

International Association of Hydrogeologists
AUSTRALIAN NATIONAL CHAPTER

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NEWSLETTER

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IAH-AUSTRALIA PRESIDENT'S MESSAGE

The National President along with a small group of other Australian members are fortunate to currently be representing us at the IAH XXVI International Congress at Edmonton, Alberta in Canada. The conference is entitled "SOLUTIONS '95". We can look forward to an interesting comment and other articles on this conference and the North American scene in the next Newsletter.

To represent the IAH-Australia committee a report by the Secretary follows:

I have managed to keep up with most of the work as it comes into me, but there is quite a load to get organised when a new committee takes over. As you all realise, this is a voluntary position, as are all positions on the executive, and it is difficult to respond immediately to all requests. However, nobody has been forgotten, and don't forget that for most of the membership administration it has to be channeled through the IAH-International organisation. Most changes of addresses have now been forwarded to the UK, along with new applications. In fact the turnaround time on new applications has been reduced somewhat.

Please note that I am no longer Secretary/Treasurer of IAH-Queensland, as from April last this position passed to one of my colleagues, Linda Foster, who continues to help with national matters. I hope that soon I will catch up with all organisation and outstanding administration, and can then deliver an almost instant response to requests (with emphasis on "almost").

Peter Evans, is the Treasurer of IAH-Australia, and is currently at Edmonton, plus taking some leave. He has recently changed jobs, leaving DPI-Water Resources and joining the Queensland Dept of Environment and Heritage. As soon as he returns and settles back into his new job, he will forward out to members all outstanding receipts.

The last Newsletter was mailed out to almost 400 members and others, and we had about 30 returned due to incorrect addresses. We managed to track down most of these but there are still some outstanding (see end of Newsletter). Please send me new or corrected addresses for yourself or others you may know of. This saves a lot of time wasted by committee members.

Robert Ellis
Secretary
Australian Chapter,
International Association of Hydrogeologists

Proceedings of Water Down Under Conference

After some detective work, we found that there still remain additional copies of the proceedings of the IAH-AIE conference that can be purchased. Prices (\$) are:

Volume	Member IAH or AIE	Non-member
1	66.00	88.00
2 (two parts)	72.00	96.00
3	57.00	76.00
Complete set	180.00	240.00

From: EA BOOKS
PO Box 588, Crows Nest, NSW, 2065

tel (02) 438 1533 fax (02) 438 5934

EDITORIAL COMMENT

This is the second issue of the Newsletter out of Queensland, and gradually the format is taking shape. I would, however, like to encourage all members to consider submitting something. You know what you would like to see. We believe that the Newsletter has a real role to play in Australia in disseminating information, and maintaining contacts. For the last issue about 390 copies were successfully mailed out.

Several members have noted that an informal "letters to the editor" would be of interest. I think that this would be worthwhile, would be pleased to receive letters and comments on any hydrogeological and related topic.

One of the phenomenon that we are now clearly seeing in Australia is the beginning of the information "explosion". There are increasing numbers of journals within the earth sciences and engineering fields, with quite a few now becoming specialised in their scope. The needs of the IAH are wider and are currently being catered to by the Association's own journal "Hydrogeology Journal" (see back cover of Newsletter). It is a broad based journal that can consider a fairly wide range of papers, and it would be good to see more Australian input to it.

Another area of activity in Australia, as well as the Northern Hemisphere, is the increasing number of workshops, seminars, short courses and conferences, some cross-disciplinary, but many specialised. A large number of these are listed via the Internet, and we are in the Newsletter attempting to provide to members of IAH-Australia a selection of these that are relevant.

A futher interesting aspect related to hydrology/hydrogeology is software. Compared to all other scientific, technical and engineering software, there is probably more readily available, and of a greater variety for our disciplines than any other. In addition to this, a great deal of it is in fact public domain, largely sourced from the US Geological Survey (even if it is not all ultra-user-friendly). On the commercial side, there are an amazing number of programs that can do a wide range of things. Quite a few are based on the USGS programs. Some are small, uni-purpose, some very large, but there is an increasing number in the middle cost-size range that are multi-purpose and very effective. As software is now part of modern hydrology we thought it a good idea to consider Australian written programs. Two are included in this issue. Write-ups of others are welcome in future issues.

COMPETITION FOR NEWSLETTER NAME

We have had a variety of suggestions about a name for the Newsletter, and will judge from those that follow, for the next Newsletter. We noted that Victorians have their own called *Flow Lines*, and the Groundwater Division in the NT have a lively one (with pictures) called *Waterwise* (contact is Jackie Stanger (089) 82 7232). Names received:

From David Holmes and colleagues Water Authority WA,
Aquanet Recharge Australia Hydro News
From Gary Dawson and colleagues Qld DPI-Water Resources,
Sub-surface Talk Hydro Info The IAH Exchange The IAH Informer
Permeate Sub-surface Informer
Elsewhere in Qld DPI,
Transmissivity Hydroletters Hydro News Hydro Net
Other Qld suggestions, students and consultants, can't remember who,
Gradients The Hydraulic Head Throughput Flow On
Others NSW and Vic, anonymous,
Fluid Facts The Piezometer Wet Net Diffusion
The following suggested titles were immediately declared ineligible by the Newsletter Editor:
Watery Words Boring News News of Bores Cone of Depression
Pore Space Void Report Wat News

CONTRIBUTIONS TO NEWSLETTER

We encourage any members or branches to submit items of any type. These can be happenings in your state or territory, movements of members, changes in government departments or the private sector, new policies and regulations, conferences or seminars, research, current or new projects, publications and books, software or projects you are working on. Anything that you would like to share.

We have had quite a bit of comment from regional centres and other country members that they would like to see abstracts of talks given at meetings. Perhaps all states could do this. It would be good to use the Newsletter as a national information exchange. We also will be pleased to receive ideas and suggestions on how to make the Newsletter more effective Australia-wide. We are aiming at a Newsletter every three months (March, June, September, December) but this depends on input, and our own ability to keep it up.

We have discussed at our national committee meeting the topic of advertising in the Newsletter. Our conclusion was that it is reasonable, and that we will accept it. Advertising can be in the form of a submitted A5 fullpage (\$100), half page (\$55), or business cards (quarter page, \$25). Our view is that this will help support the Newsletter, plus is bona fide as information exchange. We will, however, add a disclaimer for the Association in regard to such advertising.

To send items to the Newsletter, there are several ways:

- (a) post office box as per front cover,
- (b) fax: M.E. Cox, IAH Editor, (07) 864 1535
- (c) email: m.cox@qut.edu.au

Items in camera ready form will be helpful, A4 to reduce to A5.

REQUEST FOR INFORMATION on evolution of hydrogeology in Australia

John Hillier has received a letter from Bill Williamson regarding a book on hydrogeology history. Bill was a working hydrogeologist 1950-1982 with the NSW Water Resources Commission (Dept Water Resources). He has been approached with a proposal from William Back in the US to help compile a book tentatively entitled "Hydrogeology at the Millennium".

The approach is to look at how and why the discipline developed in various countries, say from 1850's. They are less after history than the development of concepts, their application, and the influence of political and social forces. But this will inevitably include some history. Bill has been asked to take on the chapter on Australia.

Bill's concern is his limited knowledge about states other than NSW. Plus the more recent changes. There are many aspects to consider, not just need, demands, methods, problems, climates, landuse changes, but also the state and federal, and local authorities. Also of interest is the training and teaching approaches and changes there.

Which are the main user areas of groundwater, why, and what are the changes now. This needs to consider, mining, agriculture, irrigation and various urban and domestic uses. Are the problems the same or different? What about the concept of pollution?

Any existing references, books or relevant documents would be of great help to Bill. This sounds a very interesting and worthwhile project and we wish Bill all the best. We encourage anybody who is interested, wishes to know more, or feels they can help Bill to get in touch will him.

William H Williamson
6 Hughes Ave, Ermington, NSW, 2115

INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS NATIONAL EXECUTIVE MEETING

(IAH-Australia)
3 May, 1995

Meetings of National Executive based in Queensland

The meetings are held at DPI-Water Resources, Mineral House, George St, Brisbane, on the second Tuesday in the *odd* months, at 5.30 pm for a 6.00 pm start.

For 1995 the meetings have been: first, 17 January; second, 14 March; third, 3 May.

The National Committee is as follows:

President	John Hillier
Vice President	Iain Hair
Secretary	Robert Ellis
Treasurer	Peter Evans
Newsletter Editor	Malcolm Cox
Assistant Editor	Magdalena Steffens
Committee Member	Colin Laing
Committee Member	Lindsay Furness
Committee Member	Bruce Pearce
Committee Member	Paul Smith
Committee Member	John Harman

Main Business Discussed

Procedure for new applications. It was agreed that in future, all applications for membership should be approved at the state level (two signatures required), before being sent to the national executive. Overseas applicants would refer to their sponsoring states.

Application forms may need changes to be easier to follow and include some more relevant information. A new form is being designed.

Funds have been sent to the IAH secretariat as required.

The idea of Michael Knight running for IAH International President at the next international meeting in China was discussed. It was supported by the National Committee as being beneficial to IAH-Australia and to hydrogeology in this part of the world, and all agreed that Michael was the most appropriate person. He will be invited to submit an item on this in the next Newsletter.

There was much interest nationally on sponsoring members from developing countries, but especially from personnel in several countries contacted. The target is the immediate offshore SE Asia-SW Pacific region. Specific aspects of such a programme now need to be organised.

John Hillier attended the AWWA Environmental Conference in Sydney on 4 April, 1995 and will submit a report to the Newsletter.

A final report on the Water Down Under conference last November in Adelaide has not yet been received by the National Executive. This will be pursued so that the financial status can be clarified.

There was discussion on the importance of the IAH-Australia becoming incorporated. This was generally agreed with and procedures will be investigated.

Encouragement and assistance to relevant conferences and training programmes was discussed.

NORTHERN TERRITORY IAH BRANCH NEWS

May 1995 Report

In the Northern (NT) there are only fourteen members of the IAH and thirteen of these work in the same organisation! It would add spice and interest if this year we could recruit more new members from organisations other than the Power and Water Authority. We assure all prospective members that meetings are brief and interesting and ask all present members to encourage 'new blood' to the organisation.

On the 2nd and 3rd of March IAH co-sponsored a major groundwater seminar in Darwin under the aegis of Water Resources Division of PAWA. This brought together members from the Alice Springs office and the Darwin office with a subsequent IAH meeting being reminiscent of a family reunion - after all these two regional offices are 1600 kilometres apart! During this meeting our main focus centred around discussions on maintaining and enhancing the small but vibrant group that exists at present. Pursuant to this the first group photo of NT members of IAH was taken (albeit a small and motley lot) and is available from the NT State liaison member, Ms D Karp. They are certain to become collectors' items in the future?!

The seminar mentioned above was well attended by both private and public sector interests and covered a wide range of topics addressing key water resources issues in the NT. These included presentations on the Keep River region (Where an extension of the Ord River irrigation area is proposed), the Western Victoria River District (a National Landcare Project). Additionally the results of the 'Dryland Salinity Hazard Map of the Northern Territory' were discussed and drew considerable interest.

1995 will be remembered in the NT for several reasons. First, the highest recorded 'wet season' rainfall was recorded in Darwin (records extend back in excess of 70 years). Second, Water Resources Division celebrates its 40th anniversary of operation in the NT. A document recording milestone events and the recollections of individuals is being prepared by the Division and is sure to include many interesting (and often humorous) accounts of groundwater exploration and investigation throughout the NT.

WATER RESOURCES MAPS - WESTERN VICTORIA RIVER DISTRICT

The Water Resources Division is carrying out a program of mapping the water resources of some twenty individual cattle stations in the Western Victoria River District. The five year project funded by the National Landcare program and the NT Government is now near the end of it's second year. For each cattle station a 1:100,000 scale map is produced which shows the preferred water resource development option, for example typical options include groundwater, surface water entrapment, piping from natural waterholes or springs, use of either surface water or groundwater, or an area may be unsuitable for any types of developments. A hydrogeology map and map showing suitability for construction of stock dams are included as smaller maps on the side of the main map.

A set of explanatory notes is prepared for the map of each station. Their intended use is as an aid in determining the most suitable form of water resource development in specific areas of the properties. When combined with other land use information, such as land unit maps and pastoral infrastructure maps, they will enable more informed decisions about property planning to be made.

The work is being done by Steven Tickell and Lakshman Rajaratnam of the Water Resources Division (089) 82 7240.

DRYLAND SALINITY HAZARD MAP OF THE NORTHERN TERRITORY

A dryland salinity hazard map covering the whole of the Northern Territory has recently been completed. Only minor clearing has taken place in the NT and no instances of dryland salinity have been recorded. Information on groundwater salinity, vegetation type, rainfall, aquifer yield and the presence of deep weathering profiles were combined on a GIS using a simple additive model, resulting in a fourfold hazard classification of high, moderate, low and very low.

The study concluded that dryland salinity is unlikely to be as serious a problem as it is in southern Australia. The main reason for this is that in higher rainfall areas where deep rooted vegetation is abundant, salt storages in the ground are generally low. In the more arid areas where salt storages are often high enough to cause dryland salinity, deep rooted vegetation is either sparse or absent. Clearing in those areas would be unlikely to alter the water balance sufficiently to raise watertables to dangerously high levels. Semi-arid areas are regarded as having the greatest salinity hazard (classified as moderate hazard on the map). Conditions there however, are only marginally favourable for dryland salinity and so it would be expected to develop in isolated patches.

The map is published at a scale of 1:2,500,000 and comes with a set of explanatory notes. For more information contact Steven Tickell (089) 82 7240.

QUEENSLAND BRANCH

New Committee of IAH-Queensland

The meeting was opened by the 1994 Chairman Malcolm Cox
Reports were presented by the Chairman and the Secretary/Treasurer Robert Ellis.
All positions were then opened for re-election.
Elected at the meeting of the Queensland Branch on 11 April, 1995 were,

Chairman	Andrew Moser
Secretary/Treasurer	Linda Foster
State liaison	Bruce Pearce
Committee	Rob Virtue
	Gerard McMahan
	James Purtill
	Robert Ellis
	Malcolm Cox

Meetings for 1995

It was decided to hold the IAH-Qld Branch meetings on the second Tuesday in the *even* months, at 5.30 pm for a 6.00 pm start.

Presentations during 1995 have been:

7 February, 1995

Northern Territory hydrogeology and water supplies for Aboriginal and other isolated communities.

Speaker: Andrew Moser

11 April, 1995

Recent developments in the hydrogeology of coastal sand masses of southern Queensland

Speakers: Peter Evans, Iain Hair, John Doherty and Andrew Moser

6 June, 1995

Groundwater dynamics in coastal barriers.

(see abstract on following page)

Speakers: Peter Nielsen, Hong Yoon Kang and Raad Jarjees

We have received a letter from a hydrogeologist in the UK requesting some work experience in Australia. He is just completing a MSc at University of Birmingham, and would like to get work from October-November, 1995.

Already has some work experience and good references.

Name: Adrian Steele (d.o.b. = 1971)

31 Wallace Rd

Selly Park

Birmingham B29 7ND

tel 0121 415 5814

fax (of supervisor, Dr J H Tellam) 0121 414 3971

Dr Peter Nielsen, Mr Hong Yoon Kang and Mr Raad Jarjees

Ground Water Dynamics in Coastal Barriers

HONG-YOON KANG

Research Student, University of Queensland

PETER NIELSEN

Associate Professor, University of Queensland

SUMMARY Extensive Field studies in New South Wales and Queensland have revealed that the overheight in the coastal water table due to wave runup and tidal action on a slope are sufficient to create a steady drift of salty ground water underneath narrow coastal islands and barriers. Typically, the difference in ground water level between the ocean side which is exposed to waves and the landward side is between 0.5m and 0.9m depending on the wave conditions and the slopes on the two sides. The resulting landward flow of salt water flushes out the fresh water from rainfall and leaves only a very thin freshwater lens for the plants. Also, the salinity structure observed under the narrow isthmus of the northern end of Bribie Island showed that a fresh water lens was occurring again under the deepest portion of the asymmetric salt water region.

This knowledge is important where wastewater disposal is concerned. In several embarrassing instances, it has been assumed that wastewater released near the coast would disappear into the ocean, but because of the above mentioned effect, it has been found to move toward the mainland instead ending up in places where it is definitely not wanted.

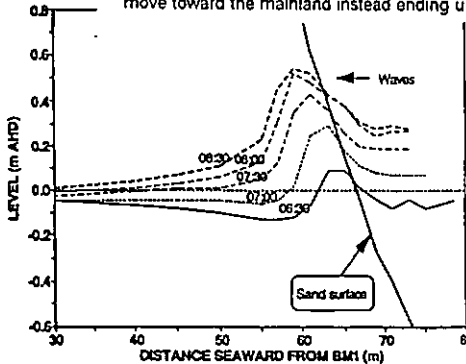


Figure 4 Water table profiles showing 'local peaks' measured on a rising tide at Kings Beach (25 Sept.1991).

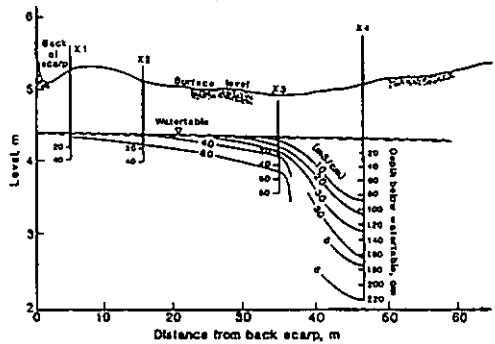


Figure 7 Conductivity contours which correspond to the salinity structure together with the water table profile, Northern Bribie Island, 30 September 1994.

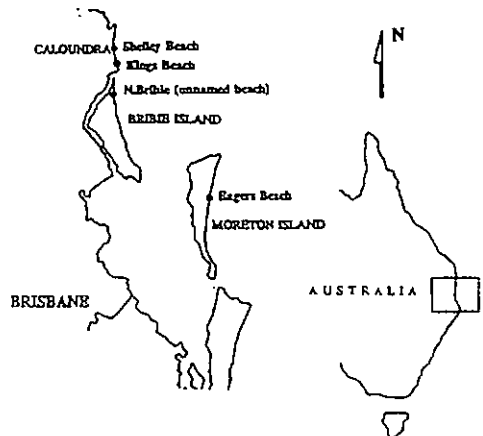
4 CONCLUSIONS

Observations of the water table and the salinity were made under a narrow barrier of the northern end of Bribie Island.

The water table levels showed a landward decrease from the wave runup limit which indicates landward flow of salt water.

It has been found that the fresh water lens grows thicker towards the channel side (protected from waves) of the barrier and the salt water region is forced deeper. It seemed that vegetation towards the channel side of the Island enjoyed a permanent fresh water supply while species on the other side (ocean side) were dependent upon brief periods of rainfall infiltration.

Furthermore, It was very surprising to find a fresh water lens occurring again under the deepest portion of the asymmetric salt water region. This should not have been possible in a vertically homogeneous medium. It was identified that a layer of impermeable indurated sand was responsible for the fresh water lens beneath the salt water body.





Peter Airey, Manager, Ecological Impacts Project,
ANSTO¹

Thursday 27 April 1995 Applications of isotopic techniques to hydrology

ABSTRACT

A review will be presented of the highlights of ANSTO's isotope hydrology program, of the current research interests and future challenges. Environmental isotopes, tritium and carbon-14 have been measured at Lucas Heights for over 20 years. One of the earliest applications was to the study of artificial recharge in the Burdekin River delta.

A major study was undertaken of the Great Artesian Basin in collaboration with AGSO, the University of Arizona and ANU. Groundwater ages using chlorine-36 were correlated with hydraulic model estimates in an intercomparison extending over one million years. Studies have been extended to the Murray Basin and elsewhere. The commissioning of ANSTO's Accelerator Mass Facility, which is currently measuring beryllium-10, carbon-14, aluminium-26, chlorine-36 and iodine-129 at environmental levels, is an important milestone.

Artificial (reactor produced) radioisotopes have been used in hydrological studies since the early 1960's. As an illustration, the multi year study of the evaluation of Sydney Water's deep ocean sewage outfalls undertaken for the NSW EPA in collaboration with AWACS will be described.

Current research interests involve issues associated with the siting of radioactive waste repositories. A scientific basis is being developed for assessing the very long term impact of the possible breaching of the engineered barrier by groundwater. In our approach, uranium ore bodies are being used as natural analogues of waste repositories.

Friday 28 April 1995 Isotopic studies of sediment transport dynamics

ABSTRACT

Radioactive isotope techniques have been extensively used to study the dynamics of sand and sediment transport. Reference will be made to studies associated with developments in the Port of Brisbane, Port Hacking, the Singapore Harbour and Kuala Marang in East Malaysia. Extensive applications have also been made to dredge spoil studies.

Environmental isotope techniques are an essential complement to those methods involving reactor produced radionuclides. ANSTO has been involved for many years in the application of Cs-137 and Pb-210 to study sediment redistribution and erosion. A national soil reconnaissance program in collaboration with the University of Newcastle and the responsible agency in each State is approaching completion. The sophistication is such that the method can be used to assess the impact of agricultural or forestry management practices on erosion. The essential approach is to use the isotopic methods to calibrate erosion/productivity models. Examples will be discussed. The next step is to examine whether catchment wide quantitative erosion data can be used to extend the quality of information obtained from remote imaging.

Current research interests also include studies of the impact of the application of sewage sludge on agricultural land on an experimental site near Goulburn.

¹Dr Peter Airey, Manager, Ecological Impacts Project at ANSTO, is responsible for coordinating projects in the fields of application of isotopes to agriculture, medicine, industry, research reactors and basic science amongst fourteen countries in the Asia Pacific Basin. His visit to Brisbane has been sponsored by the Centre for Medical and Health Physics and the School of Geology, QUT with the aim of developing collaborative projects and supervision of postgraduate students.

MINES AND ENERGY SA
GROUNDWATER AND ENVIRONMENTAL SERVICES DIVISION
STRATEGIC PLAN 1995-1998

The responsibility of the Division is to identify and assess the quality of groundwater resources and the constraints on their development, and to facilitate the development and management of these resources by providing cost effective groundwater related services to government, industry and the public.

There are three main initiatives that are going to be developed over the next three years which reflect the requirements of sustainable use of water supplies for economic development and the use of innovative technology to encourage the recycling of stormwater to increase water use efficiency whilst minimizing environmental impacts.

- **Great Artesian Basin** - this resource is crucial to development in the Far North of SA. A comprehensive data base is being established and a computer model will be developed to determine potential impacts of withdrawals for future developments. Monitoring of current withdrawals (eg Olympic Dam borefields) is continuing as is the rehabilitation program to repair uncontrolled flowing bores.
- **Aquifer Storage and Recovery** - this innovative technique has been pioneered by MESA in conjunction with Local Government, private developers and research groups. So far it is being used in the Adelaide metropolitan area for the re-use of stormwater, however there are other circumstances where the ASR technique may be beneficial. MESA is currently investigating the feasibility of storing water from Lake Alexandrina in local aquifers for re-use when blue-green algae outbreaks render the lake water unusable. Clayton and Strathalbyn are the two locations being tested. The potential for using ASR elsewhere in SA is going to be investigated and a report prepared on issues, optimum locations and marketing opportunities.
- **Mount Lofty Ranges** - groundwater resources are under increasing stress in the region (eg Piccadilly Valley, bottled spring water, irrigation). A comprehensive assessment of resources and usage is being initiated with a database and monitoring networks to be established. A groundwater quality sampling program has already been carried out in key catchments by AGSO.

Other important projects include an assessment of groundwater resources in the Far West and the Gawler Craton (northern Eyre Peninsula) for potential mining developments, a review of the status of water supplies in Aboriginal Lands and the development of a works program, and an assessment of the sustainable yield of the confined aquifer in the Southeast.

MESA has an ongoing commitment to investigate and monitor areas of intensive groundwater use and to provide technical advice to management committees. These areas include the Southeast, Mallee, Angas-Bremer, North Adelaide Plains and Southern Vales. MESA also plans to ensure that the statewide Drillhole Data Base contains reliable and validated information.

**INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS
VICTORIAN COMMITTEE**

June 1995 Report

1. Meetings

- 7 March 1995 Mineral Springs and Mineral Water in Victoria. Andy Shugg
- 16 May 1995 Risk Assessment for Groundwater Purposes. Nick Withers,
Stuart McConnell

2. Draft State Environment Protection Policy - Groundwaters of Victoria.

The Victorian Environment Protection Authority launched its Draft SEPP on Groundwater Protection in December 1994 for public comment. Several seminars have subsequently been held to discuss the draft and a wide diversity of views have been expressed. Considerable discussion continues on the significance of attenuation zones and the feasibility of containment for landfill leachates.

3. Water Industry Reforms

The technical arm of the Rural Water Corporation, HydroTechnology, is expected to be sold to Sinclair Knight Merz as part of the Victorian Governments privatisation agenda. Meanwhile, some traditional functions undertaken by HydroTechnology are being let out to public tender.

The Land Protection Division (and many other areas) of the Department of Conservation and Natural Resources is being corporatised.

The Victorian Salinity Program is being significantly restructured with the functions of the Salinity Bureau altered to a "non-hands on" roll of policy and monitoring of departmental activities. The coordinated and protected salinity budget ceases to exist.

4. Resurgence of Groundwater Based Irrigation

The dairy boom in Victoria has caused a resurgence of irrigation activity in the vicinity of Yarram in South Gippsland. Many bores that have not been used for a decade or so have been heavily pumped over the summer irrigation season. Falling water levels (at a rate of approximately 1m/year) thought to be associated with offshore oil and gas production have caused a significant problem to these "new" irrigators.

5. Consultant Activities

Groundwater Technology Australia Pty Ltd is currently conducting a major groundwater hydrogeological study in an area of the western suburbs of Melbourne. The study involves characterisation of the local and regional hydrogeology in order to assess a chemical contamination plume within the Newer Volcanics basalt aquifer system.

The study area is located within the Werribee Plains area, which is at the north-east end of the Port Philip Sunkland. The Werribee Plains are characterised by extensive Upper Pliocene to Pleistocene basalt flows.

Shallow groundwater beneath the study area is contained within the Newer Volcanics basalt flows. The Newer Volcanics in the Altona area have a combined aquifer thickness of approximately 35 metres and are underlain by Brighton Group sediments (the fine sandy clays of which can act as a confining layer). The basalt aquifers are both heterogeneous and anisotropic, and groundwater flows preferentially through joints, fractures and vesicles in the basalt, as well as through fluvial deposits between the flows.

Because of the extreme heterogeneity of primary and secondary porosity features throughout the basalt, hydrologic parameters such as hydraulic conductivity vary by orders of magnitude over very short distances. Separating the upper succession of flows from deeper basalt layers is generally a scoria/silty clay layer at around 15 to 18 metres depth. This layer is generally assumed to be a hydraulic confining layer underlying the uppermost aquifer beneath the study area.

Aerial photo interpretation has indicated a major lineament or separation in basalt flows in an area that was originally a low area and wetland. This lineament may be interpreted as the possible intersection of two basalt flows, a major vertical fracture in the basalt or a zone of higher weathering in the basalt. Such features in basalt landscapes generally act as groundwater conduits, as transmissivities are higher and groundwater flow is much more pronounced. Occasionally these features are groundwater discharge areas. The lineament is evident in the groundwater level contours across the area. Localised groundwater mounding, probably due to the differences in transmissivity deriving from the heterogeneity of the basalt, is also evident beneath the study area.

Water levels in both shallow and deep wells within the study area tend to be between 7 and 10 metres below ground surface in the basal vesicular basalts. Stabilised standing water levels in wells are generally at several metres above where it was initially encountered during drilling, suggesting at least partial confinement. Groundwater flow across the study area is in a general south-easterly direction. Further south, groundwater flow through the basalt appears to be split and deflected around coastal marine (transgressive) sequences and possibly land-derived clays which may occupy areas between individual basalt flows. These sedimentary sequences can be interpreted as former topographic elevations around which the lavas had flowed, or as low areas between lobes of basalt that were eventually infilled when the seas transgressed.

A groundwater contamination plume containing chlorinated hydrocarbons has been identified in the uppermost basalt aquifer and is known to have migrated some two kilometres. The characterisation of the hydrogeology of the area as discussed above has greatly facilitated interpretation of the migration pathways of the plume. Secondary features within the basalt such as lineaments, fracture patterns and vesicularity, along with differences in permeability between the basalt and the coastal sediments are major features that control plume migration. Further work is currently proceeding on characterisation and modelling of the plume and development of remediation options.

WESTERN AUSTRALIAN BRANCH

REORGANISATION OF THE WATER INDUSTRY

Following the planned separation of the water utility from the Water Authority of Western Australia, the government has decided to amalgamate the Hydrogeology and Groundwater Resources Branch of the Geological Survey, the Water Resources Division of the Authority, and the Waterways Commission into a new commission, to be effective from January 1st 1996.

The amalgamation is being overseen by the Water Industry Restructuring Implementation Group, headed by former Minister of Mines Peter Jones, and is being managed by a steering committee of the three organisation heads, Tony Laws, Brian Sadler and Bruce Hamilton, under the chairmanship of Ken Webster. Some twenty project teams have been set up to deal with such matters as strategic direction, structure, resourcing, assets, accommodation, management, and IT structures.

The water utility is being restructured and 'downsized' to concentrate on core business, with much of the work previously done by employees being outsourced to private contractors through competitive tendering. The modus operandi of the new commission will not be clear until the appointment of a Chief Executive Officer.

WORKSHOP ON GROUNDWATER QUALITY MANAGEMENT IN DEVELOPING COUNTRIES

A highly successful workshop for delegates from developing countries was held at CSIRO in Perth during the week 18-21 April 1995. The workshop was sponsored by the (British) Commonwealth Science Council and UNESCO, and run by the Centre for Groundwater Studies and CSIRO Division of Water Resources.

Attendees from developing Commonwealth countries in Africa and Asia/Pacific presented case studies from their own countries and lecturers from Australia, New Zealand and the United Kingdom gave instruction on management techniques.

Delegates were also invited to a meeting of the WA branch of IAH immediately after the workshop on Wednesday 19 April where a presentation was given by National President John Hillier on "Groundwater Development and Consequent Problems-the IAH Position".

AUSTRALIAN PRODUCED SOFTWARE

Contribution from

Noel Merrick, University of Technology, Sydney

RINVERT for Windows™ has been developed by Noel Merrick from the National Centre for Groundwater Management at UTS (Sydney). It is the first Windows program worldwide to perform automatic interpretation (inversion) of resistivity soundings in terms of a layered earth model. The resistivity method has widespread acceptance in hydrogeological and engineering applications, particularly water supply, stratigraphy, salinity, seawater/freshwater interfaces and contamination.

For the novice, *RINVERT* provides a forward modelling facility and an extensive *Help* facility. You can learn resistivity basics, examine the glossary and click on unfamiliar terms to see a definition. *RINVERT* also provides a *monte carlo* equivalence analysis to assess ambiguity in interpretation, and features an automatic report generator. The Windows interface permits output to any printer supported by Windows.

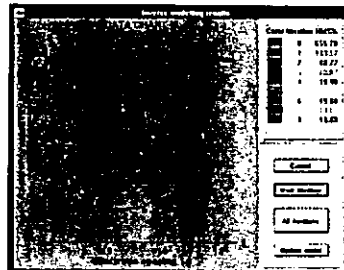
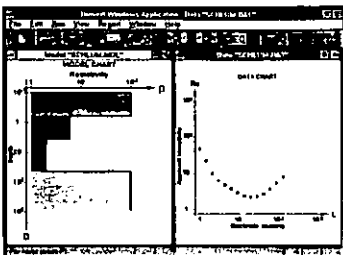
RINVERT for Windows sells for \$695 and is available from C Vision Pty Ltd, 185 Elizabeth Street, Suite 307, Sydney, NSW 2000 (Tel: 02-2834000, Fax: 02-2614854).

FEATURES:

- Automatic Inversion of a Dataset to an Optimal Earth Model
- Dynamic Equivalence Analysis
- Forward Modelling
- Automatic Report Generator
- Standard Windows™ Interface with Mouse Control
- Meaningful Icons for Resistivity Analysis
- Earth Model of Multiple Horizontal Layers
- Colour Display of Earth Model
- Display of Model Sounding Curve
- Field Data Entry and Editing
- Display of Field Data as a Sounding Curve
- Visual and Statistical Comparison of Field and Model Data
- Spreadsheet - Style Editors
- Context Sensitive and Comprehensive Help System

APPLICATIONS:

- Water Supply
- Stratigraphy
- Bedrock Channels
- Groundwater Quality
- Soil Salinisation
- Geotechnical Studies
- Coastal Studies
- Seawater/Freshwater interface
- Contaminant Spills
- Landfill Monitoring
- Salinity Studies
- Clay Distribution
- Ore Body Detection
- Geothermal Studies



AUSTRALIAN PRODUCED SOFTWARE

Contribution from

John Doherty, DPI-Water Resources, Brisbane

PEST is *PARAMETER ESTIMATION* for any model

PEST is a unique computer program which adjusts the parameters of a model until the model produces numbers that match an independent dataset. As such it is an extremely useful tool for the calibration of all kinds of environmental models, including groundwater models.

A set of MODFLOW/MT3D utilities have been written to automate PEST linkages to these models. Software is also provided that interpolates water levels, drawdowns and concentration values produced by these models to borehole locations, so that a direct comparison can be made between model-generated numbers and field data.

PEST differs from other nonlinear parameter estimation software in that it communicates with a model through the model's own input and output files. A user sets up his/her model in the usual way and then identifies those places on the model input file(s) (these must be text files) that contain adjustable parameters (these parameters can be single numbers or whole zones within an array of numbers). The user then identifies those model-generated numbers on model output file(s) for which there are corresponding field observations. Supplied with this information, PEST then runs the model many times, altering parameters all the while, until it finds that set of parameters for which the discrepancies between the model-generated numbers and field data are minimised in the weighted least squares sense.

The beauty of this method of Optimizer-Model linkage is that the model does not need to be recast as a subroutine to be linked to the optimizer. This makes PEST unique. It means that a user does not need to recompile the model, or even have the model source code. It also means that non-programmers and programmers alike can use PEST with their models.

Another repercussion of PEST's ability to write model input files and read model output files is that the "model" can actually consist of a batch file running multiple programs in succession. This facility can be used, for example, in the simultaneous calibration of a soil process model and a groundwater model, the former providing recharge to the latter.

For World Wide Web browsers, a description of PEST can be found at the following site:
<http://gil.ipswichcity.qld.gov.au/comm/pest/index.html>

For further information contact:

Dr. John Doherty

phone: (07) 877 9474

fax: (07) 877 9591

email: jdoherty@gil.ipswichcity.qld.gov.au

Watermark Computing

45 Cook St

Oxley 4075

Australia

Phone + 61 7 877 9474 +61 7 379 1664

Fax + 61 7 877 9591

email jdoherty@gil.ipswichcity.qld.gov.au

UPCOMING CONFERENCES

MURRAY-DARLING 1995 WORKSHOP, WAGGA WAGGA

11-13 September, 1995

The title of the workshop is "Groundwater and the community", and the objective is to enhance the integration of groundwater issues into natural resource management along the Murray-Darling Basin. The role of the community is emphasised. This year it is coordinated by AGSO. Submit an abstract (100 words) by 31 March. Contact is,

Australian Convention and Travel Services
GPO Box 2200, Canberra, ACT, 2601
tel: (06) 257 3299 fax: (06) 257 3256

MESOZOIC GEOLOGY CONFERENCE, BRISBANE

23-26 September, 1996

On the following page is a flyer for the Mesozoic Geology Conference. The Conference is being hosted by the Queensland Division of the Geological Society of Australia (GSA), and the IAH-Australia has accepted an invitation to participate and be sponsor of one session. The preliminary programme outline has three streams, within each of which are three fullday sessions. One session is proposed as "Hydrogeology of Mesozoic Basins" and will cover "groundwater occurrence, geochemistry, genesis, and environmental considerations of groundwater use".

AUSTRALIAN SYSTEMS CONFERENCE

26-28 September, 1995

From: Tony Ladson <tony_ladson@muwayf.unimelb.edu.au>
Subject: Systems Conference

A conference announcement for Hydrologists with interests in Environmental Management. An Australian Systems Conference will bring together systems practitioners and academics from all disciplines in fields such as environmental management and information technology. Abstracts and ideas for workshops to be in by March 31.

Contact: Bill Hutchinson, Edith Cowan University, School of MIS,
Pearson St, Churchlands, WA, 6018
tel (09) 383 8283, fax (09) 383 8754, email w.hutchinson@cowan.edu.au

AIAS GROUNDWATER CONTAMINATION SEMINAR

MELBOURNE UNIVERSITY

22 June, 1995

Groundwater Contamination - What are the Implications for Agriculture?

The Melbourne Branch of the Australian Institute of Agricultural Science (AIAS) is hosting a seminar on groundwater contamination in agriculture. It will be held in the Kimpton Lecture Theatre (off Royal Parade) at the School of Agriculture, University of Melbourne on Thursday 22nd June at 4 pm.

The seminar will include a discussion on the type and extent of contamination, how contaminants get into groundwater and problems arising from contamination. The seminar will also give an insight into groundwater investigation and monitoring procedures, and what strategies can be undertaken to minimise problems arising from contamination. It will be given by Mr Alex Simopoulos, Senior Geologist, AGC, Woodward Clyde, Melbourne. The cost is \$10 for AIAS members and \$15 for non-members.

Contact Andrew Western
western@aquacivag.unimelb.EDU.AU

GROUNDWATER CONFERENCE SOUTH AFRICA **26 - 28 September 1995, Midrand, South Africa**

Organizers. This will be the 8th Biennial Ground Water Conference organised by the Ground Water Division of the Geological Survey of South Africa and the third conference to be organised jointly with the Borehole Water Association of Southern Africa.

Theme. Ground water recharge and the rural water supply.

Objectives. To achieve the goals for the water supply set by the new government of South Africa, great demands will be placed on our groundwater reserves. This inter alia a good understanding of recharge to aquifers. The conference aims to emphasize the contribution of the hydrogeologist in developing a sound and organised approach for developing our ground water supplies optimally, particularly for the rural community, while also understanding the role of recharge in the successful management of our valuable ground water reserves.

Topics. Two topics will receive attention during the Conference:

Aquifer recharge: mechanisms and control, regional variation, methods for determining recharge

Rural water supply from ground water: exploration, appropriate aquifer testing procedures, appropriate abstraction techniques, infrastructure maintenance, management of field wells, social considerations, ground water vs surface water supplies, aquifer and borehole protection.

Provisional Program. The Opening Address will be given by Prof K Asmal, Minister of Water Affairs and Forestry.

Tuesday, 26 September: Keynote and contributed papers on rural water supply and aquifer exploration, evaluation and exploration, cover interesting aspects such as education in rural areas, regional aquifer exploitation potential, decision analysis and GIS.

Wednesday, 27 September: Highlights of Wednesday's programme including ground water recharge and leachate generation, Okavango Delta as a recharge source and distance dependence of storativity.

Thursday, 28 September: Ground water pollution, chemistry and quality are Thursday's topics and include papers on high fluoride ground water and chemistry of spring water management strategies to control dewatering.

Special poster viewing sessions will be arranged. A detailed provisional programme will be included in the Final Announcement. Although formal presentation sessions are fully subscribed, contributions for poster presentations can still be accepted.

Technical Workshops. Technical workshops for the ground water industry, organised by the Borehole Water Association, will run parallel with scientific programme sessions.

Exposition. During the conference, an exposition of ground water-related products will be on display.

Technical Excursion. A post-conference technical excursion to view rural water supply schemes is being planned.

The Secretariat
Ground Water Division
P.O. Box 75728
Lynnwood Ridge 0400
South Africa

Contact: Andre F Bruton
andre.bruton@pixie.co.za (Andre Bruton)
Tel: +27 (11) 674-1920
Fax: +27 (11) 475-3279

MODELING FLOW AND TRANSPORT IN THE SUBSURFACE
September 11-15, 1995 in Toronto, Canada:

with Dr. Jacob Bear, Dr. John Nitao and Thomas Vogele

The course will teach the principles of ground water flow and contaminant transport modeling in both the saturated and the vadose zone. Lectures will be accompanied by hands-on computer lab sessions.

A new multiphase computer model, NUFT (Nonisothermal Unsaturated Flow and Transport), will be introduced. NUFT solves flow and transport of multiple phases and contaminants in both the saturated and the unsaturated zone in 1, 2 and 3 dimensions. NUFT was specifically developed to simulate unsaturated zone processes and to test the feasibility of soil remediation systems, such as Soil Vapor Extraction (SVE).

Dr. Bear is a world renowned hydrologist affiliated with the Technion-Israel Institute of Technology. Dr. Nitao, the creator of NUFT, is a research scientist at Lawrence Livermore National Laboratory. Thomas Vogele is a hydrogeologist and computer modeler with Weiss Associates in Emeryville, CA.

For more information and to register please contact:

Thomas Vogele ---- vogele1@llnl.gov

Dr.J.Bear ----- cvrbear@technion.technion.ac.il

20TH BIENNIAL GROUND WATER CONFERENCE
11-12 September, 1995, San Diego

The 20th Biennial Ground Water Conference, sponsored by the California Water Resources Center, California. Dept. of Water Resources, State Water Resources Control Board, and the Water Education Foundation will be held September 11-12, 1995 at the San Diego Princess Hotel.

The conference theme is "Making the Connections." A brochure will be mailed upon request.

Contact: Jeff Woled
jtwoled@ucdavis.edu.

First National Conference on Stream Management in Australia

19 - 23 February 1996

CALL FOR PAPERS

VENUE

The venue will depend upon the number of people who express an interest in attending but the conference will certainly be held in a convivial rural setting, close to some rivers! At present some pleasant venues in north east Victoria are being considered. Travelling there will be part of the conference, with coaches taking delegates on a field trip from Melbourne to the venue.

TOPICS

The conference sub-themes include:

- ◆ Erosion and sedimentation processes
- ◆ The influence of vegetation on stream processes
- ◆ Ecological consequences of erosion and sedimentation
- ◆ Sand and gravel extraction
- ◆ Stream engineering techniques
- ◆ Fluvial geomorphology and river management
- ◆ Influence of dams on river processes

Please feel free to suggest any other sub-themes that would have broad appeal.

FEES

The registration fee for the conference will not exceed \$450. This will cover a field trip from Melbourne to the venue on the Monday, all meals from Monday lunch until Friday lunch, conference proceedings and return coach trip to Melbourne on the Friday.

Accommodation costs will range from \$90 - \$550 for the four nights (Monday through Thursday).

CALL FOR PAPERS, POSTERS ETC.

A formal set of pre-printed papers will be produced for the conference. These will be fully refereed and of high quality. Papers presented at the conference will be 15 minutes in length, with 5 minutes for questions. Papers will be restricted to six (6) pages. Prospective authors will be selected from the submitted abstracts. At least one author of each paper is expected to be present at the conference.

Posters will also be presented with the posters going on display for the full length of the conference. New and novel forms of presentation are encouraged eg. videos, demonstrations of GIS systems, or anything else that takes your fancy.

Abstracts should be sent by mail (3 copies), fax, or E-mail to the conference secretariat, and must be less than 350 words in length.

DEADLINES

Receipt of expression of interest	June 30
Receipt of abstracts	June 30
Invitation to publish and present papers	July 17
Full manuscripts submitted	September 15

EXPRESSION OF INTEREST

- I am interested in attending the First National Conference on Stream Management in Australia
- My organization would be interested in sponsoring the conference
- I propose to present a paper at the conference
- I propose to present a poster at the conference
- An abstract (3 copies) of my paper/poster is enclosed with this form.

Title First Name Surname

Position or Occupation

Organisation

Postal Address

Postcode

Telephone Fax

E-mail

Return To :

Office of Continuing Education
Monash University
Wellington Road
CLAYTON 3168 Victoria AUSTRALIA
Fax : (03) 9905 1343
E-mail : maureen.kemp@adm.monash.edu.au

Dr Ian Rutherford, Dept. of Civil Engineering,
Monash University Ph: 03 9905 2940, Fax 03 9905
5033 E-mail : Rutherford@eng.monash.edu.au

WESTERN PACIFIC GEOPHYSICS MEETING, BRISBANE July, 1996

The next American Geophysical Union (AGU) Western Pacific Geophysics Meeting (WPGM) will be held in Brisbane in July 1996. This will be the fourth WPGM, which have been held at two-year intervals since the first in 1990 in Kanazawa Japan. The other two have both been in Hong Kong. The WPGM is designed to provide an AGU-style meeting on "home" ground for AGU members in the western Pacific region, as well as to encourage international cooperation between AGU members and members of other geophysical societies in the region.

The WPGM provides the opportunity for in-depth discussion of issues of particular interest to countries in this region, although papers on all AGU-related topics are encouraged. AGU has a strong involvement in all aspects of hydrology, hydrogeology and hydrochemistry. Similarly, the WPGM is open to geophysicists worldwide without regard to society membership. This will be a truly international conference and will take advantage of the many new facilities recently opened in Brisbane.

There are several ways that you can contribute to the success of the meeting:

- distribute this message to fellow hydrologists either individually or via a notice board
- suggest a topic for a special session
- volunteer to convene a special session or chair a general session
- attend the WPGM and present a paper (first call for papers to be distributed in July)
- encourage colleagues in other countries to use WPGM to visit Australia/New Zealand

Planning for the logistics of the meeting has been underway for a year, and detailed planning of the scientific program has now commenced. Warren Bond (CSIRO Division of Soils, Canberra) has been appointed as the Australia/New Zealand representative for Hydrology on the Program Committee, with James A. Davis (USGS at Menlo Park) as the North-American counterpart.

Call for Suggestions for Special Sessions

Several kinds of sessions are sought: those with a particular relevance to current issues in the western Pacific region; sessions with a strong interdisciplinary nature; and sessions dealing with topics of current interest in hydrology research world-wide. Sessions in each of the hydrology sub-disciplines are sought.

If you have an idea for a special session, please send me a brief description of it, together with an indication of whether or not you are prepared to act as convenor for that session, or if not, a suggestion of who could be asked to do this. Suggestions will be accepted up until August 1, 1995, which is the deadline for the second call for papers.

Warren Bond
WGPM Program Committee (Hydrology)
CSIRO Division of Soils
GPO Box 639
Canberra, ACT 2601
tel: (06) 246 5948 fax: (06) 246 5965
email: W.Bond@cbr.soils.csiro.au

Calendar of Key WPGM Dates

July, 1995	First call for papers
December 1995	Final call for papers
March 1996	Deadline for abstracts
July, 1996	WPGM commences

MESOZOIC GEOLOGY
OF THE EASTERN AUSTRALIA PLATE

23-26 September 1996
Sheraton Brisbane Hotel & Towers

The Technical Conference

MESOZOIC 96 will be an international conference held over three days to discuss the geological evolution and economic potential of the Mesozoic rocks of the eastern Australia Plate. Explorationists and researchers are invited to participate.

The eastern Australia Plate, preserved in and around the Tasman and Coral Seas in Australia, Papua New Guinea, New Caledonia, and New Zealand, records a history of continental convergence during the Late Palaeozoic through continental breakup into the Tertiary. MESOZOIC 96 aims to bring together earth scientists from a broad range of disciplines with academic and industry perspectives to discuss current research relevant to the Mesozoic rocks of this region.

The technical program will focus primarily on the results of recent research and on the economic evaluation of Mesozoic rocks. The format will comprise plenary keynote sessions, concurrent sessions, technical poster presentations and pre and post conference excursions. The principal themes of the conference will embrace:

- The evolution of the eastern Australia Plate from Gondwanaland to continental breakup, discussing the deformation and distribution of terrains, nature and scale of magmatic events, styles of metamorphic and metallogenic pathways, and development of continental basins
- The economic potential of this region including a discussion of metaliferous deposits, gemstone deposits, industrial minerals, the formation of coal deposits, and the occurrence of hydrocarbon and water resources
- Related topics such as palaeogeography and palaeoclimates during the Mesozoic as well as a special session discussing new techniques and advances in looking through Mesozoic cover utilising geophysics, geochemistry, remote sensing, and computer modelling

Call for Papers

Paper submissions are invited for consideration by the technical program committee. Potential presenters should:

- forward a 300 word synopsis (original plus two copies)
- clearly state title of presentation
- clearly indicate whether synopsis is for a paper or poster presentation
- include co-authors' names, affiliations and addresses for correspondence
- advise details for presenter(s) if not the author
- complete and return the attached form to the conference secretariat

As an indication of support and commitment to the conference, all presenters are required to register for the conference.

Papers & Posters

Accepted authors will be required to submit an extended abstract (comprising six A4 pages including tables, figures, diagrams and references) for publication in the conference proceedings volume. This volume will be distributed to delegates at the conference.

Deadline dates are as follows:

- 1 November 1995 Paper/poster synopses submitted in triplicate
- 1 December 1995 Notification of acceptance
- 30 June 1996 Extended abstract submitted in triplicate

Posters will be an integral part of the program. Posters will be on display on the day of discussion.

Excursions

Excursions are being planned to complement the conference themes. These are planned to address the following topics:

- Mesozoic related gold deposits in eastern Australia
- Energy resources and sedimentology of Mesozoic basins
- Relationships between the Mesozoic geology of eastern Australia, New Zealand and Papua New Guinea
- Mesozoic volcanism in eastern Australia
- Gemstones (diamonds, sapphires and opals)
- Local tours (one-two days) within the Brisbane region

Indicate your interest in attending an excursion by ticking the box on the attached form and returning the form to the secretariat.

Trade Exhibition

Extensive and interactive, the trade exhibition will be an integral part of the conference. Displays will span all sectors of the industry including exhibitors from equipment suppliers, government departments, consulting services, gemstone companies, academic institutions and kindred scientific and professional bodies. The exhibition will also provide delegates with a unique opportunity to examine and test the latest developments in instrumentation and computer systems.

The trade exhibition will be located adjacent to the session rooms. To acknowledge the trade exhibition's importance, the conference program will be structured to ensure delegates have ample time to inspect the exhibition.

To ensure your organisation does not miss out on this excellent marketing opportunity, complete and return the attached form.

Conference and Exhibition Secretariat

For further information, contact:

MESOZOIC 96
PO Box 1280, MILTON QLD 4064, AUSTRALIA
Tel: (07) *369 0477 Int: (+617) *369 0477
Fax: (07) *369 1512 Int: (+617) *369 1512

*After 1 July 1995, please include an additional 3 after the area code.

Further Information

Please add my name to the conference mailing list to receive further information as it becomes available.

Please send me further information about excursions.

Please provide trade exhibition details.

Please provide information about becoming a member of:

GSA GSNZ PESA IAH

Synopsis Submission

My PAPER synopsis and two hard copies are attached

My POSTER synopsis and two hard copies are attached

Title (Prof/Dr/Mr/Mrs/Ms/Miss).....Surname.....

Given Name

Organisation

Position.....

Postal Address.....

Suburb/City

State.....Country.....P/Code.....

Tel (work) () Home ().....

Fax ().....

EMAIL BULLETIN BOARD IN HYDROLOGY

The Department of Civil Engineering at Monash University, Victoria has a bulletin board in hydrology. To be included on the list, send the message:

"Subscribe hydrology *your name*" to LISTSERVE@eng.monash.edu.au

After this you can then send messages to the bulletin board to,

HYDROLOGY@eng.monash.edu.au

IAH COMMISSION FOR GROUNDWATER IN URBAN AREAS ON INTERNET

This Commission is run by IAH-International and aims to advance scientific understanding of the interactions between groundwater and the urban environment, and to improve the hydrogeological basis which underlies the relevant aspects of policy making and management in urban areas.

Members of the IAH Commission of Groundwater in Urban Areas and other IAH members can now use the internet to communicate with each other and discuss any topic related to groundwater in urban areas on the network. A mailing list server at CSIRO Division of Water Resources manages the urban groundwater email list "urban_gw@adl.dwr.csiro.au"

HOW TO SUBSCRIBE

to subscribe to the list send a message to the listserver address:
mailist@adl.dwr.csiro.au

saying in the body of the email text:

`subscribe urban_gw`

The subscription request will be approved by the owner of the list. You can at any time remove your name from the list.

For further information contact,
Dr Claus Otto, CSIRO Division of Water Resources,
Private Bag, PO Wembley, WA, 6014
Tel. (09) 387 0200, Fax (09) 387 8211
email: "claus@per.dwr.csiro.au"



*"On the Internet, nobody
knows you're a dog."*

MEMBERS MOVEMENTS and NEW ADDRESSES

(please send in details to keep our lists current)

- | | |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BACHELOR, Dr Daud | Is now
Environmental Manager
Environmental and Licensing Professionals Pty Ltd,
163 Musgrave Rd, Red Hill, QLD, 4059
P.O. Box 320, Red Hill, QLD, 4059
tel (07) 368 2918 fax (07) 368 3991
(incorrect information was given in the last Newsletter; apologies
for any inconvenience caused) |
| BOYES, Bruce | Is now Groundwater Services
8 Tamar Close, Wilson, WA
tel (09) 458 3387, fax (09) 458 3391 |
| MATHWIN, Tim | Has now joined the Geological Survey of W A
100 Plain St, Perth, WA
tel (09) 222 3491, fax (09) 222 3633 |
| MOSER, Andrew | Has now joined Coffey Partners International Pty Ltd
53B Fairlawn St, Nathan, QLD, 4111
tel (07) 274 4411, fax (07) 274 4977 |
| WATERHOUSE, John | Has now joined Golder Associates in Perth
441 Vincent St West, Leederville, WA
tel (09) 381 3444 |

LOST MEMBERS

Would anyone be able to provide information about any of the following members. We would like to update their status and addresses. Please contact the Secretary Rob Ellis.

- | | |
|----------------|------------------------------------------------|
| BERHANU, Z.Z. | National Centre for Groundwater Management, SA |
| DE SILVA, G.M. | Naracoorte, SA |
| ELDER, G.M. | DWR, Melbourne, VIC |
| LEECH, S.J. | Pancontinental, Kalgoorlie, WA |
| MCAULEY, C.V. | Prahran, VIC |
| TYSON, P.L. | Bardon, QLD |



IAH-AUSTRALIA
AUSTRALIAN NATIONAL CHAPTER

**INTERNATIONAL ASSOCIATION OF
HYDROGEOLOGISTS**

Application for Membership

Complete the information required on the reverse and send the form to the Secretary (or Liaison Officer) of your State or Territory Branch

The IAH

The International Association of Hydrogeologists is a professional association for those within disciplines related to groundwater, its occurrence, utilization, testing and management. IAH is a scientific and educational organisation that is truly international, and was established to foster closer ties, cooperation and information exchange related to the study of groundwater. IAH is non-government and non-profit and has nearly 1700 members internationally from around 70 countries. The Association is affiliated with the International Union of Geological Sciences (IUGS), and was founded during the 20th International Geological Congress in 1956.

By its statutes the IAH is an association of individuals and corporate members, and not a federation of national committees. National groups do, however, organise local meetings and other activities. A proportion of the national membership subscriptions goes to the local organisation to support these activities, the remainder to the international body. The country of the international secretariat is changed every several years.

The IAH publishes the *Hydrogeology Journal* and various workshop and conference proceedings.

Main objectives of the IAH

promote	international and national cooperation between involved scientists and engineers
sponsor	international and national technical/management meetings and symposia on hydrogeology
publish	hydrogeological reports, papers and maps
establish	investigation commissions and working groups to report on special topics
encourage	the international application of relevant approaches and techniques for the benefit of the hydrological and human environment

Membership Requirements

IAH will accept as individual members anyone directly or indirectly engaged in study or research on, or management of water in its various forms related to hydrogeology, if sponsored by two members in good standing. Companies and research organisations can apply for corporate membership.

Family Name Title:.....

Given Names

Organisation

Mailing Address

Postal Code COUNTRY
(please provide a mail address that will be relatively permanent)

Telephone

Fax

Email

Qualifications Highest Degree..... Year Awarded

Institution.....

Other Qualifications.....

Fields of Interest in Hydrogeology.....

Type of Membership Applied For [tick]

Member (\$80) [] Student Member (\$50) [] Corporate Member (\$400) []

Sponsorship Scheme

Member, partial sponsor (\$90) [] Member, full sponsor (\$150) []

Organisation or corporate sponsor (\$50) [] Sponsored Member []

I hereby apply for Membership of the IAH

signed..... date

Nominating Members:

name (print)signed..... date

name (print)signed..... date

Students:

Statement by supervisor. The above applicant is currently enrolled in the course in the

School/Department of.....at

Supervisor:.....(signed).....(print)(date)

NEW MEMBERS

We would like to welcome the following new members who have recently been accepted into the IAH.

COOK, I	WA	DODSON, W	WA
HERBERT, Graham	QLD	JOHNSON, S	WA
LANGFORD, P	WA	LLOYD, Trevor	QLD
LI, Jiaorong	QLD	MARTIN, R	SA
SHAMS, R	WA		

A full and updated Australian membership list will be printed in the last newsletter of the year.

CAREER OPPORTUNITIES- MINISTRY OF WATER RESOURCES SULTANATE OF OMAN

Hydrogeologists, Hydrologists, Groundwater Resources Project Managers, Groundwater Recharge Scheme Specialists, Senior Drilling Specialists.

Minimum Qualifications: B. Sc. Degree, 10 years experience. Computer experience, mathematical modelling and international assignments will be considered as additional advantages.

The Ministry of Water Resources has occasional requirements for the secondment of professional staff possessing the qualifications listed above, through international consulting engineers active in the Sultanate. Tax-free salaries will be negotiable and all living, transportation, holiday and insurance expenses covered. Minimum contract duration is 12 months.

For further information please submit detailed C.V. and supporting documentation to: P.O. Box 613, Post Code 111, CPO Muscat, Sultanate of Oman.

GROUNDWATER SCHOOL



Centre for
Groundwater Studies

is coming to you

Due to the high demand for training in groundwater issues the Australian Groundwater School is to be convened in a number of capital cities

Perth

18-22 Sept 1995

- Groundwater School

25-29 Sept 1995

- Organic Contamination & Remediation of Groundwater

Brisbane

27 Nov - 1 Dec 1995

- Groundwater School

4 - 8 Dec 1995

- Applied Groundwater Flow Modelling

For further information please tear off the lower section and send to:

Groundwater School

Centre for Groundwater Studies, Private Mail Bag 2, Glen Osmond, SA 5064

Phone: 08 3038753

Fax: 08 3038750

Email: trp@adl.dwr.csiro.au



Please advise me of the details for the coming Australian Groundwater School

Name (and position):

Organisation:

Address:

P/Code:

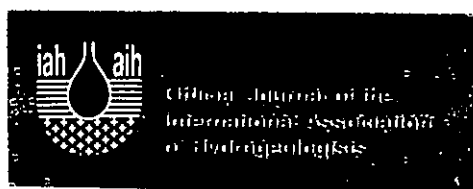
Phone:

Fax:

E-mail:

HYDROGEOLOGY JOURNAL

Edited by Clifford I. Voss and William E. Wilson



The editors welcome communications related to the editorial and technical content of *Hydrogeology Journal*. Please address such correspondence and submit manuscripts to:

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