

## February 2002 Edition

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## Around the Traps South West

Glenelg Water,  
South West Water &  
Portland Coast Water

### Cleaner Safer Ocean Confirmed

The first findings are in from a \$110,000 five year study commissioned by South West Water to discover the impacts of treated wastewater discharges on the ocean flora and fauna in the vicinity of the outfall, to the west of Thunder Point. A benchmark study carried out in 1991, prior to the wastewater being treated, found evidence of major localised pollution.



**Treatment Plant Operator Anthony Evans above the cliff face at the outfall's location.**

**The outfall is 20 metres from the cliff face**

South West Water Chairman Graeme Rodger said; "The independent consultants undertaking the five year review have reached two significant conclusions. Firstly, that the health of the inter tidal algal communities has improved since the establishment of the treatment plant in 1996. Secondly, that any impacts that are occurring are within natural seasonal and locational variations and that any impacts are not detectable within the study parameters."

"South West Water is delighted that the expectations of the mid 1990's have been realised. Now that the quality of the wastewater has lifted the next challenge is to achieve reuse."



**The Warrnambool Wastewater Treatment Plant**

The Warrnambool Wastewater Treatment Plant processes wastewater from Warrnambool, Allansford and Koroit. Solids are screened, treated and removed from the waste stream.

The monitoring program commenced in 1999 and concludes in 2004. Consultants, Water ECOscience, were awarded the study contract.

South West Water Executive Officer Russell Worland said; "Monitoring will continue on a six monthly basis through to 2004 so that South West Water can build a comprehensive data platform regarding flora variety and density."

"Interested persons wanting further details on the Warrnambool Wastewater Treatment Plant Ocean Outfall Biological Monitoring Program should contact the South West Water Environmental Section (03 5564 7600)."

**South West Water Media Release 27 December 2001**

### Reclaimed Water Irrigation Course

I attended the first three days of the reclaimed water management and irrigation seminar in January, organised by AWWOA, at the University of Melbourne, Dookie Campus. The remaining two days are to be staged in February.



I've found the seminar so far to be very informative and I was able to broaden my knowledge in a number of areas. Some topics covered that I have found interesting are :

- Soil properties and water relationships
- How soils composition can change dramatically in a small distance and the importance of considering topography when doing soil samples
- Managing water with different salinity levels and the possible impacts of salt on soils and pastures.
- Scheduling of irrigations and development of water budgets

A tour of a local farm where irrigated crops such as maize and lucerne were grown was also interesting. This farmer was able to point out his crop management practices, how he schedules irrigation and fertiliser application, double cropping practices and crop rotations and their role in maintaining soil fertility and structure. This was a good message to us that what we were learning should be put into practice at our plants.

The mix of science based information and practical work in the course is good and I have certainly picked up a lot of extra ideas during discussions with people from other parts of the state who are doing the course as well.

I am looking forward to implementing some of the things that I've learnt in the way we run the Shepparton wastewater management facility in the future and would recommend the course to any operators who are involved with irrigation or who have to deal with off-site users of their water.

**Contributed by: Peter Dwyer, Goulburn Valley Water.**



## Editorial

*Another bumper edition with a large number of contributions including the WITC crossword. Keep those articles coming. If your authority puts out a press release forward a copy via fax or email to 'The Editor'.*

*Don't forget the contact in your area for 'Operator' articles. We now have a contact for the 'North West' in David Tickner*

**THE EDITOR**

## President's Prattle

Welcome to 2002,

I hope that 2001 was a success and that this year gives you good fortune!

You would have all received the national Operators Magazine that was published in December 01, we are pleased from the positive feedback we have received and look forward to enhancing the next edition mid year.

It is important to have the input from you the members, so please consider submitting articles to either the National Magazine (WaterWorks) or the Newsletter (Operator), and also the "Call for Papers" for the 2002 conference at Geelong will be out soon. The exchange of ideas and information is what we are all about.

I would like to welcome to the Committee David Tickner from Grampians Water. David has put his hand up and fills a casual vacancy.

Please enjoy this Newsletter and keep Smiling

**Russell Mack, AWWOA President.**



### Around the Traps North East

**North East Water, Goulburn  
Valley Water & Coliban  
Water**

## Wangaratta's New Nutrient Removal Plant

Guess what, Wangaratta has a new nutrient removal plant and here's my description of it in my own primitive terms.

### Brief History.

Wangaratta is located approximately 50kms from Wodonga. The thriving population of approximately 16000 is home of the legendary Jazz Festival and a wicked bingo night on Saturdays. Situated approx. 4kms N/East of Wangaratta abodes our Wastewater Treatment Plant (WWTP). The previous components of the WWTP consisted of:

- Primary Aerated Lagoon
- Secondary Faculative Lagoon
- Maturation Lagoons

- 300 Megalitre Storage Basin (Winter)
- 70 Hectare Plantation (irrigation)

The plant handles approximately 5.0 megalitres of wastewater per day, being a combination of both industrial and domestic waste. Previously effluent was disposed of through evaporation processes, irrigation to the tree plantation during summer and creek discharge via Reedy Creek during winter months. Because of continuous poor results, particularly in regards to phosphorous and suspended solids and N.E.R.W.A.'s commitment to enviromental issues a INDUCED AIR FLOTATION, CLARIFICATION PLANT (IAF) has been installed to remove these nutrients with a capacity of 6.5 megalitres/day. Thus eliminating our loads on Reedy Creek.

### Induced Air Flotation, Clarification Plant. (IAF)

While an IAF Plant works on the same basic principles as a DAF plant, namely flotation to remove flocculated solids, the chemistry and physical components to achieve this are quite different. Two of the main differences being the use of a surfactant and the way the air/water mixture is obtained in the IAF process. Also the IAF process has a rapid throughput for a relatively compact unit, 6.0 by 3.0 metres in area mainly due to the design components of the JAMESON CELL.

### Basic Principles:

- Coagulant (Aluminium Sulphate) is injected at two different stages, apparently this achieves better phosphorus removal. The purpose of the coagulant being twofold, to precipitate reactive phosphorus and to form floc particles. Rapid mixing is achieved by pumps situated at the storage lagoons and later with an inline mixer. Flocculation occurs in pipeline and Jameson Cell (IAF).
- Surfactant (Sodium Dodecyl Sulphate) is injected before entry to Jameson Cell. The surfactant is the main difference between the DAF and IAF processes. The surfactant ensures that all the flocculated material is hydrophobic (air attractant) ensuring that all the sludge floats above the water level and avoids settling. This is the reason that the bubble size doesn't seem so prolific to the process as in a DAF system, apparently this process used quite commonly in the mining industry
- Polymer is also added just before the IAF plant. The cationic polymer enhances the flocculation process enlarging the floc particles to the size of "cornflakes" for flotation.
- The chemically conditioned wastewater is then forced into what's called a Downcomer which forces the water through nozzles. This causes a venturi effect thus entraining air into the system from the atmosphere. This air/water mixture proceeds downward with quite remarkable agitation and velocity where it comes out into the flotation cell. The sludge is floated to the top and mechanically removed by scrapers to a launder. The clean effluent passes to a transfer cell and then pumped through a bank of four continuous self cleaning sand filters.

- The filtered water is then pH corrected using caustic and then discharged to Reedy Creek at a dilution of 5:1. This will be maintained and controlled using an existing flow monitoring station at the creek and newly installed citect and telemetry components.

### Summary:

While the IAF plant passed all its proof of performance criteria quite easily, it's hard to give it "thumbs up" creditation just yet without more history and data input. The plant achieved a constant 0.4mg/l Total Phos, 3.0mg/l suspended solids and approx. 1.0 ntu during testing.

My main concerns as an operator are: Operator timeframes (running and maintenance). Whilst the plant performed well, it did have the capacity to change water quality quite quickly especially in relationship to changes in pH in the raw water and with chemical strengths and viscosity. It seemed the pH changes didn't have to be overly large, being 0.2 of a pH unit to affect performance.

Running Costs: The dollar shouldn't matter when we're improving wastewater quality and improving and nurturing our streams and waterways for future generations use. Sadly we all know it still controls and manipulates us quite harshly. So based on a 75l/s flowrate and an assumed running cost of \$1100.00 per day for 6 months of the year, the grand total comes to \$200000 per year, not cheap. However a lot of this is speculation till we are able to access more data and history. The next 12 months should if anything be interesting.

I would also like to thank McConnell and Dowell and Enviromental Systems on their professionalism and workmanship in the construction and setup of the plant to this stage.

**Brian Scobie, Operator – North East Water**

# Secretary's Scrawl

Arrangements are progressing well for the next Conference to be hosted by Barwon Water in Geelong.

The "call for papers" is out and closes in March. Please consider submitting an abstract – a platform paper it isn't that hard to do and is a real buzz once it's all over – just ask Roland Passuello from North East Water.

The AWWOA has plenty of people and resources who are only too pleased to help you if required – all you need to do is ask!

## 2002 Conference



If the platform presentation isn't your cup of tea, remember the "Operator Poster Papers" which will again be sponsored by the Water Industry Training Centre. Get to work on your material now.

Also, it is not too early to start thinking about the conference in 2003. If you know of a suitable venue, or if you think your Authority would be interested in Hosting the conference, please contact someone from the Committee.

### Water Works

By now everyone would have received a copy of "Water" with the inaugural edition of "WaterWorks" included. We hope that you enjoyed reading this publication, and the editorial team is now on the lookout for articles for future editions. As stated in the magazine, articles do not need to contain rocket science or be overly complicated, and we have a preference for practical information. To make the magazine easier to read, we would like to include more photos and schematics in future editions and avoid large slabs of text.

If you have something to contribute that may be of interest to other operators, please contact either myself or Russell. The editorial team is willing to help you set up and even write the article if you think you need help, so don't be shy - get involved. Alternatively, if you have a particular topic that you would like information on, let us know and we may be able to source someone to write something.

### Reclaimed Water Irrigation Course

(See article from Peter Dwyer Page 2).

The AWWOA was pleased to be involved with the development and promotion of this course. The wastewater operators at Goulburn Valley Water raised the idea for this sort of course at an internal staff meeting and on investigation, it was found that the new Water Industry Training Package did not include an irrigation module. After a ring around to various training providers, the University of Melbourne (Dookie Campus) agreed to run the course with the backing of the WITC.

This course offers the opportunity for an update of skills required by wastewater operators from all Authorities and as such it was appropriate for the AWWOA to get involved. A lot of work was put into the course content to ensure it covered both operational and scientific issues, but at an appropriate level. The course outline has been forwarded to the ITAB with a request for inclusion in the Water Industry Package in the future.

This is a good example of how we can use the resources of the AWWOA to reach a positive outcome and to meet our Association goal of updating Member knowledge and skills.

The AWWOA may be able to help set up other courses or seminars. If you have a topic that may be of interest to other operators, are having trouble finding someone to deliver it, or maybe you are short of numbers and need operators from other Authorities involved to be able to run a course in your area, please contact either myself or Russell and we'll see what we can do to help.



## New Members

Welcome to the following people who have recently joined our Association.

Shane Jordan-Hill, Dr Frans Kalf, Ken Murphy, Rachel Sproal, Nick Gorman, Bruce Anderson, John Shannahan.

New Corporate Members include Pump Selections, Coliban Water, South West Water.

## Apology/Correction

In my report on the Charity Golf Day in the November 2001 Newsletter, I inadvertently left Mono Pumps off the list as a Gold Sponsor. Sorry guys and thanks for your support !!!.

George Wall - AWWOA Secretary

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## AWWOA Members Survey

### Current and Future Directions

Congratulations and thank you to all Members who responded to our survey sent out in late November 2001. We had an overwhelming response, with more than 33% of all Members completing and returning the survey. The numbers have been 'crunched' and a full review will be circulated at a later date. Using the information you have provided, we have a better idea of what you think of the Association and what direction you think we need to head.

A big pat on the pat to those educated ones among us who picked up the typo – we were just CURIOUS to see if you were concentrating!

The survey answers highlighted some issues for us to consider and a summary of some key results are listed below along with some comments on what the committee is planning in each regard.

The majority of replies indicated that the Association should be seeking to expand its member base, and 76% have suggested that we seek members on a National basis. The committee has been discussing this possibility for a while, and it is reassuring to note the majority of our members are in support of this stance.

A sub-committee is reviewing our Constitution and we intend to table some Motions to change our constitution at the AGM in April 2002. To facilitate a National Group and allow our future expansion into other States, it is vital that we remove the word Victoria from our constituted name. After much debate at a recent committee meeting, a motion to slightly alter our name and logo to better reflect our future aspirations has been developed. We also intend to take the opportunity at the AGM to tidy up our constitution's wording and clean up some anomalies/ambiguities we seem to be continually discovering.

The question relating to what information our Members were interested in provided a mixed response. The items which topped this list with over 60% of respondents indicating an interest in were - positions vacant, industry training, new technology and a treatment plant locations/types directory.

In relation to positions vacant we see these as an important Member service and ads are mailed out free of charge to Corporate members and at a nominal fee for non-members. We have tried to promote this service as a benefit of taking out a corporate membership, but obviously this service is not used as widely as it could be. We need your help to promote this idea and to get your Authority involved as a corporate member if they are not already. We also need you to lobby them to forward their ads to us so that we can distribute them. If your employer needs more convincing, perhaps you could mention the costs of newspaper ads V's free distribution directly to the very people they hope to employ.

The issues of new technology and development of a plant directory will be discussed at future committee meetings and we will keep members informed of our progress.

More to follow in the near future.

Cynthia Lim – Committee Member

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## An Operator Tip

### Getting The Low-Down On The Drop-Test!

To check liquid chemical doses at a Water Treatment Plant, it is common practice for the Operator to carry out a "drop-test". This usually consists of noting the time taken for a fixed volume of chemical solution to fall or "drop" in a calibration cylinder with the chemical dosing pump operating. Knowing the dosing rate and the raw water flow into the WTP, the chemical dose can then be calculated.

But is the answer the right one?

For example, with a drop-test result of 20 mL/min at a raw water flow of 8 L/s, the chemical dose can be calculated as:  $20 \times 10^6 / (60 \times 10^3 \times 8) = 41.7$  ppm. This answer is correct if quoted as "ppm (volume)" or "ppm (v)", but **not as mg/L or ppm (weight basis)!**

To convert a drop-test result to a dose expressed in **mg/L**, two other pieces of information are required:

- the specific gravity (SG) of the liquid chemical, and
- it's strength, as percent on a weight/weight basis (w/w).

For example, liquid alum is typically supplied as a 49% w/w solution (7.5% w/w  $Al_2O_3$ ) and at this strength has a SG of 1.3. To work out the chemical dose in mg/L, the following formula is used:

$$\text{mg/L} = \text{SG} \times \%w/w \times (\text{chemical flow from drop-test, mL/min}) / [6 \times (\text{raw water flow, L/s})]$$

For the above case, using liquid alum the dose becomes:

$$\text{mg/L} = 1.3 \times 49 \times 20 / (6 \times 8) = 26.5 \text{ mg/L.}$$



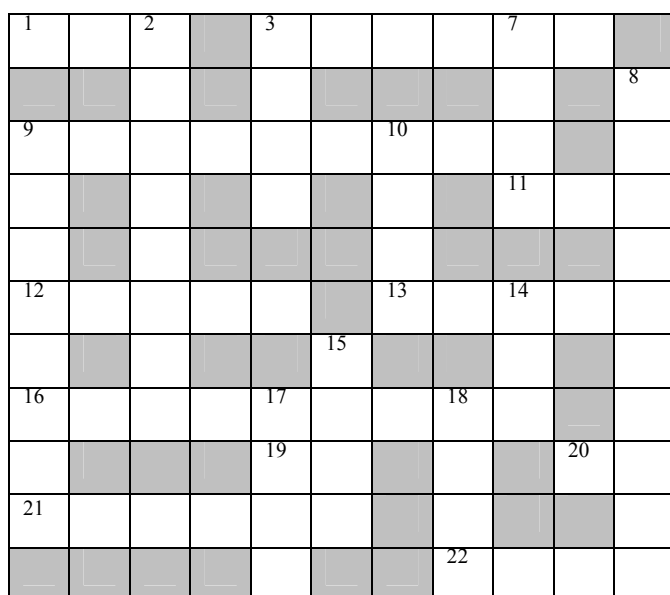
Note that this dose is *lower* than the result expressed in ppm(v)! It is really surprising how many WTP Operators quote chemical doses as mg/L when in fact they are ppm(v)! So, next time you record chemical doses on your WTP Log Sheet please check that they either ppm(v) or mg/L.

And, know the difference!

**Peter Gebbie - Member AWWOA**  
**Earth Tech Engineering Pty Ltd**  
**Phone: 03 8517 9268**  
 Email: [peterg@fisherstewart.com.au](mailto:peterg@fisherstewart.com.au)

*Editors : The AWWOA welcomes tips but any correspondence regarding their content should be directed to the writer.*

## The Water Industry Training Centre Crossword



### Clues

#### Across

1. A measure of the oxygen consuming capacity of inorganic and organic material present in wastewater.
3. Bacteria that require dissolved oxygen.
9. Substances required for cell growth.
11. Errors and Omissions Excepted.
12. Reactive form of phosphorus.
13. Solution used to zero a photometer
16. Materials removed during treatment processes.
19. Unserviceable.
20. Ratio of the circumference of a circle to its diameter.
21. Zoological term for organisms that are capable of movement.
22. A channel for conveying a fluid or carrying cable.

#### Down.

2. The heavy, coarse mixture of grit and organic matter present in wastewater.
3. A substance that dissolves in water and releases hydrogen ions.
7. A substance that dissolves in water and releases hydroxide ions.
8. The point at which free residual chlorine first appears.

9. A chart containing three or more scales that can be used to determine the feed rate on a pump.
10. No feeling.
14. Alkyl Benzene Sulphonate
15. A device to prevent damage from an excessive current.
17. Blunt.
18. Has the chemical symbol Pb.

(Answers in the next edition of 'Operator')

### Next Edition



### Article Contribution Deadline For the May Edition April 27

**North East** - North East Water, Goulburn Valley Water and Coliban Water

Peter Tolsher - fax/ph 02 6059 1596,  
 mobile 0419 337 151, email: [wodwest@nerwa.vic.gov.au](mailto:wodwest@nerwa.vic.gov.au)

**South East** - East Gippsland Water, Gippsland Water, South Gippsland Water and Westernport Water

Russell Mack - Ph 03 5177 4659, fax 03 5177 4690,  
 mobile 0427 331 586, email: [mackr@gippswater.com.au](mailto:mackr@gippswater.com.au)

**South West** - Glenelg Water, South West Water and Portland Coast Water

John Harris - Ph 03 5562 9275, fax 03 5562 9262,  
 mobile 0417 338 688, email: [jhar@swwa.com.au](mailto:jhar@swwa.com.au)

**North West** - Central Highlands Water, Grampians Water and Lower Murray Water

David Tickner - Fax 03 5394 1493, mobile 0419 551 459  
 Email: [Ticko@netconnect.com.au](mailto:Ticko@netconnect.com.au)

**Central** - Barwon Water, Western Water and Metropolitan Water Companies

Graham Thomson - ph 03 5226 9109, fax 03 5226 9140  
 mobile 0408 993 756,  
 email: [graham.thomson@barwonwater.vic.gov.au](mailto:graham.thomson@barwonwater.vic.gov.au)

#### Private Industry

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Articles can be forwarded to area contacts or directly to The Editor Ph 03 2526 9236, fax 03 5226 9262, mobile 0418 569 183,  
 email: [richard.greenhough@barwonwater.vic.gov.au](mailto:richard.greenhough@barwonwater.vic.gov.au)

### Around the Traps Central



**Barwon Water, Western  
Water & Metropolitan Water  
Companies**

### Barwon Water to sewer Skenes Creek

The coastal township of Skenes Creek will be sewered by September, 2004.

Barwon Water's Board approved connecting the town to the Apollo Bay sewerage system at its October meeting. The \$2.9 million scheme will be funded through the State Government's Small Town Sewerage Policy, Skenes Creek residents and Barwon Water.

Barwon Water Chairman Stephen Vaughan said the joint venture between the State Government and Barwon Water would ensure costs to residents were kept to a minimum. Property owners will pay a lump sum of \$800 or instalments of \$80 per annum over 20 years. This will be payable when construction begins in April, 2003.

In a survey conducted by Colac Otway Shire last year, 70 per cent of surveys were returned with 97 per cent of respondents in favor of the scheme. "The survey indicated an overwhelming response to the proposal, and Barwon Water will now proceed immediately with preparing the plans and obtaining approvals," Mr Vaughan said.

The project involves construction of a network of pipes, a pump station and a 7.8-kilometre sewer pipeline along the Great Ocean Road to the Apollo Bay sewage treatment plant. Mr Vaughan said the Apollo Bay plant had the capacity to meet the increase in sewage from the new scheme as well as planned development.

Key target dates:

- opportunity for public comment regarding the Skenes Creek sewerage district February - 2002
- on-site survey for reticulation design to commence April - 2002
- reticulation plans on display for comment August - 2002
- construction to start April - 2003
- declaration of a serviced area at Skenes Creek September - 2004 all homes to be connected to sewerage system by September - 2006.

**Barwon Water Press Release 3 December 2001**

### **'Fern Gully Walk' opened at Barwon Water's West Barwon Reservoir**

Barwon Water on Friday December 14, 2001 opened an 800-metre walking track it built through a picturesque fern gully near the West Barwon Reservoir at Forrest. The path creates a tourist attraction for the town and a picturesque route for the growing band of regular walkers in the community.

Much of the path is boardwalk as the gully is very damp and sensitive beneath its canopy of tall eucalypts - the kind of environment that is so beloved of the tree ferns and other temperate rain forest species.

Ferny gullies are not hard to find in the Forrest area, but without a path through them they are muddy and difficult to access. The 'Fern Gully Walk' looks like any other from the start, but closer inspection reveals rare king ferns, notched tree stumps still standing after the tree they carried was taken for milling 50 or so years ago, and some soaring eucalypts. Benches and viewing platforms have been built into the track to take advantage of these features.

Richard Greenhough, Coordinator Headworks, Barwon Water, who managed the walking track project, said he was pleased to see that the path was already well-used by local walkers.

Richard said that Barwon Water has plans to add more paths to the already extensive network within the reservoir reserve. In fact, Barwon Water is fully supportive of DNRE's proposal to link West Barwon Reservoir with Lake Elizabeth within the next two years by a walking track.

He added that the walking tracks were part of beautification works that have been undertaken by Barwon Water Headwork's personnel over many years. Hundreds of trees were planted in 1995 and 1997 with the help of Forrest Primary School children and pine forests that once filled the valley are progressively being replaced with native species.

Mr Greenhough's speech was warmly received by more than 150 members of the Forrest community at the town's Christmas party held at West Barwon Reservoir.

The Christmas party was arranged by the Forrest and District Progress Association, a small but active community group who also made the first approach to Barwon Water to build the 'Fern Gully Walk'.

**Forrest & District Progress Association Press Release  
Mary Dracup, Secretary, 17 December 2001**



### **Conferences And Seminars**

#### **2002 Weekend Seminar Swan Hill Saturday and Sunday, April 27 & 28.**

It's registration time again for the annual Weekend Seminar this year to be held at the Sundowner Resort, Swan Hill. A registration form is included with 'Operator'

Trade exhibitors have been finalised and a tentative program has been set in place. Airmet Scientific, ProMinent, Selby Biolab and CorrCon are the exhibitors along with the Water Industry Training Centre. The AWWOA gratefully acknowledges the support of these organisations.

A new section has been added to the weekend program '*Operators 5 minutes of Fame*'. Just to give you some insight into the segments, and if you intend registering for the weekend it might be a good idea to put together a few lines about your position and your role in the Water Industry. More about it on the weekend.

The Association's Annual General Meeting will be held at 4.30 pm on the Saturday afternoon.

Remember the weekend is open to financial members only and is limited to the first 40 members to registrar. Refer to the registration form for more details.

**Richard Greenhough - Weekend Seminar Organiser**



## Annual Charity Golf Day

Each year the AWWOA, from the proceeds of the Annual Charity Golf Day presents a cheque to the host Authority at the Annual Water Industry Conference. The host Authority nominates a charitable organisation to receive the cheque. In Bendigo last year the cheque was passed on to Rotary Clubs of District 9800. Below is a thank you letter received from that organisation.

Mr G Wall  
Australian Water & Wastewater Operator's Assoc  
Inc  
5440 Barmah – Shepparton Road  
Tallygaroopna 3634

Dear George

*On behalf of the 71 Rotary Clubs in Rotary District 9800, I wish to sincerely thank your group for assistance in donating funds towards development of the Rotary Camp Getaway site at Axedale.*

*This camp is aimed to provide children with a disability a camp/recreation experience that they will remember for a long time. Our district 9800 Committee is currently working hard to redevelop a current camp site on the Campaspe River at Axedale, (15 minutes from Bendigo), as a purpose designed and built camp for people with special needs.*

*Your donation of \$850 is a wonderful contribution from your generous association. The donation will enable our camp Getaway Committee to move closer towards the goal of total redevelopment of the camp as a model recreation venue for people with a disability.*

*Once again, many thanks for your generous assistance which will assist us complete this worthwhile community project.*

*Yours in Rotary Service,*

*Paul Kirkpatrick – Chairman, Rotary Camp Getaway*

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**'OPERATOR' is printed by Barwon Region Water Authority. The AWWOA gratefully acknowledges the support provided by Barwon Water in producing 'Operator'**



**Barwon  
Water**

### AWWOA Office Bearers & Committee 2001- 02

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Email: [info@awwoa.org.au](mailto:info@awwoa.org.au)**

**Below is the first in a series of articles to be presented by WSL Consultants. The AWWOA would like to thank Nick Bray, Patrick Maiden & WSL Consultants .**

## The Chemistry Of Water

Having a value for a nutrient in a water sample is of little use if we do not know what that nutrient does in water processes. In the forthcoming editions, WSL Consultants will be offering a basic summary of water chemistry tests commonly performed by our analytical laboratories for the water industry. The purpose of the articles will be to allow treatment plant operators to gain a better understanding of relevant water chemistry facts. WSL has been performing water and wastewater analysis throughout Victoria for 35 years.

### Which Nitrogen Is That?

The element nitrogen makes up about 78% of the air we breathe and is essential for life. Nitrogen occurs in various forms in addition to its gaseous, elemental state. Most nitrogen in raw wastewater is present as ammonia and organic nitrogen. Nitrogen receives special attention in wastewater treatment because the presence of excessive nutrients leads to greater production of algae. Although this may occur naturally, human activities such as agriculture and its attendant soil fertilisation, as well as wastewater treatment and discharge may greatly increase both the incidence and severity of algal blooms. Blooms of algae are not appealing for the appearance, or taste and odour, if the water is consumed. Some blue-green algae produce toxins that are released when the algae die. Decomposition of these dead algae removes dissolved oxygen, leading to the death of aquatic organisms including fish.



**Reduced Forms of Nitrogen: Organic Nitrogen (Org-N)** includes simple and complex proteins that derive from animal or plant material. They are typically not soluble but generally break down to smaller, more reactive compounds. **Ammonia Nitrogen ( $\text{NH}_3\text{-N}$ )** is produced by such means. Ammonia is readily bio-available, and can be used as a nutrient by algae, aquatic plants or other bacteria. It can be toxic to some species at low concentrations. The presence of significant levels of organic nitrogen and ammonia in water may indicate untreated sewage. **Total Kjeldahl Nitrogen (TKN)** is the sum of organic nitrogen and ammonia. The TKN test is useful to indicate nitrogen input to a treatment plant.

**Oxidised Forms of Nitrogen: Nitrite Nitrogen ( $\text{NO}_2\text{-N}$ )** is usually produced from ammonia when specific bacteria and dissolved oxygen are present in the waste. Nitrite can be further oxidised to **Nitrate Nitrogen ( $\text{NO}_3\text{-N}$ )**. It is not toxic to aquatic life, however very high concentrations of nitrate can be toxic for infants. Nitrate is also readily bio-available. Nitrogen is much less an issue in drinking water - Nitrogen levels should be low and may only be significant in the nitrate form. A trace of nitrite may indicate sewage contamination (or animal manure) but can also be present in ground waters due to biological reduction of nitrate. **Oxidised Nitrogen ( $\text{NO}_x\text{-N}$ )** is the sum of nitrite and nitrate.

**Total Combined Nitrogen (TCN)** is the sum of all forms of nitrogen present in the water (organic nitrogen + ammonia + nitrite + nitrate).

**Nitrogen gas ( $\text{N}_2$ )** can form from nitrate, when dissolved oxygen levels fall, causing another group of bacteria to utilise the oxygen present in nitrate as their metabolic source. Only a few groups of organisms can access nitrogen gas and so this process of biological reduction virtually removes the nitrogen from the aquatic system.

Laboratory analysis of nitrogen is usually reported in terms of the elemental amount of nitrogen in each form. Thus the amount of nitrogen in one form can be compared with the amount of nitrogen in another form.

- Org-N (Organic Nitrogen)
- $\text{NH}_3\text{-N}$  (Ammonia Nitrogen)
- $\text{NO}_3\text{-N}$  (Nitrate Nitrogen)
- $\text{NO}_2\text{-N}$  (Nitrite Nitrogen)
- TKN as N (Total Kjeldahl Nitrogen)
- TCN as N (Total Combined Nitrogen)

If anyone has any questions regarding water or wastewater testing or suggestions for future editions, please contact *Patrick Maiden, Senior Biologist* ([pmaiden@wsl.com.au](mailto:pmaiden@wsl.com.au)) or *Nick Bray, Manager of Chemistry* ([nbray@wsl.com.au](mailto:nbray@wsl.com.au)).



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## Around the Traps Private Industry

This is the second article in a series of interviews titled '**Profile of an Operator**' specifically dedicated to water and wastewater operators employed in the private industry.

### Profile of an Operator - Greg Bray

- Works for Norske Skog (Albury Mill)
- Job title - Water & Wastewater Treatment Operator, also Emergency Coordinator.



- Main role - Water and Wastewater Treatment
- First job - storeman
- Celebrating 20 year anniversary in February 2002

### How did you become an operator?

Straight after school I became a storeman, then I got a job at the Australian Newsprint Mill (as it was known then) when the plant first started up. My first role was a utility operator where I was mixing chemicals and unloading trucks for the mill. This involved me in the water treatment area from the start and where I have stayed ever since. My first role was a day position, which I did for 8-9 years then I went onto 12 hour shift work.



### Describe Norske Skog's main business activities?

Norske Skog is a global company, which was founded in 1962. The company is one of the world's leading suppliers of wood-containing printing paper and the world's second largest newsprint producer with a capacity of 5.8 million tonnes per year. Norske Skog's Albury mill is near the headwaters of the Murray River. Due to its location, the mill must practice a high level of environmental compliance and develop innovative practices for minimizing its environmental impact.

### Can you tell me about your Treatment Plant?

There are three sections to the water and wastewater treatment plant, which runs constantly because of the specific requirements of the different processes. The first major section of the plant treats raw water, which comes from the Murray River. In summer up to 15 megalitres of water is processed to world health drinking water standards and is used in the paper making process as well as for the workers of the plant for drinking and showers.

### The second section of the plant deals with the mill effluent.

The water is treated and reused up to 20 times throughout the papermaking process before being sent to the site's Ettamogah Lake which irrigates the Ettamogah forest, a 350ha area adjacent to the mill, during spring and summer.

The effluent is a mixture of wood fibres, clay and ink from recycled paper. The mill effluent temperature is 45-50 degrees Celsius. It is important to reduce the temperature to ensure the microorganisms used to clean the water are not put at risk. Phosphorus and ammonia are added as a nutrient food source for the microorganisms. The effluent then goes through secondary and tertiary treatment prior to storage at the Ettamogah Lake until irrigation season.

The third section is a self-contained sewerage treatment plant used to treat the effluent from the staff toilets.

Another job of the treatment plant is to process the biosolids, 70-80 tonnes per day are produced as a by-product of the paper making process. A coagulant is added to the sludge and it is dewatered.



The finished product is donated to farms as a soil conditioner due to the nutrients and organic matter, which improves soil properties and productivity.

### What are the major challenges you face in your role?

We are always doing extra training as needed as the mill changes. The biggest challenge is treating the different process streams that come into the treatment plant. We all work 12 hour shifts, day and night with one operator per shift crew. The other operators are (John Day, Graham Pressnell, Mark Younger and Mick O'Callaghan). We are proud to be working self sufficiently within the company but also operate well as a team, although sometimes we hardly see each other.

Cynthia Lim and AWWOA would like to thank  
Greg Bray and Norske Skog.



### Around the Traps South East

East Gippsland Water, Gippsland  
Water, South Gippsland Water &  
Western Port Water

### National Water Week 2001 at Western Port Water

National Water Week 2001 was a great success.



This year it was decided to focus on local issues and to promote the partnerships and work that is happening within the Candowie Reservoir catchment in particular.

The Community Bus Tour was once again very well supported.

Invitations were sent to over a hundred community groups across the authority's area.

Thirty-five representatives from twenty-six community groups attended on the day.

The tour was the perfect opportunity to showcase the work of the Candowie/Lance Creek Catchment Management Group (CMG). The CMG is a partnership between the farmers in the two catchments and Westernport Water and South Gippsland Water. The CMG has the twin aims of increasing farm productivity and improving water quality in Candowie and Lance Creek Reservoirs.



Doug Halloran,  
Project Engineer,  
shows tour  
participants the  
re-vegetation site  
along the Tennent  
Creek.

The participants on the tour visited a site along the Tennent Creek where willows were removed earlier this year. They were able to see first hand the re-vegetation works that have been carried out to date.

The final stop on  
the tour was the  
King Road  
Sewerage  
Treatment Plant at  
Coronet Bay  
where Adrian  
Scott, Plant  
Operator, guided a  
tour of the facility.



As well they were able to see behind the scenes at two of the Authority's major facilities - the Ian Bartlett Water Purification Plant at Almurta and the King Road Wastewater Purification Plant at Coronet Bay. The operators of these plants were on hand to demonstrate the basic processes involved and answer questions from the community members.



Westernport Water  
employees, Adrian  
Scott, Phillip Keady  
and Doug Halloran  
chat over lunch with  
tour participant  
Bruce Proctor.

These tours provide our customers with authoritative information about Westernport Water's business operations. One of the most appreciated features of this tour was the fact that the staff were along for the whole tour and available for questions at any time. The feedback from the tour participants was very positive.

Rose Thomas  
Customer Relations Manager  
Western Port Water