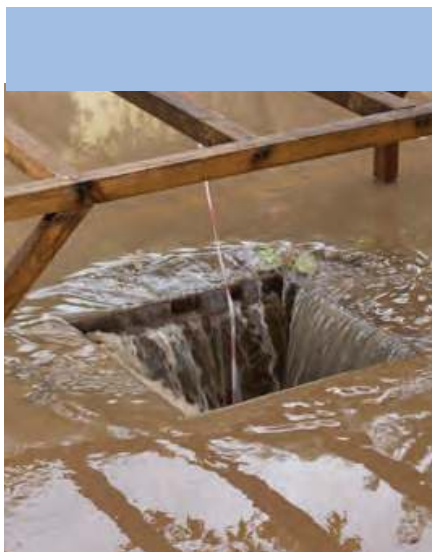
- 589 individual subscribers to our Member log in area (496 in 2012-13)
- 89,948 page views were recorded (86,998 in 2012-13)

### WHAT VISITORS DOWNLOADED MOST

- Drinking water treatment fact sheet (9627)
- All about Australia's drinking water fact sheet (7486)
- A guide to blue-green algae fact sheet (4243)
- Management strategies for cyanobacteria (blue-green algae) and their toxins: A guide for water utilities - RR 74 (3256)
- Natural organic matter: understanding and controlling the impact on water quality and water treatment processes (2442)
- Risk assessment for drinking water sources - RR 78 (1688)
- Research blueprint: 2012-2016 (1323)
- Quality of stored rainwater used for drinking in metropolitan South Australia - RR 84 (892)
- Public health aspects of rainwater tanks in urban Australia (886)
- Zeta potential: a tool for the successful control of coagulation and removal of *Microcystis aeruginosa* in water treatment plants (806)



# NEW PROJECTS IN 2013-14



- Identify and assess the water quality risks from extreme events (Stuart Khan, UNSW, 1063/12)
- Evidence-based approaches to monitor and manage chlorine & chloramine residual (Chris Chow, AWQC, 1064/12)
- Bayesian risk assessment tool for extreme weather events (Anne Roiko, Griffith University, 1071/12)
- Management of treatment sludge impacted by cyanobacteria (Gayle Newcombe, AWQC, 1073/13)
- Water treatment optimisation manual (Peter Mosse & Bruce Murray, WSAA & WaterRA, 1074/13)
- Online monitoring guidance manual incorporating decision support tools for superior process performance (Chris Chow, AWQC, 1075/13)
- Development of tools for the assessment and management of aesthetic and health risks associated with cyanobacteria (Gayle Newcombe, AWQC, 1078/13)
- Selection of suitable *Cryptosporidium* surrogates for validation of granular media filtration performance (Paul Monis, AWQC, 1079/13)
- An integrated approach to coagulant application in urban water systems (Zhiguo Yuan, UQ, 2036/13)\*
- National validation 2.2: high priority research and development gaps – Phase 2 (Cedric Robillot, AWRCOE, 3018/12)
- A novel approach to quantify indirect ingestion of recycled water: Improving the evidence base for water guidelines (Martha Sinclair, Monash University, 3021/12)
- Assessing the human health risks associated with micropollutants in stormwater intended for beneficial reuse (Andrew Humpage & Fred Leusch, AWQC & Griffith University, 3023/12)

\* ARC funded project

**TOTAL WATERRA CASH - \$0.8M**

**TOTAL IN-KIND - \$4.4M**

**TOTAL EXTERNAL CASH - \$6.3M**

**TOTAL VALUE OF NEW PROJECTS 2013-14 - \$11.5M**

# 2013-14 HIGHLIGHTS

## BUILDING CAPABILITY

Building research capacity and capability and facilitating uptake of outcomes



WaterRA students  
at the February 2014  
Orientation Day

### STUDENTS SUPPORTED :

Current

15 PhD

2 Honours

2 industry member part-time Masters

**Total supported (since 2008) = 61**

### Students who completed in 2013-14

**Elissa O'Malley** – Hons (UQ, Entox)

**Anna Wilson** – Hons (Flinders University/  
SA Water)

**Trang Trinh** – PhD (UNSW)

**Russell Yap** – PhD (UNSW)

**Emma Plant** – PhD (University of Adelaide)

**Sarit Kaserzon** – PhD (UQ)

**Philip Scott** – PhD (Griffith University/Smart  
Water Research Centre)

**Muhammad Umar** – PhD (RMIT)

### STUDENT AWARDS

**Anna Wilson** - AWA 2014 Undergraduate Water prize

**Michael Webber** - AWA Michael Flynn Award for best paper (with Paul Atherton and Gayle Newcombe)

**Yulia Shutova** - Civil and Environmental Engineering Overall Prize for the best performance in Research presentation (University of NSW) Civil and Environmental Engineering Environmental Engineering Prize for the best performance in Research presentation

**Rachael Aganetti** - Dean's Scholar Award – College of Engineering and Science (Victoria University)

**Rachael Aganetti** - Outstanding Final Year Student Award for Bachelor of Engineering in Mechanical Engineering

**Muhammed Umar** - first prize for the High Degree by Research Publication Award in the School of Civil, Environmental and Chemical Engineering (RMIT University)

**Emma Plant** - Dean's Commendation for Doctoral Thesis Excellence (University of Adelaide)

# 2013-14 HIGHLIGHTS

## ADVOCACY

Promoting the importance of safe water on the national agenda



Dr Stephanie Rinck-Pfeiffer conducts her first GWRC Meeting in Singapore, May 2004

## NATIONAL AND INTERNATIONAL REPRESENTATION

### NATIONAL COMMITTEES

Active member of Australian Water Research and Development Coalition

Representation on NHMRC Water Quality Advisory Committee

Representation on AWA Water Quality Monitoring and Analysis Specialist Network Committee

Representation on advisory committees for Monash University, RMIT University, Victoria University and Curtin University

### INTERNATIONAL COMMITTEES

Board member of Global Water Research Coalition

WERF Exploratory Team – Sustainable Integrated Water Management

### WATERRA COMMITTEES

Maintain dialogue with state regulators through Regulatory Advisory Committee

Maintain dialogue with science leaders through Scientific Advisory Committee

## COMMUNICATION OF ISSUES

### VIA WEBSITE

131 news items published on the WaterRA website

Monthly WaterRA Blog, 11 published

Water Quality Matters newsletter published monthly for Members

### PRESENTATIONS

Symposium at Water Corporation, Perth

WSAA/WERF Workshop on Sensors, Melbourne

OzWater'14 Workshop, Brisbane

Centre for Water Management and Reuse - UniSA Node Workshop

# CEO REPORT



The past year has been one of the most financially constrained in the water industry for some time. The long term drought conditions, behind us in many, but not all, parts of the country, has shifted the industry focus from needing to shore up water supply security (at almost any cost) to one of driving economic efficiency and maximising customer value. This environment has placed severe pressure on research funding. This year the Victorian industry decided to wind down the long-running Smart Water Fund, and at the national level, it is looking less likely that the national centres of excellence will secure additional Commonwealth investment beyond their current terms. Of most significance was the decision by the Commonwealth to close the National Water Commission in late 2014, which has further distanced water as a priority on the national agenda.

WaterRA is positioned in the Australian water research landscape as an efficient deliverer of water research, but we should not be complacent regarding our susceptibility to the pressures of the current environment. To consolidate our role as a leading national research agency, we need to continue delivering R&D for the industry, but just as importantly, translate this research into a form that aligns with current industry priorities. In short, this means relating what we do in terms of customer value. Customer value may be defined differently across utilities, however, there are probably three areas that will resonate with all. These are - delivering efficiencies in operations (i.e. Capex / Opex savings), benefits or improvements in service delivery, or benefits from improved risk management. Since 2008, our research focus has largely been on water quality and health outcomes, leading to a significant portfolio of work that has contributed to risk mitigation. We now anticipate, with our broadened research scope, that future work will contribute more significantly to other aspects of customer value.

The Annual Report highlights the numerous outputs that have been delivered this year. A few highlights include the publication of 12 final reports, 4 fact sheets, 41 peer reviewed journal papers, 4 editions of Health Stream and several research 'impact studies'. In total, there are more than 900 documents available on our website. Our website remains our knowledge hub, and we had almost 90,000 page views this year, a record since the company was incorporated. We also supported 12 new projects this year, contributing to the portfolio of more than 60 active projects. Our Education Program focuses a spotlight onto future industry talent, with 19 current higher degree students. WaterRA-supported students feature heavily in winning industry awards, which reflects on the high quality of their work. The strength of this program would not be possible without the continued support from Australian universities and sponsoring organisations. Networks and collaborations that we foster are aspects of the company that consistently rank highest with members in regards to what they value most from engaging with us.

Sadly, a report from our Chair, Professor Michael R Moore, is notably absent from this year's Annual Report. I draw your attention to the inside front cover that pays tribute to Michael, highlighting some of his remarkable achievements. Michael was a loyal and passionate supporter of WaterRA, representing the organisation as our Chair and ably leading the Board. He also provided me with excellent support and I know that I speak for all Members, the Board and staff in saying that we will miss him dearly. I know that Michael would not want us to dwell on his passing, but to celebrate the things that have been achieved and there is no better place to do this than in our Annual Report. I invite you to review the many achievements of WaterRA in this past year and challenge you to be an active contributor into the future.

D Halliwell



WEBSITE PAGE VIEWS  
**89,948**

GOOGLE STATS FOR 1/3/2011 – 28/2/2014

Water for the wellbeing of all Australians



People Search for:

WATER TREATMENT	34%
WATERRA	16%
HEALTH STREAM	13%
DRINKING WATER GUIDELINES	9%
BLUE-GREEN ALGAE	7%
DRINKING WATER	6%
ORGANIC MATTER	4%
POLLUTANTS	4%
RAINWATER	3%
DRINKING WATER SAFETY	2%
WATER QUALITY ISSUES	2%



**BASIC WATER NEEDS**

**ONE IN SIX**  
 PEOPLE WORLDWIDE DON'T HAVE  
 ACCESS TO SAFE FRESHWATER



Water  
 Research  
 Australia

[www.waterra.com.au](http://www.waterra.com.au)

Countries with more than 100 people  
 accessing information generated by  
 WaterRA via the website



AUSTRALIA (50,275)	SINGAPORE (316)	THAILAND (134)
UNITED STATES (3,153)	IRAN (315)	DENMARK (133)
INDIA (1,198)	PHILIPPINES (308)	EGYPT (123)
CANADA (1,168)	ITALY (233)	NIGERIA (123)
UNITED KINGDOM (1,081)	SOUTH KOREA (224)	ETHIOPIA (120)
GERMANY (561)	SOUTH AFRICA (222)	VIETNAM (119)
NETHERLANDS (465)	SPAIN (212)	SRI LANKA (114)
CHINA (436)	PAKISTAN (210)	SWEDEN (110)
FRANCE (383)	INDONESIA (195)	IRELAND (108)
BRAZIL (348)	HONG KONG (186)	SAUDI ARABIA (107)
NEW ZEALAND (332)	JAPAN (169)	TAIWAN (106)
MALAYSIA (317)	BANGLADESH (152)	GHANA (100)

## CONFERENCES

Water Recycling Conference -  
Brisbane, July 2013  
(David Halliwell)

SETAC-Melbourne, September  
2013 (Gareth Roeszler)

NOM - Perth, October 2013  
(Claire McInnes)

IMSTEC - Melbourne,  
November 2013 (David Halliwell)

OzWater'14 - May 2014  
(Michael R Moore, David  
Halliwell, Peter Brass, Angela  
Gackle, Carolyn Bellamy)

AWA Biosolids Management  
Conference June 2014  
(Gareth Roeszler)

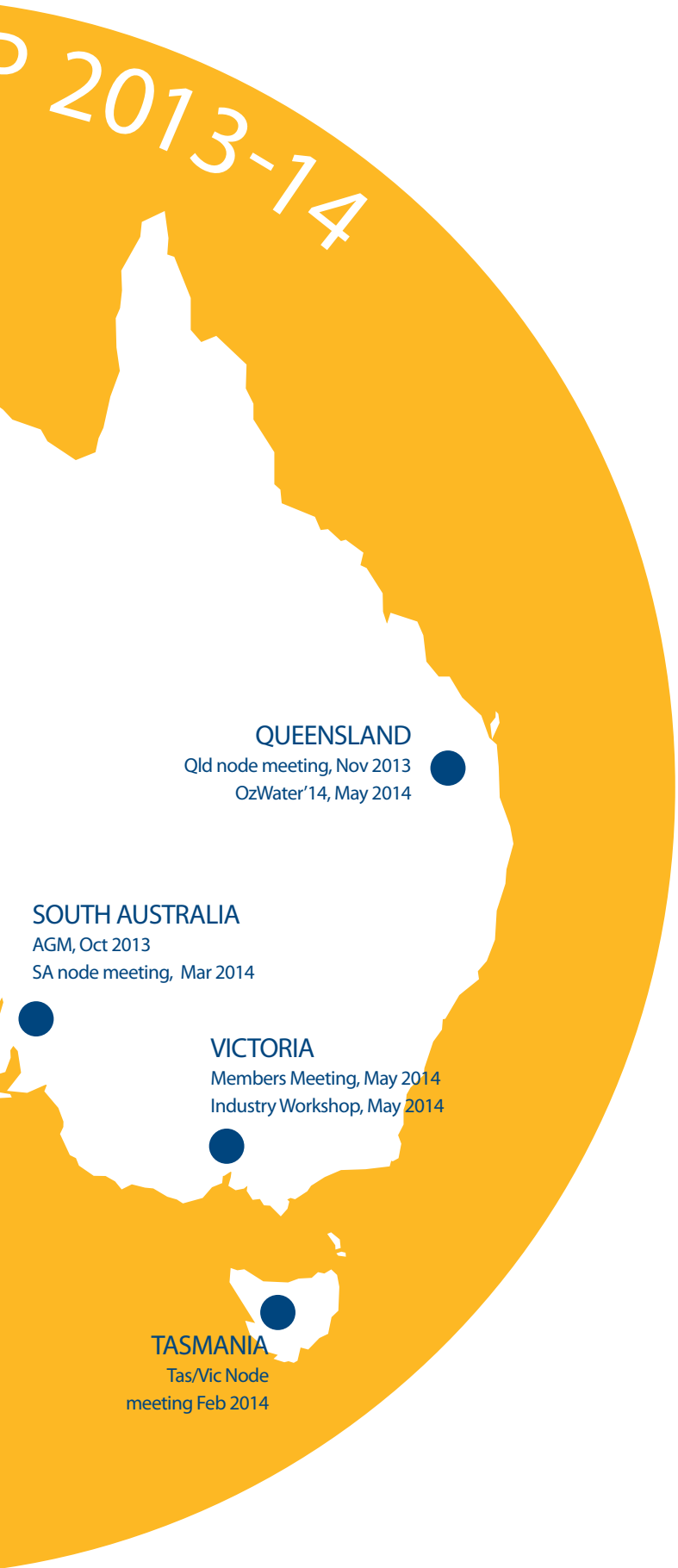
## INTERNATIONAL

GWRC Board Meeting,  
Chicago - September 2013  
(David Halliwell)

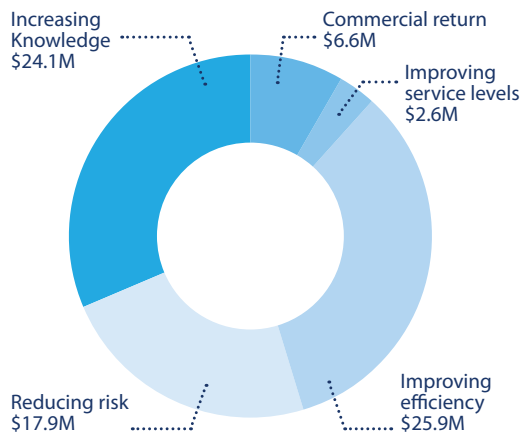
GWRC Board Meeting,  
Singapore - May 2014  
(David Halliwell)

Singapore International Water  
Week - May 2014  
(David Halliwell)

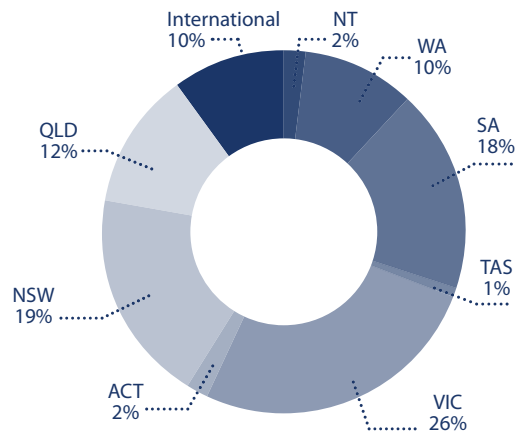




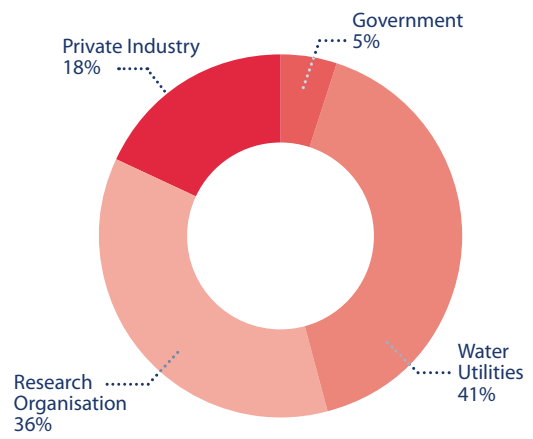
### INVESTMENT IN INDUSTRY OUTCOMES



### WHERE OUR COLLABORATORS ARE



### WHO OUR COLLABORATORS ARE



# WATERRA BOARD

The WaterRA Board is responsible for the strategic direction and oversight of WaterRA on behalf of the members. It comprises three Directors nominated by research members, four Directors nominated by industry members, an Independent Chairperson and the CEO.

During 2013-14 the following Board changes occurred:

- Ms Jodieann Dawe returned to the role of CEO from January until April 2014 (David Halliwell was appointed CEO in April).
- Mr Ross Young left the Board in September 2013 and was replaced by Dr Dharma Dharmabalan.
- Mr Keith Cadee retired from The Board at the AGM in Adelaide in October 2013. Keith was instrumental in the establishment of WaterRA, and served on the Board since its formation.

## CURRENT BOARD MEMBERS AT 30 JUNE 2014



### Prof Michael Moore – Independent Chair

Prof Michael Moore was elected as the Independent Chair of WaterRA in July 2008 and again in October 2010 for a further period of three years. Prof Moore's extensive experience has him well-placed to lead WaterRA. He is a registered toxicologist, founding member and Vice-President of the Australasian College of Toxicology and Risk Assessment and a Fellow of the College. He has a PhD in medicine and a Doctor of Science in biochemistry in medicine.



### Prof Simon Beecham – Non-Executive Director (Research)

Prof Simon Beecham was appointed as a Non-Executive Director in November 2009, and was a member of the original Implementation Committee for WaterRA in the lead-up to its incorporation. Prof Beecham is Head of the School of Natural and Built Environments at the University of South Australia, and is a former Head of Civil Engineering and Director of the Centre for Water Management and Reuse. He is a Fellow of Engineers Australia and a Fellow of the Australian Institute of Company Directors.



### Dr David Halliwell - Executive Director

Appointed as CEO and Executive Director for WaterRA in April 2014. Dr Halliwell worked with WaterRA in various research management roles, including Acting CEO (August 2012 - January 2014) from its commencement in 2008. Previously Dr Halliwell was a Research Director with the Victorian Department of Primary Industries. Dr Halliwell has significant experience in the administration of research & development; technology transfer and commercialisation; science; finance and business management, and public administration. He is a Graduate of the Australian Institute of Company Directors.



### Dr Melita Stevens – Non-Executive Director (Industry)

Dr Melita Stevens was appointed as a Non-Executive Director in October 2010. She was also a member of the implementation committee that supervised the start-up of WaterRA. Dr Stevens has a background in public health microbiology and has been involved in water quality and research for 20 years. Melita is Principal Scientist at Melbourne Water.



### Dr Hamish Reid – Non-Executive Director (Industry)

Dr Hamish Reid was appointed as a Non-Executive Director in October 2010. The General Manager Customer and Business Futures at South East Water, he has responsibilities across a broad range of key water industry issues. Dr Reid has worked at South East Water since 2005, working for four years as the Manager of Research and Technology. He has held roles with Melbourne Water, the Victorian Environmental Protection Authority and in a number of environmental agencies in New Zealand.



### Mr Peter Brass – Company Secretary

Mr Brass was appointed as the Company Secretary on the WaterRA Board in August 2012. Peter has over 20 years' experience in governance, risk management and internal audit in both private and public organisations and is a Graduate of the Australian Institute of Company Directors and facilitates training courses for the Governance Institute of Australia.





Board Chair Michael Moore and retiring Board Director Keith Cadee at the WaterRA AGM, October 2013



**Prof Stephen Gray – Non-Executive Director (Research)**

Prof Stephen Gray was appointed as a Non-Executive Director in October 2011. Prof Gray is the Director of the Institute for Sustainability and Innovation at Victoria University, where he is responsible for Victoria University's water research program. He leads the CSIRO Cluster on Advanced Membrane Technologies for Water and was previously the leader of the CSIRO Urban Water team and has over 20 years' research experience in water and wastewater treatment.



**Dr Steve Capewell – Non-Executive Director (Industry)**

Dr Steve Capewell is a water quality and treatment specialist with extensive knowledge of the planning, design, operation and optimisation of water treatment plants and process technologies. He currently heads the Drinking Water Quality Branch at the Water Corporation in Western Australia. Steve co-developed the water treatment management framework within the Water Corporation. Dr Capewell was appointed to the Board following the retirement of Mr Keith Cadee in October 2013.



**Dr John Howard – Non-Executive Director (Research)**

Dr John Howard has more than 30 years experience in water quality and water resources management, with roles in the UK and South Africa involving water quality research, water and environmental consulting and water quality management. John is currently the General Manager of Strategy & Planning at SA Water which involves responsibilities for Research and Innovation, Asset Management and Corporate Strategy. He is a Fellow of the Australian Institute of Company Directors.



**Dr Dharma Dharmabalan – Non-Executive Director (Industry)**

Dr Dharma Dharmabalan has worked in the water industry in Australia for more than 25 years. He is currently the General Manager for Capital Works Delivery with TasWater in Tasmania and holds degrees in the fields of Civil Engineering, Environmental, Hydrology, Computing and Water Systems Risk Management Philosophies from Universities around the world. Dharma rejoined the WaterRA Board following the departure of Mr Ross Young in November 2013.



# WATERRA BOARD COMMITTEES

The WaterRA Board is supported by two advisory committees – the Scientific Advisory Committee and the Regulatory Advisory Committee. Their role is to provide the Board with strategic and impartial scientific and regulatory advice on WaterRA’s research program, and on emerging issues of concern to the water sector. The advisory committees comprise national and international experts, who are highly regarded in their respective fields.

## Scientific Advisory Committee Members: 2013-14

Dr John Howard (Chair)	SA Water Corporation
Prof David Waite (Deputy Chair)	University of New South Wales
Dr Andrew Bath	Water Corporation WA
Prof Ian Falconer	University of Adelaide
Prof Jurg Keller	University of Queensland
Dr Stephanie Rinck-Pfeiffer*	Global Water Research Coalition
Mr Mike Chapman	GHD
Dr David Halliwell	WaterRA

\* Long-term SAC Member Dr Frans Schulting retired as Managing Director of the GWRC this year and Dr Stephanie Rinck-Pfeiffer was appointed to the role in May 2014.

## Regulatory Advisory Committee Members: 2013-14

Mr David Sheehan (Chair)	Coliban Water, Victoria
Dr David Halliwell	WaterRA
Dr Paul Byleveld	NSW Department of Health
Dr David Cunliffe	Department of Health (SA)
Mr Rodney Dedman	Department of Health (Victoria)
Mr Xavier Schobben	NT Department of Health and Families
Dr Greg Jackson	Queensland Health
Dr Kaye Power	Independent Pricing and Regulatory Tribunal NSW
Mr Jim Dodds	Department of Health WA
Dr Phil Callan	Independent
Mr Cameron Dalgleish	Dept of Health and Human Services, Tasmania

The Board has established two Sub-committees – the Risk & Audit Committee and Human Resources Committee – which provide an important assurance that key areas (Finance, Human Resources and Risk Management) of the Board’s duties will be rigorously discharged.

## Risk and Audit Sub-committee Members: 2013-14

Prof Stephen Gray (Chair)	Victoria University
Dr Melita Stevens	Melbourne Water
Dr Steve Capewell	Water Corporation of Western Australia
Mr Gary Penn	SA Water Corporation (independent member)

## Human Resources Sub-committee Members: 2013-14

Prof Simon Beecham (Chair)	University of South Australia
Dr Hamish Reid	South East Water Corporation
Dr John Howard	Australian Water Quality Centre

# MANAGEMENT COMMITTEES

The WaterRA CEO is supported by two operational committees – the Project Review Team and the Education Committee. These committees provide the CEO and staff with advice to ensure the provision of high quality and relevant research. The members of the operational committees are representatives from member organisations who bring a high level of knowledge and skills to WaterRA and its members.

## Education Program Committee Members: 2013-14

Prof Felicity Roddick (Chair)	RMIT University
Mr Paul Atherton	Grampians Wimmera Mallee Water
Ms Carolyn Bellamy	WaterRA
A/Prof Mike Burch	SA Water Corporation
Dr Rita Henderson	University of NSW
Mr Asoka Jayaratne	Yarra Valley Water
Dr Kathryn Linge	Curtin University
Prof Dennis Mulcahy	University of South Australia
Mr Glen Rowlands	TasWater

## Project Review Team

The Project Review Team (PRT) met three times during 2013-14. The PRT provided invaluable support in the review of all WaterRA project proposals, including those for submission to external agencies such as the ARC, Victorian Smart Water Fund, Water Research Foundation, Water Environment Research Foundation and the National Centres of Excellence for Water Recycling and Desalination. The PRT comprises the WaterRA CEO, WaterRA program manager, and a cross-section of industry and research representatives.

## Project Review Team Members: 2013-14

Dr Rino Trolio (Chair)	Water Corporation WA
Dr David Halliwell	WaterRA
Mr Asoka Jayaratne	Yarra Valley Water
Prof Stuart Khan	University of NSW
Dr Penny Knights	Sydney Catchment Authority
Dr Fred Leusch	Griffith University
Ms Claire McInnes	WaterRA
Mr Con Pelekani	SA Water Corporation
Ms Nadine Reithmuller	Power & Water Corporation NT
Mr Gareth Roeszler	WaterRA
Dr Martha Sinclair	Monash University

# WATERRA TEAM



## Dr David Halliwell – CEO (from April 2014) and Executive Director

David was appointed CEO and Executive Director in April 2014. David was previously Acting CEO (August 2012 - January 2014) and General Manager - Research and has worked with WaterRA in various research management roles since 2008. Before that he was a Research Director with the Victorian Department of Primary Industries. David has a PhD in chemistry, an MBA, a BSc (Hons) in chemistry and aquatic biology.



## Mr Peter Brass – General Manager, Operations and Company Secretary

Peter commenced with WaterRA in 2013. He has previously held senior management positions and has over 20 years' experience in governance, risk management and internal audit in both private and public organisations. Peter has a Bachelor of Economics, is a Certified Practising Risk Manager, a Fellow of CPA Australia and a Graduate of the AICD.



## Ms Susan Spragg – Executive Assistant

Susan is Executive Assistant at WaterRA, having worked at CRC WQT since 1998. Sue also assists the Company Secretary and is responsible for a diverse range of administrative and key functions within WaterRA. She is an Certified Member of the Governance Institute of Australia.



## Mr Gareth Roeszler – Program Manager, Research

Gareth commenced working with WaterRA in March 2010 and has had several roles in the Research Team. Gareth has a BEng (Chemical), a BLaws (Honours) and a Grad Dip in Legal Practice. Before joining WaterRA Gareth worked for BHP Billiton at Olympic Dam in SA.



## Ms Angela Gackle – Manager - Marketing & Communications

Angela took up this position in May 2013 (having previously been in the role from 2008 - 2010). She has a BSc in zoology/pharmacology. Angela was previously the Manager of MarComms in the CRC WQT and before that in CSIRO for 13 years. She has also worked in local government and a number of other sectors.



## Ms Carolyn Bellamy – Manager - Education Program

Carolyn has been in this role since March 2009. She administers the education initiatives that support the development of young water professionals for the future. Before joining WaterRA, Carolyn coordinated the CRC WQT Education and Training Program.



## Ms Claire McInnes - Program Coordinator

Claire commenced in this role in October 2012. She has extensive experience in Project and Engineering Management, gained working in the defence, and oil and gas industries prior to joining WaterRA. Claire has a BEng(Aero), MA(Int Rel) and Grad Cert in Project Management, and is a member of the Australian Institute of Project Management.



## Mr Fred Fleuren – Senior Finance Officer

Fred is the Senior Finance Officer, and manages the financial and management accounts. He joined WaterRA in October 2008, having worked at CRC WQT since 2003. Fred is a member of the Association of Accounting Technicians and is continuing studies to gain further business knowledge and develop new professional skills.

### Other staff changes during the year:

Ms Jodieann Dawe returned from parental leave in January (CEO January - April 2014).

# DIRECTORS REPORT AND FINANCIAL SUMMARY

FOR THE YEAR ENDED 30 JUNE 2014

- Corporate Information
- Directors' Report
- Auditor's Independence Declaration
- Statement of Profit or Loss and Other Comprehensive Income
- Statement of Financial Position
- Directors' Declaration
- Independent Auditor's Report



## CORPORATE INFORMATION

The Board of Directors of Water Research Australia Limited (WaterRA) has pleasure in presenting this report for the financial year ended 30 June 2014 to the members of WaterRA.

### The Board

WaterRA has a representative Board comprising nine Directors:

- An Independent non-executive Chair
- Four non-executive Directors nominated by industry members and elected by members
- Three non-executive Directors nominated by research members and elected by members
- The CEO

The Chair is a paid position elected for a term of three years, while other non-executive Directors serve terms of two years in a voluntary capacity.

The Chair, Professor Michael Moore, was first appointed 11 July 2008 at a general meeting of members and re-appointed on 25th October 2013, following a resolution of the members at the 2013 Annual General Meeting.

### WaterRA Committees

The Board established a Scientific Advisory Board Committee and a Regulatory Advisory Board Committee. The advisory committees have no formal decision-making powers but provide expert advice to assist the Board and management in developing, conducting and evaluating the research program of WaterRA.

The Board also established two sub-committees – the Risk and Audit Committee and Human Resources Committee – which provide an important assurance that key areas (Finance, Human Resources and Risk Management) of the Board's duties will be rigorously discharged. The Risk and Audit Committee appointed an Independent Member in May 2014 for a two year term.

In addition to the two advisory Board committees and sub-committees of the Board, two management committees – the Project Review Team and the Education Committee – provide advice and support to the CEO and staff and make recommendations to the Board on specific program issues.

### Directors

The names and details of the company's Directors in office during the financial year are as outlined on the following page. All Directors were in office for the entire year unless otherwise stated.

Short biographies for Directors can be found on pages **16-17**.

## CORPORATE INFORMATION

During the 2013-14 financial year the Board met on ten occasions for Board meetings or Non-Executive Director meetings - either face-to-face or via teleconference. In addition Directors also met on four occasions for the Board sub-committees, either face-to-face or via teleconference.

Name	Date of Appointment	Term End or Retirement Date	Board Meetings			Non-Executive			Board Sub-committee	
			A	B	C	D	E	F	RAAC	HR
Prof Simon Beecham	27 Nov 2009	2015 AGM	7	7	0	9	9	0	n/a	4
Mr Keith Cadee	12 Oct 2007	2013 AGM	2	2	0	2	2	1	2	n/a
Dr Stephen Capewell	25 Oct 2013	2015 AGM	5	4	1	7	7	2	3	n/a
Ms Jodieann Dawe	10 Jan 2014	31 Mar 2014	1	1	0	n/a	n/a	n/a	n/a	n/a
Dr Dharma Dharmabalan	15 Nov 2013	2014 AGM	5	5	0	7	7	0	n/a	n/a
Prof Stephen Gray	28 Oct 2011	2015 AGM	7	6	1	9	8	1	5	n/a
Dr David Halliwell	6 Sept 2012 9 April 2014	27 Jan 2014 ongoing	5	5	0	n/a	n/a	n/a	n/a	n/a
Dr John Howard	12 Oct 2007	2015 AGM	7	6	1	9	8	1	n/a	4
Prof Michael Moore	11 Jul 2008	2016 AGM	7	7	0	9	9	0	n/a	n/a
Dr Hamish Reid	26 Oct 2010	2014 AGM	7	7	0	9	9	0	n/a	n/a
Dr Melita Stevens	26 Oct 2010	2014 AGM	7	6	1	9	8	1	3	4
Mr Ross Young	18 Oct 2012	27 Sept 2013	1	1	0	1	1	0	2	n/a

A Number of meetings held during the time the Director held office during the year

B Number of meetings attended

C Number of apologies registered

D Non-executive meetings held

E Non-executive meetings attended

F Number of apologies registered

# DIRECTORS' REPORT

Details of Directors' qualifications, experience and special responsibilities

Name	Qualifications/Professional Memberships	Position and Organisation	Special Responsibilities
Prof Simon Beecham	PhD (Civi Eng), BSc(Hons) (Civil Eng), GHCE FAICD, FIE Aust, CPEng, SIA, AWA	Head of School, Natural & Built Environment, University of South Australia	Chair: HR Committee (Board sub-committee)
Mr Keith Cadee	BEng (Civil), MEng (Environmental) MIE(Aust), GAICD	General Manager, Acquisition Group, Water Corporation (up to 30 June 2013)	Chair: Risk & Audit Committee (Board sub-committee) until 25 October 2013
Dr Stephen Capewell	BSc(Hons), PhD (Chem Eng), GAICD	Manager, Drinking Water Quality, Water Corporation	Risk & Audit Committee (Board sub-committee)
Ms Jodieann Dawe	BSc (Hons), MAppSc (Colloid Chemistry), MBA, GradDipFinSecCorLaw GAICD, AFAIM, MRACI, CChem, IWA, AWA (Director)	CEO, Water Research Australia (until 8 April 2014)	
Dr Dharma Dharmabalan	D Tech, DipH Delft, GradDip (Comp), BScEng (Hons) (Civil), MEng (Env), Adjunct Prof (VU), Adjunct A/Prof (Deakin) WE, FIE (Aust), CPEng, FICE, FASCE, MIWEM, MAWA	General Manager, Works Delivery, Tasmanian Water & Sewerage Corporation	
Dr David Halliwell	MBA, PhD, GAICD, BSc (Hons)	A/CEO Water Research Australia (to 27 Jan 2014) CEO Water Research Australia (from 9 April 2014)	
Dr John Howard	BSc (Hons), PhD (Freshwater Chemistry) FAICD, AWA (Director)	General Manager, Strategy & Planning, SA Water Corporation	Chair: Scientific Advisory Committee Member of HR Committee (Board sub-committee)
Prof Michael R Moore	BSc (Hons), PhD (Medicine), DSc (Biochemistry in Medicine) MACM, FACTRA AWA, ACTRA, Biochem. Soc. BTS, IWA,	Independent	Independent Chair: WaterRA Board
Dr Hamish Reid	PhD, BSc (Hons) MAICD, AWA	General Manager Customer and Business Futures, South East Water Corporation	Member of HR Committee (Board sub-committee)
Dr Melita Stevens	PhD, BAppSc, DipMicro, Adjunct Prof (RMIT), Senior Fellow (Melbourne) AWA	Principal Scientist, Melbourne Water Corporation	Risk & Audit Committee (Board sub-committee)
Prof Stephen Gray	BE (Chem Eng) PhD (Chem Eng)	Director, Institute of Sustainability, and Innovation, Victoria University	Chair: Risk & Audit Committee (Board sub-committee) from 25 October 2013
Mr Ross Young	Grad Dip (Natural Resources Law), MBA, BAppSc (Env Assessment Land Use Policy)	CEO Sydney Catchment Authority (up to 27 September 2013)	Member of Risk & Audit Committee (Board sub-committee) until 27 September 2013



# DIRECTORS' REPORT

## Company Secretary

Mr Peter Brass has been the Company Secretary during the 2013-14 financial year.

## Principal Activities

WaterRA's principal activities during 2013-14 were:

- Co-ordinating and managing high quality research on priority issues in water quality on behalf of the members of WaterRA and the Australian water community
- Facilitating knowledge transfer and uptake of outcomes of R&D into industry through workshops and members' meetings
- Providing scientific evidence to underpin regulation and guidelines relating to safe drinking water and recycled water
- Promoting the importance on the national agenda of safe water to the Australian community by engaging with key decisions makers within government and industry

## Operating Results for the Period

The company's trading result for the year ended 30 June 2014 was a deficit of **(\$452,668)** [2013 deficit of **(\$361,994)**].

The surplus/(deficit) for WaterRA as a whole can be considered as having two components:

**PART A** - A deficit of **(\$979,365)** for the 2013-14 year from revenue and expenditure acquitting commitments to research projects [2013 deficit of **(\$1,141,367)**] from cash reserves.

**PART B** - A surplus of **\$526,697** for the 2013-14 year from the remainder of the income statement not related to acquitting commitments to research project expenditure [2013 surplus of **\$779,373**].

The overall deficit is a reflection of research projects utilising the cash committed to them.

The company is a not-for-profit entity, registered as a charity and is exempt from income tax.

## Cash & Project Commitments

At 30<sup>th</sup> June 2014 the company had cash at hand of \$2,902,420 [2013 \$3,242,054]. At the same date WaterRA commitments to research projects plus external project funding held or received by WaterRA was \$1,373,383 [2013 \$2,921,803].

The cash commitments will be acquitted over the term of the research projects, with each project averaging a span of two to three years.

The WaterRA Board closely monitors its commitments to research projects relative to cash and working capital to assure that WaterRA's cash commitments to projects can be covered in full from the point of Board approval.

## Members Liability on Winding Up

Each Member of the company undertakes to contribute to the company's property an amount as may be required not exceeding one hundred dollars if the company is wound up while it is a Member or within one (1) year after ceasing to be a Member, for payment of the company's debts and liabilities contracted before it ceased to be a Member and of the costs, charges and expenses of winding up and for an adjustment of the rights of contributories amongst themselves.

# DIRECTORS' REPORT

## Dividends

No dividends were paid during the reporting period. The company is limited by guarantee and its constitution precludes the payment of dividends.

## Share Options

The company has not granted options to any persons to have shares issued to them. The company is limited by guarantee and its constitution precluded the payment of dividends.

## Significant Changes in State of Affairs

In the opinion of the Directors, there were no significant changes in the state of affairs of the company that occurred during the financial year under review not otherwise disclosed in this report.

## After Balance Date Events

There has not arisen, in the interval between the end of the financial year and the date of this financial report, any item, transaction or event of a material and unusual nature that in the opinion of the Directors is likely to substantially affect the operations of the company, the results of those operations, or the company's state of affairs in future financial years.

## Environmental Regulations

The company is not particularly exposed of any environmental regulation. The Directors have not received notification nor are they aware of any breaches of environmental laws by the company.

## Future Developments and Results

There are no significant changes in the state of affairs that are expected in the future which will affect the results and therefore require disclosure.

## Indemnification and Insurance of Directors and Officers

Since the end of the previous financial year, the company has paid an insurance premium of \$9,097 in respect of a directors and officers liability insurance contract for current and former directors and officers, against all liabilities and expenses arising as a result of work performed in their respective capacities, to the extent permitted by law.

## Auditors Independence

The auditors independence declaration, which forms part of the Directors reports for the financial year ended 30 June 2014, has been received and can be found following this report.

## Signed in accordance with a resolution of the Directors.



Stephen Gray  
(Director)

14 August 2014



Melita Stevens  
(Director)

# AUDITOR'S INDEPENDENCE DECLARATION



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**AUDITORS INDEPENDENCE DECLARATION  
UNDER SECTION 307C OF THE CORPORATIONS ACT 2001  
BY PAUL GOSNOLD  
TO THE DIRECTORS OF WATER RESEARCH AUSTRALIA LIMITED**

As lead auditor for the audit of Water Research Australia Limited for the year ended 30 June 2014, I declare that, to the best of my knowledge and belief, there have been no contraventions of:

- (a) The auditor independence requirements of the Corporations Act 2001 in relation to the audit; and
- (b) Any applicable code of professional conduct in relation to the audit.

A handwritten signature in blue ink that reads 'Paul Gosnold'. The signature is written in a cursive, flowing style.

Paul Gosnold  
Director

BDO Audit (SA) Pty Ltd

# STATEMENT OF PROFIT OR LOSS AND OTHER COMPREHENSIVE INCOME

FOR THE PERIOD ENDED 30 JUNE 2014	2014	2013
	\$	\$
<b>REVENUE</b>		
Revenue from continuing operations	3,437,360	2,948,886
Other income	20,542	271
<b>EXPENDITURE</b>		
Research programs	(2,212,530)	(1,560,764)
Education programs	(163,791)	(210,645)
Marketing and communications	(172,114)	(101,082)
Operating expenses	(287,040)	(332,050)
Depreciation and amortisation expense	(13,843)	(13,842)
Employee benefits	(1,027,931)	(1,060,068)
Chairman remuneration	(33,321)	(32,700)
Surplus/(Deficit for the year)	<u>(452,668)</u>	<u>(361,994)</u>

Copies of the full set of financial statements are available on request

# STATEMENT OF FINANCIAL POSITION

AS AT 30 JUNE 2014	2014 \$	2013 \$
<b>ASSETS</b>		
Current assets		
Cash and cash equivalents	2,902,420	3,242,054
Trade and other receivables	273,217	192,301
Other assets	57,600	76,261
Total current assets	<u>3,233,237</u>	<u>3,510,616</u>
Non-current assets		
Intangible asset - software	41,527	55,370
Total non-current assets	<u>41,527</u>	<u>55,370</u>
Total assets	<u>3,274,764</u>	<u>3,565,986</u>
<b>LIABILITIES</b>		
Current liabilities		
Trade and other payables	393,672	375,851
Revenue received in advance	1,148,636	1,005,011
Total current liabilities	<u>1,542,308</u>	<u>1,380,862</u>
Non-current liabilities		
Total non-current liabilities	-	-
Total liabilities	<u>1,542,308</u>	<u>1,380,862</u>
Net assets	<u>1,732,456</u>	<u>2,185,124</u>
<b>EQUITY</b>		
Retained earnings	<u>1,732,456</u>	<u>2,185,124</u>
Total equity	<u>1,732,456</u>	<u>2,185,124</u>

Copies of the full set of financial statements are available on request

# DIRECTORS' DECLARATION

WATER RESEARCH AUSTRALIA LIMITED  
A.B.N. 32 127 974 261  
DIRECTORS' DECLARATION  
(SHORT DISCLOSURE)

The Directors of the company declare that:

In the opinion of the Directors of Water Research Australia Limited:

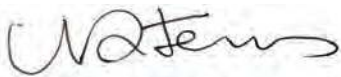
1. the Statement of Profit or Loss and Other Comprehensive Income as extracted from the full Financial Report of the company are drawn up so as to present fairly the results of the operations of the company for the financial year ended 30 June 2014 and the state of affairs of the company as at 30 June 2014.
2. there are reasonable grounds to believe that the company will be able to pay its debts as and when they become due and payable.

This declaration is made in accordance with a resolution of the Board of Directors.

On behalf of the Board of Water Research Australia Limited.



Stephen Gray  
(Director)



Melita Stevens  
(Director)

Dated this 14<sup>th</sup> day of August 2014

# INDEPENDENT AUDITOR'S REPORT



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## INDEPENDENT AUDIT REPORT

### TO THE MEMBERS OF WATER RESEARCH AUSTRALIA LIMITED

#### Report on the Financial Summary

The accompanying financial summary of Water Research Australia Limited comprises the statement of financial position as at 30 June 2014 and the statement of profit or loss and other comprehensive income for the year then ended, derived from the audited financial report of Water Research Australia Limited for the year ended 30 June 2014. The financial summary does not contain all the disclosures required by the Australian Accounting Standards and accordingly, reading the financial summary is not a substitute for reading the audited financial report.

#### Directors' Responsibility for the Financial Report

The directors of the company are responsible for the preparation and fair presentation of the financial summary in accordance with Australian Accounting Standards, and for such internal control as the directors determines is necessary to enable the preparation and fair presentation of the financial summary that is free from material misstatement, whether due to fraud or error.

#### Auditor's Responsibility

Our responsibility is to express an opinion on the financial summary based on our audit procedures which were conducted in accordance with Auditing Standard ASA 810 Engagements to Report on Summary Financial Statements. We conducted an independent audit of the full financial report of Water Research Australia Limited for the year ended 30 June 2014. Our audit report on the full financial report was signed on 22 August 2014, and was not subject to any modification. The Auditing Standards require that we comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the financial report is free from material misstatement.

An audit involves performing procedures to obtain evidence about the amounts and disclosures in the financial summary. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial summary, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation of the financial summary in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Our procedures in respect of the financial summary included testing that the information in the financial summary is consistent with the full financial report, and examination on a test basis, of evidence supporting the amounts, discussion and analysis, and other disclosure which was not directly derived from the full financial report. These procedures have been undertaken to form an opinion whether, in all material respects, the financial summary is presented fairly.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

#### Independence

In conducting our audit, we have complied with the independence requirements of the *Corporations Act 2001*. We confirm that the independence declaration required by the *Corporations Act 2001*, which has been given to the directors of Water Research Australia Limited, would be in the same terms if given to the directors as at the time of this auditor's report.

#### Opinion

In our opinion, the financial summary derived from the audited financial report of Water Research Australia Limited as of 30 June 2014 is consistent, in all material respects with the audited financial report in accordance with Australian Accounting Standards.

BDO Audit (SA) Pty Ltd

Paul Gosnold

Director

Adelaide, 22 August 2014

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# WATERRA PUBLICATIONS 2013-14

## Journal Papers - Refereed

Allard S, Fouche L, Heitz A and Von Gunten U (2013) "Oxidation of Manganese (II) during Chlorination: Bromide Catalysis." *Environmental Science and Technology* 47(15): 8716-8723.

Antony A, Blackbeard J, Angles M and Leslie G (2014) "Non-microbial indicators for monitoring virus removal by ultrafiltration membranes." *Journal of Membrane Science* 454: 193-199.

Barker SF, Sinclair M, O'Toole J, Leder K, Malawaraarchchi M and Hamilton A (2013) "A probabilistic model of norovirus disease burden associated with greywater irrigation of home-produced lettuce in Melbourne, Australia." *Water Research* 47(3): 1421-1432.

Beale D, Porter N and Roddick FA (2013) "The interaction between natural organic matter in raw waters and pesticide residues: a three dimensional excitation-emission matrix (3DEEM) fluorescence investigation." *Water Science & Technology* 67(11): 2428-2436.

Braun K, Cruaux L, Fabris R, Morran J, Ho L and Drikas M (2013) "Comparison of conventional and MIEEX coagulation processes for bacterial removal, utilising real time optical monitoring techniques." *Environmental Technology* 35(8): 1038-1045.

Braun K, Fabris R, Morran J, Ho L and Drikas M (2014) "Drought to flood: A comparative assessment of four parallel surface water treatments during the 2010-2012 inflows to the Murray-Darling Basin, South Australia." *Science of the Total Environment* 488-489: 36-45.

Byrne A, Braun K, Fabris R, Morran J and Drikas M (2014) "Behaviour of small particles in distribution systems - impact of improving treatment." *Journal of the American Water Works Association* 106(1): 67-68.

Chow C, Saint C, Zappia L, Henderson R, Roeszler G, Dexter R, Nguyen T, Stuetz R, Byrne A, Trolio R, Lucas J, Escher B, van Daele C, Dutt M, Tang JYM and Altenburger R (2013) "Most oxidative stress response in water samples comes from unknown chemicals: The need for effect-based water quality trigger values." *Environmental Science and Technology* 47(13): 7002-7011.

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Fujii M, Dang TC, Bligh M, Rose AL and Waite DT (2014) "Effect of natural organic matter on iron uptake by the freshwater cyanobacterium *Microcystis aeruginosa*." *Environmental Science and Technology* 48: 365-374.

Gibney KB, Sinclair M, O'Toole J and Leder K (2013) "Using disability-adjusted life years to set health-based targets: A novel use of an established burden of disease metric." *Journal of Public Health Policy* 34(3): 439-446.

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Kaserzon SL, Hawker D, Booij K, O'Brien DS, Kennedy K, Vermeirssen E and Mueller J (2014) "Passive sampling of perfluorinated chemicals in water: *in-situ* calibration." *Environmental Pollution* 186: 98-103.

Kaserzon SL, Vermeirssen E, Hawker D, Kennedy K, Bentley C, Thompson J, Booij K and Mueller J (2013) "Passive sampling of perfluorinated chemicals in water: flow rate effects on chemical uptake." *Environmental Pollution* (177): 58-63.

Loi C, Busetti F, Linge KL and Joll C (2013) "Development of a solid-phase extraction liquid chromatography tandem mass spectrometry method for benzotriazoles and benzothiazoles in wastewater and recycled water." *Journal of Chromatography A* 1299: 45-57.

McDonald S, Kristiana I, Tan J, Joll C and Heitz A (2013) "Analysis of halogen-specific AOX revisited: Method optimisation and validation." *Journal of Chromatography A*.

Najnin N, Forbes A, Sinclair M and Leder K (2014) "Risk factors for community-based reports of gastrointestinal, respiratory and dermal symptoms: findings from a cohort study in Australia." *Journal of Epidemiology* 24(1): 39-46.



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- Neale PA, Jamting K, Escher B and Herrmann J (2013) "A review of the detection, fate and effects of engineered nanomaterials in wastewater treatment plants." *Water Science & Technology* 68(7): 1440-1453.
- O'Toole J, Sinclair M, Barker F and Leder K (2014) "Advice to risk assessors modeling viral health risk associated with household graywater." *Risk Analysis* 34(5): 797-802.
- Plant EL, Smernik RJ, Greenwood P, Macdonald LM and van Leeuwen J (2013) "The organic chemistry of plant residues: comparison of NMR and pyrolysis data using multivariate statistical approaches." *Current Organic Chemistry* 17: 3000-3012.
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- Rodriguez-Molares A, Howard C and Zander A (2014) "Determination of biomass concentration by measurement of ultrasonic attenuation." *Applied Acoustics* 81: 26-30.
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Allard S - 'Iodo-trihalomethane formation during the chlorine/ammonia process: role of Natural Organic Matter (WP3)'. 5<sup>th</sup> IWA NOM Specialist Conference, Perth, 1-4 October 2013.

Allard S, Nottle CE, Chan A, Joll C, Charrois JWA and Von Gunten U - 'Mitigation of I-DBPs and control of bromate formation during ozonation pre-treatment'. NOM5 Down Under, 5<sup>th</sup> IWA Specialist Conference on Natural Organic Matter Research, Perth, Western Australia, 1-4 October 2013.

Allard S and Von Gunten U - 'Iodo-trihalomethane formation during the chlorine/ammonia process: role of Natural Organic Matter'. NOM5 Down Under, 5<sup>th</sup> IWA Specialist Conference on Natural Organic Matter Research, Perth, Western Australia, 1-4 October 2013.

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Gaget V - 'Bad tastes and odours in our drinking water reservoirs: are benthic cyanobacteria the culprits?'. SA Water Knowledge Sharing Seminar, Adelaide, 21 November 2013.

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How Z - 'Natural Organic Matter Research (oral presentation)'. NOM5 Down Under, 5<sup>th</sup> IWA Specialist Conference, Perth, Western Australia, 1-4 October 2013.

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Lampard J, Chapman H, Roiko A, Stratton H and McCarthy D - 'Campylobacter spp. in Australian stormwater: human health implications for harvesting and reuse (poster presentation)'. 17<sup>th</sup> International Symposium of Health Related Water Microbiology, Florianopolis Island, Brazil, 15-20 September 2013.

Lampard J, Chapman H, Sidhu J, McCarthy D, Stratton H, Roiko A and Gernjak W - 'Pathogenic bacteria detected in stormwater from urban Australian catchments'. 8<sup>th</sup> International Conference on Water Sensitive Urban Design, Gold Coast, Australia, 25-29 November 2013.

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- Martins A, Porter N and Carpenter P - 'The influence of sampling and storage conditions on herbicide degradation in river water samples (Poster)'. SETAC Australasia, Melbourne, Victoria, 30 September - 3 October 2013.
- Neale P, O'Malley E, Jamting K, Herrmann J and Escher B - 'Assessing the fate and effect of engineered nanomaterials in reference and wastewater derived organic matter'. SEATAC Europe 24<sup>th</sup> Annual Meeting, Basel, Switzerland, 11-15 May 2014.
- Neale PA and Escher B - 'Applying a fractionation approach to understand the effect of dissolved organic carbon on bioassays'. Micropol & Ecohazard 2013: 8<sup>th</sup> IWA Specialized Conference on Assessment and control of micropollutants and hazardous substances in water, Zurich, Switzerland, 16-20 June 2013.
- Neale PA and Escher B - 'Does co-extracted organic matter influence bioanalytical tools?' NOM5 Down Under 2013: 5th Natural Organic Matter Specialist Conference, Perth, Australia, 1-4 October 2013.
- O'Toole J, Gibney KB, Sinclair M and Leder K - 'Conveying the concepts of adopting a disability adjusted life year (DALY) microbial health based target for drinking water to health regulators and water managers'. 17<sup>th</sup> International Symposium on Health-Related Water Microbiology (IWA), Florianopolis, Brazil, 15-20 September 2013.
- Ostarcevic E, Cran M and Gray S - 'Developments in real-time integrity monitoring of reverse osmosis membranes'. International Membrane Science and Technology Conference (IMSTEC2013), Melbourne, 25-29 November 2013.
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- Perraton S, Blackwell B, Fischer B, Gaston T and Meyers G - 'Wastewater reuse in the absence of water scarcity and a market: A case study from Beaconsfield, Tasmania (Australia)'. Australia Asia Pacific Water Recycling Conference, Brisbane, Queensland, Australia, July 2013.
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- Scott P, Lim R, Nugegoda D, Coleman H, McDonald J, Tremblay L, Blackbeard J, Pettigrove V, Blockwell S, Nice H, Bartkow M, Warne M and Leusch F (2013). 'Assessment of endocrine disruption in Australian aquatic environments using an *in vivo* approach with mosquitofish (*Gambusia holbrooki*) and rainbowfish (*Melanotaenia fluviatilis*)'. SETAC 3<sup>rd</sup> Annual Meeting, Melbourne, 1-3 October 2013.
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- Umar M, Roddick FA and Fan L - 'Treatment of reverse osmosis concentrate by ultraviolet light emitting diodes (UVLEDs/H<sub>2</sub>O<sub>2</sub> with and without coagulation'. IMSTEC Conference, Melbourne, Victoria, Australia, 25-29 November 2013.
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Watson K - 'Using fluorescence - PARAFAC analysis for assessing disinfection by-product formation and removal efficiency in synthetic waters subjected to adsorptive precursor removal'. NOM5 Down Under - 5<sup>th</sup> IWA Specialist Conference on Natural Organic Matter Research, Perth, Western Australia, 1-4 October 2013.

Yap R, Whittaker M, Stuetz R, Peirson W, Jefferson B, Newcombe G and Henderson R - 'Flotation without flocculation: Field demonstration of algae separation using chemically-treated bubbles'. IWA Specialist Conference: Advances in Particle Science and Separation, Sapporo, Japan, 15-18 June 2014.

Yeung A, Dang T, Muenchhoff J, McDonald J, Waite DT and Neilan BA - 'Effects of growth rate on proteomic changes and toxin production in *Microcystis aeruginosa* under iron limitation'. 9<sup>th</sup> International Conference on Toxic Cyanobacteria, Pilanesberg, South Africa, 11-16 August 2013.

## Student Theses

Kaserzon S (2014) Development and calibration of aquatic passive sampler technologies for emerging pharmaceuticals and water pollutants, (PhD) University of Queensland

O'Malley E (2013) Understanding the interaction of engineered nanomaterials, organic matter and micropollutants: Implications for fate in wastewater treatment plants and toxicity, (Hons) University of Queensland.

Plant E (2013) Comparison and development of advanced techniques for organic matter characterisation in water and wastewater processing, (PhD) University of Adelaide

Wilson A (2013) Development of Rapid Tools for *Cryptosporidium*, Flinders University. (Honours) Flinders University

Scott P (2014) Investigation of endocrine disruption in Australian aquatic environments (PhD) Griffith University

Trang Trinh (2013) Process robustness and impacts of hazardous events on membrane bioreactor performance (PhD) University of NSW

Umar M (2014) Treatment of reverse osmosis concentrate using hydrodynamic cavitation - evaluation of oxidation efficiency and biodegradability improvement (PhD) RMIT University.

Yap R (2013) Optimising dissolved air flotation (DAF) for algae removal by bubble modification in drinking water and advanced wastewater systems, (PhD) University of NSW

## WaterRA Fact Sheets

WaterRA (2014) Log removal values in wastewater treatment.

WaterRA (2014) Research Update - Cyanobacteria.

WaterRA (2014) Research update - Membranes.

WaterRA/WSAA (2014) Member Update - March 2014  
Mycobacteria in drinking water.

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The SA Water House location in the heart of Adelaide's CBD, makes the building an attractive and convenient base for WaterRA staff and visitors.

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# WATERRA MEMBERS

## INDUSTRY MEMBERS

Australian Water Association Ltd  
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