



International Association of Hydrogeologists

AUSTRALIAN NATIONAL CHAPTER

NEWSLETTER

Vol. 4 No. 2

JULY 1987

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IAH NEWSLETTER

JULY 1987

NATIONAL COMMITTEE ACTIVITIES AND ANNOUNCEMENTS

New Members

Mr J. G. Bartley
(Dept. of Ind. Tech. & Res.)
149 Kerferd Road
Albert Park
VIC 3206

Mr G. A. Bird
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2/48 Fairlight Street
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NSW 2094

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30 Waverley Street
SOUTH PERTH WA 6151

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66 Gipps Street
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BURANDA QLD 4102

Mr G. F. Holland
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44 Nabilla Crescent
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Mr G. P. Hoxley
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23 Laughlin Avenue
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Dr. M. Johnson
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12/6 Taranto Road,
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22 Currawong Cres
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Mr. R. R. Moore
43 Westview Street
Karrinyup WA 6018

Mr. I. W. Potts
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7 Jacobson Street
Mooroopna VIC 3629

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22 Boronia Pde
Lugarno NSW 2210

Mr. H.K. Sullivan
(Golder Associates
Pty Ltd)
161A Copeland Rd
East Beecroft
NSW 2119

Mr. J. D. Wischusen
73 Albion Rd
Box Hill
VIC 3128

Membership subscriptions

Members whose subscriptions are outstanding will find an invoice on the back page. Members with outstanding 1986 Subscriptions are reminded that their membership will lapse at the end of the year.

Advertising

Advertising will be accepted in subsequent newsletters. Rates and categories are outlined on the penultimate page.

IAH Commission on mineral and thermal waters

Dr. M.R. Habermehl has been nominated as the Australian representative on this commission.

Education Subcommittee

R. Lakey has formed an education subcommittee in Victoria. A second subcommittee is planned to be formed in Western Australia.

New logo for IAH - Australian National Chapter.

The new logo for IAH - Australia is shown on the title page of this issue.

BRANCH NEWS

New South Wales

The New South Wales Branch was formed on 10th February 1987. The following office bearers were elected:

D. Woolley - President
R. McLaughlan - Secretary
J. Ross
M. Knight
R. Carr
W. Morton

The inaugural meeting was addressed by former National Secretary R. Lakey on Salinity in the Murray River Basin. The second general meeting with twenty five present, was held on 28th May 1987 and was addressed by W. Morton of Australian Groundwater Consultants on groundwater discovery at Ok Tedi, Papua New Guinea.

Western Australia

A new format was used for the May Branch meeting, "Groundwater Resources - Allocation and Development." The meeting took the form of a seminar, with a break for supper and suitable liquid refreshment to lubricate discussion. Tony Allen (Geological Survey) opened with a subject of key interest to consultants and government authorities alike; "Dividing the Groundwater Resource". This touched on many of the technical issues raised in the "Groundwater Management" presentation by speakers from the West Australian Water Authority in late 1986. As supper cooled the discussion became more heated and it reflects on the enthusiasm of the participants that they were reluctant to recess for their beer and chicken! Peter Dundon (Australian Groundwater Consultants) then presented the "Practical aspects of developing groundwater," a less contentious but equally interesting topic. The extended meeting encouraged open discussion and better interaction between members and fellow workers - the format comes highly recommended to our other branches.

In June the Branch had a joint meeting with The Institution of Engineers with a talk from Dr Rona Salama (CSIRO) on "Problems in the Development of Groundwater in the Northern Territory", giving us an insight into the increasing pressure on groundwater resources in the Territory, particularly in Darwin and with new irrigation

projects at Katherine. We hope to have further news from the N.T. at a future presentation by Jon Hall (AGC).

The Geological Society will be host to the next Branch meeting which is entitled "Groundwater in the Goldfields." This is a very topical issue, as was proved at the expense of the WA Branch mid-year social which was postponed because many members were engaged in groundwater exploration and development in the goldfields of WA, satisfying an ever increasing demand from the mining industry. The meeting, to be held on September 8, will be given a brief historical perspective by Paul Whincup (Groundwater Resource Consultants) followed by discussion of groundwater exploration and development techniques by Peter Dundon (AGC) and Roger Passmore (Rockwater). The meeting promises to be very interesting and we hope the attendance will not be another victim of the topical nature of the subject! - Bob McGowan

REPORTS

Northern Territory Projects

The Water Resources Division of the Department of Mines and Energy is now the Water Directorate of the new N.T Power and Water Authority, however, their role in the investigation and development of groundwater resources in the Northern Territory remains largely unchanged.

Major projects being undertaken at present by the Water Directorate include :-

Expansion of the Roe Creek Borefield to augment the Alice Springs town water supply system (two 160 m

deep bores have been completed in the Mereenie Formation comprising 406 mm pump well casing and 250 mm production casing and screens. These bores will sustain discharge rates of up to 80 L/s each).

Augmentation of the Jabiru town water supply system by expanding the Namambu Creek Borefield.

Investigation of the potential for development of a 15 ML/day groundwater supply for an agricultural project near Alice Springs.

Investigation of the potential of carbonate aquifers in the Lambells - McMinns area to supplement Darwin's town water supply system.

Apart from these major projects the Water Directorate continues to investigate and develop domestic groundwater supplies for Aboriginal communities and to provide advice and assistance to the pastoral industry.

Much groundwater investigation, development and management work is also being carried out by and for the mining industry. Many water supply and dewatering studies are currently being carried out primarily for the gold mining sector with new mines being developed in the Pine Creek Tanami and Tennant Creek goldfields. Hydrogeological consultants, both locally based and interstate are carrying out much of this work. - Jon Hall

South Australia - Projects

Coffey and Partners

The EWS Dept. has contracted Coffeys to investigate and

recommend a scheme to intercept saline accessions to the River Murray in the reaches between Holder and Ramco Point near Waikerie. The study will investigate the feasibility and effectiveness of available salt interception options, considering economic, social and environmental costs and benefits. In undertaking this task, primary emphasis is to be given to the investigation of interception schemes. The impact on these of continued groundwater mound development, of improved irrigation drainage water disposal and of improved irrigation water management is to be considered.

Coffey & Partners also undertook the groundwater investigations for excavation of the new completed trial pit at the Lochiel coal deposit, 130 km north of Adelaide. Ten wells equipped with line shaft pumps commenced pumping 1 700 kl/day for three months prior to excavation to dewater and depressurize fine grained Tertiary silts. The novel method of applying vacuum (0.1 atmospheres) to the annulus between the well casing and the pump column increased flow rates from all wells by 40-50% and achieved a rapid acceleration of depressurisation of the silts.

Australian Groundwater Consultants

Over the last few months, Kinhill Stearns and Australian Groundwater Consultants have worked together on the water supply issues at Leigh Creek. The water supply for the township has relied on surface water storage in Aroona Dam, however the uncertainty of runoff into the dam and the increased population at Leigh Creek have led to the development of an alternative supply which comes from fractured rock aquifers in the Windy Creek and Emu Creek

catchments. The water from these aquifers is saline requiring the development of a desalination plant which is now capable of supplying the total needs of the community when the dam supply fails. Commissioning of the final stages of the plant will be completed shortly. Whenever water is available from the dam it will be used, since it is far cheaper to provide than desalinated water, also, the aquifer supplies are replenished very slowly and must be conserved wherever possible. The capricious nature of hydrological phenomena has been demonstrated to those involved in this project yet again: at the critical time when supplies from the dam were dwindling, it refilled and the spillway flowed for the first time in 12 years.

A.G.C. has completed the next stage of groundwater development for the Olympic Dam project. This involved the establishment of a well field in the Great Artesian Basin southeast of Lake Eyre South. Six wells flow at 20 - 40 litres/sec, however some pumps may have to be installed at shallow depths in some of the wells at higher elevations. Monitoring activities will continue as required by government.

In a move to improve the co-ordination of complementary consulting activities, environmental consultants Paul Manning and Associates have merged with AGC.

Watersearch

Mike Cobb has been busy up at the Granites Gold Mine (500 km northwest of Alice Springs) working for North Flinders Mines. Expansion of the existing supply from a highly transmissive calcrete/silcrete aquifer was required from 24 to 30 litres/sec. Eight new wells were drilled to

delineate the lateral and vertical limits of the aquifer. The drilling subsequently expanded the area of aquifer up to 7 sq. km with distinct salinity stratification from good quality at the water table down to 8 000 mg/L at depth (maximum aquifer thickness is 38 m). Reverse osmosis desalination is practical as the present average pumped salinity is 3 000 mg/L.

For something completely different, Mike has also carried out an investigation to improve the water supply on Flinders Island, 35 km off Eyre Peninsula near Elliston. Pleistocene aeolianite (Bridgewater Formation) is draped over granite with the best prospects being the modern coastal sand dunes.

Water Resources Branch (EWS Dept)

Modelling for the conceptual design of the Woolpunda Interception Scheme is continuing in conjunction with A.G.C. The optimum spacing between pumping wells and their distance from the river has been determined. A river salinity survey has revealed the importance of deep trenches in the river bed (10 m deeper than average) associated with sharp bends in the river. The deeper head of fresh water enhances flow toward the trench because of the density difference with the saline groundwater. One trench discharges an estimated 1 000m³/day which raises the river salinity by 20ECU (20% of the total increase along the reach).

SA Dept of Mines & Energy

The groundwater model of the Mallee region has been used to calculate the effects of clearing natural vegetation on River Murray salinity. Fifty years after the increased

recharge reaches the water table (assuming a recharge rate of 5 mm/yr over cleared areas), an increase of 70 EC at Morgan was calculated.

Penong in the State's Far West has a deteriorating groundwater resource i.e. declining water levels and increasing salinity. A Dept. of Agriculture sponsored consultant's report recommended that "off peak" mains water could be stored underground within the low salinity lens and removed during the summer months. Recharge is envisaged via an infiltration trench with extraction by up to four tube wells. The feasibility of this proposal is currently being assessed.

The South Australian portion of the Great Artesian Basin is undergoing a thorough investigation which involves levelling of well heads, hydraulic and hydrogeochemical analyses and the creation of an integrated data base. A consultant was then engaged to interpret the structure of the basin with particular emphasis on the ecologically fragile mound springs along the SW margin.

Mt. Gambier's Blue Lake continues to be investigated, this time using a combination of geophysics (SIROTEM and VES), down hole hammer and continuous coring through the Gambier Limestone sequence. A better understanding of the structure and recharge mechanism to the lake is being gained.

Peter Smith and Dennis Edwards visited the Victorian Dept. of Industry, Technology and Resources, N.S.W. Water Resources Commission and BMR to get ideas for an integrated hydrogeological data base using the Department's recently acquired main frame computer. Data obtained are being assessed by those responsible for implementing the Department's computing needs.

A number of the Groundwater & Engineering Branch's geologists have been volunteered by Don Armstrong to present lectures at the 23 Aug. - 4 Sept. 9th Groundwater School and have been slaving over lecture note preparation.

- Steve Barnett

The Great Artesian Basin In Queensland

The Queensland Water Resources Commission has commenced a program aimed at updating their knowledge of the Great Artesian Basin. This follows concern expressed about the large waste of water from the basin and the restrictions which apply to the use of the water for irrigation purposes.

It has been estimated that over 750 of the 2,450 artesian bores in the basin flow uncontrolled. In the present investigation all bores in the basin will be inspected and their present condition reported on, the flow and temperature measured and where possible the static head will also be measured. Flow recession, dynamic and static tests will be carried out on some bores so more values of aquifer characteristics can be obtained. Because of the distances involved it would be rare if more than one bore can be inspected per day and it is estimated that with present staff this task will take about 3 years.

A permanent monitoring network will be selected from the existing bores. It will consist of about 350 bores which will be measured every 3 to 5 years.

The last major review of the basin was carried out in the 1940's and resulted in a report in 1954. Following the field investigation it is intended to assess the current

state of the basin and review the Basin yield. The effect on the basin of rehabilitating uncontrolled bores will be assessed together with possible uses which could be made of the water saved. The results and projections of the 1954 report will be checked to see if they are still valid and current management practices will be reviewed.

It is estimated that this review will take about 5 years to complete, but it is hoped that the ground work will be laid to allow more frequent reviews of the basin's performance in the future.

- Bruce Pearce

**Workshop on Groundwater Modelling - Mildura, Victoria,
16-18 February 1987**

All told thirty three scientists, from five states of Australia, gathered together at the Grand Hotel in Mildura, in summer temperatures, to share thoughts and experiences in groundwater modelling. Our keynote speaker, and stimulating questioner, for the three days was Professor Lynn Gelhar (Massachusetts Institute of Technology) whose extended stay in Australia was funded jointly by the CSIRO Division of Groundwater Research (CSIRO-DGR), Perth WA, and the Centre for Water Research at the University of Western Australia (CWR-UWA). A total of sixteen papers were presented over the first two days of the workshop; a well guided and worthwhile discussion was held on the third morning followed by a whirlwind excursion to the Raak Plain to view saltpan type groundwater discharge areas.

Papers offered for presentation covered a broad range, from zero-dimensional to three-dimensional models, from

descriptive modelling to detailed mathematical analysis of a modelling methodology, as well as point and dispersed source modelling methodology. Adrian Peck (CSIRO-DGR) in welcoming delegates, challenged all present to consider the adequacy with which collected data represent spatially varying aquifer parameters, and the degree to which errors in such data can be quantified in model prediction. Lynn Gelhar followed on by describing "the modelling process", from problem definition and observation, to solution of the problem. Lynn illustrated his talk with examples from his experience in hydrosalinity modelling in the USA. By demonstrating the utility of zero-dimensional models (or lumped parameter models) in comparison to two-dimensional models, Lynn made the point, quite strongly, that the complexity of model development should be applicable to the situation under investigation and to the questions being asked of the modeller.

One of the many issues raised at the workshop was parameter and model prediction uncertainty, and the associated issue of appropriate scale of measurement and quantification of spatial variability of model parameters. The scale at which the modeller seeks to address the problem has a large bearing on model prediction uncertainty, since parameters utilized in the model are often collected at a much smaller scale. Regional scale modelling of groundwater basins in Victoria, nitrate contamination of groundwater in SE South Australia, and tracer tests in the Northern Territory served to illustrate this issue. Lloyd Townley (CWR-UWA) provided the audience with an overview of a developed strategy for estimation of model prediction uncertainty, and a paper questioning the theoretical underlying assumptions of estimation of transmissivities via stochastic inverse methodologies was also presented.

As was evidenced from the breadth of scientific disciplines present at the workshop, groundwater modelling has become a multidisciplinary area of work involving civil engineers, geologists, mathematicians, soil scientists, hydrologists, hydrogeologists and many others. Effective modelling often requires input from these and other areas, but caution was suggested, against allowing any single disciplinary bias to overrule the model development.

Summary of Main Issues Raised

1. Appropriateness of model dimensionality
2. Data collection - problems of scale, and adequacy of data
3. Quantification of model prediction uncertainty
4. Modelling prior stream systems
5. Adequate field testing (validation) of models

A copy of the workshop program and a list of participants is available from:

CSIRO Division of Groundwater Research
Private Bag, PO Wembley, Western Australia 6014.

- Greg Davis, CSIRO

REMUNERATION SURVEY

It is intended to carry out a survey of IAH members next year. Results of two overseas remuneration surveys are shown below

Association of Groundwater Scientists and Engineers (USA) - 1987

Hydrogeologists/Hydrologists (217 replies)

Years of experience		Salary (thousand US \$)	
<5	34%	<\$20	2%
5-10	39%	\$20-25	9%
11-15	16%	\$25-30	23%
16-20	7%	\$30-35	13%
>20	4%	\$35-40	20%
		\$40-50	20%
		\$50-60	9%
		>\$60	6%

Institution of Geologists (UK) - 1986

Geologists (621 replies)

Age	Median Salary (£S)	
<26	7560	13%
26-30	10500	25%
31-35	13420	33%
36-40	16000	15%
41-45	17910	8%
46-50	19250	5%
51-55	19900	6%
55-60	19400	4%
>60	19230	1%

CONFERENCES SYMPOSIA AND MEETINGS

- 27-28 October 1987 Workshop on allocation of
groundwater, Sydney
Details from Don Woolley (02-9220121)
John Moreton (079 273 833)
Richard Evans (03 508 2640)
- 1-4 May 1988 International Groundwater Symposium:
Halifax, Nova Scotia
- Hydrogeology of cold and temperate
climates
- Hydrogeology of Mineralised zones
(details elsewhere in newsletter)
- 16-20 May 1988 Symposium on 'The contribution of
geoscience to the National Economy',
1988 ANZAAS Congress, Sydney contact:
Chief Executive Officer, 1988 ANZAAS
Congress, University of Sydney NSW 2006
(02) 692 3268
- July 1990 International Conference on Groundwater
in Large Sedimentary Basins, Perth (note
change of year)

ANNOUNCEMENTS

E.S. Hills Memorial Scholarship Appeal

Donations are invited for the establishment of an annual award for an outstanding and needy student taking post-graduate studies in Geology at Melbourne University.

Contact: Secretary, E.S. Hills memorial Scholarship Appeal, Dept. of Geology, University of Melbourne, Parkville 3052.



INTERNATIONAL GROUNDWATER SYMPOSIUM
INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS



ATLANTIC CANADA REGION

CANADIAN NATIONAL CHAPTER

FIRST NOTICE AND CALL FOR PAPERS:

INTERNATIONAL GROUNDWATER SYMPOSIUM
OR
HYDROGEOLOGY OF COLD AND TEMPERATE CLIMATES
AND
HYDROGEOLOGY OF MINERALIZED ZONES

MAY 1-4, 1988
HALIFAX, NOVA SCOTIA

The Canadian National Chapter of the International Association of Hydrogeologists is sponsoring an International Groundwater Symposium at the World Trade and Convention Centre in Halifax, Nova Scotia, Canada. Special sessions will focus on the logistics and problems associated with hydrogeological investigations in cold climate areas of the world, and on the hydrogeology and hydrogeochemistry of mineralized zones, including the hydrogeologic aspects of mine development.

In conjunction with the IAH Symposium, the Canadian Water Well Association (CCWA) will host Canwell '88, a convention of water well contractors and equipment suppliers from across Canada. This event will feature technical presentations and displays of drilling equipment, monitoring equipment and groundwater resource development supplies.

A full range of social events is planned, including field trips in the complex hydrogeological terrain characteristic of Atlantic Canada. Delegates will experience the world renowned hospitality of historic Halifax, one of North America's most famous port cities.

Authors are invited to submit abstracts of no more than 250 words in English prior to September 1, 1987 to:

Mr. J. E. Gibb
Environment Canada
Conservation and Protection, Atlantic
4th Floor, Queen Square
45 Alderney Drive
Dartmouth, N.S.
B2Y 2R6

Complete papers in English or French will be required by January 31, 1988. Details on paper format and presentation will be forwarded at a later date.

Suggested topics include, but are not limited to:

- | | |
|--|--|
| <p><u>Mineralized Zones</u></p> <ul style="list-style-type: none"> · mine dewatering, methods, and impacts · mine water management · groundwater monitoring and protection at in-situ leach mines · hydrogeochemistry of ore zones · groundwater in ore genesis | <p><u>Cold and Temperate Climates</u></p> <ul style="list-style-type: none"> · heat pump applications · logistical problems in cold climate/weather groundwater studies · hydrogeology of permafrost zones · waste disposal in cold climates · fate of organic contaminants |
|--|--|

I plan to attend the IAH International Groundwater Symposium in Halifax, N.S. in 1988 _____

I plan to submit an abstract _____

Please send further symposium details notices and/or proceedings information as available _____

Please check as desired and send to:

Mr. D.S. MacFarlane, Chairman
International Groundwater Symposium
Halifax '88
c/o Jacques Whitford & Assoc. Ltd.
1046 Barrington Street
Halifax, Nova Scotia
B3N 2R1

NAME: _____
ADDRESS: _____

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Adverts to be submitted in camera ready form on A4 paper in black and white.

INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS

Australian Membership Subscription

1986 Subscription @ \$10
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1987 Subscription @ \$50
Late Fee @ \$10
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