

NEWSLETTER  
INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS  
AUSTRALIAN CHAPTER

VOLUME 3 NO.1

MARCH 1986

1 WELCOME HOME ROB AND JENNY WILLIAMSON

The National Committee on behalf of the Australian membership take this opportunity to extend a heartfelt welcome to Rob and Jenny on their return to Australia after their harrowing past seven months imprisonment in Afghanistan following their kidnapping on May 18, 1985.

2 MEMBERSHIP NEWS

2.1 New Members

The following new members are welcomed:

Mr G Gates  
Hydrogeologist  
NSW Water Resources Comm.  
14 Melaleuca Avenue  
LEETON NSW 2705

Mr B M Harris  
Hydrogeologist  
SA Eng. & Water Supply  
Department  
38 Royal Avenue  
BURNSIDE SA 5066

Mr J S Throssel  
Geologist  
Australian Groundwater Consult-  
ants  
37 Philip Road  
DALKEITH WA 6009

Mr J Sheard  
Geologist  
SA Dept. Mines & Energy  
P O Box 151  
EASTWOOD SA 5065

Mr M Chandler  
Hydrogeologist  
Groundwater Resource  
Consultants  
71 Dallas Crescent  
WANNEROO WA 6065

Mr R Reoel  
Geologist  
SA Dept. Mines & Energy  
P O Box 151  
EASTWOOD SA 5065

Mr X P Sibernaler  
Hydrogeologist  
SA Dept. Mines & Energy  
Box 359 Gawler  
SA 5118

Mr C L Johnson  
Coffee & Partners  
Hydrogeologist/geo-  
physicist  
24 Clivia Cres.  
DAISY HILL QLD 4128

Mr W R P Boucaut  
Geologist  
SA Dept. Mines & Energy  
27 Avoca Avenue  
BRIDGEWATER SA 5155

Mr N Z Gerges  
Geologist  
SA Dept. Mines & Energy  
P O Box 151  
EASTWOOD SA 5063

Mr I D Jolly  
Research Officer  
SA Dept. Mines & Energy  
25 Glenfeil Street  
ADELAIDE SA 5000

Mr I S Rowan  
Hydrogeologist  
Aust. Groundwater Consultants  
4 Rogana Crescent  
HALLETT COVE SA 5158

Mr J A Reed  
Hydrogeologist  
SA Dept. Mines & Energy  
30 Sherwood Drive  
GLENALTA SA 5052

2.2 Note From Treasurer

The Treasurer wishes to thank those members who have responded to the call for 1985 subscriptions made in the past newsletters. A reminder has been sent to non-respondents.

1986 subscriptions are due by March 31. Please note that dues for 1986 have been set at \$30, the increase being necessitated by the 10DM postage surcharge imposed by the International Council and the unfavourable exchange rate for the Australian dollar.

Could anyone help with current mailing addresses for: Mr D Megirian  
Mr J Lloyd  
Mr R McLaughlan

- their newsletters continue to return - marked, "not known at this address".

### 2.3 Australian Chapter General Meeting Brisbane may 1986

Opportunity will be taken to hold a General Meeting of the Australian Chapter on the evening of Tuesday May 13 during the International Conference, Groundwater Systems Under Stress, Brisbane May 12-16. All National Committee Offices will be declared vacant and new Office Bearers will be elected at that meeting. Nominations are now called for these Offices. A form for this purpose is enclosed with this newsletter. Nominations will also be accepted at the General meeting.

## 3 NATIONAL COMMITTEE REPORT

### 3.1 Administrative Guidelines for National Committees of IAH

IAH is an Association of individuals and corporate members; it is not a Federation of National Committees (NC's) (Statutes 111.1 and 5; IX and X). Nevertheless IAH has always encouraged the activities of NC's (Statute X).

The progressive growth of IAH at an increasing rate necessitates some kind of general guidelines concerning the general and financial relations between the members and the NC, and between the NC, the Council and the Treasurer.

And its meeting on 29 May 1985 at Skaly Center in Czechoslovakia and later at the 18th Congress in Cambridge (September 1985) the IAH Council considered the following proposals for guidelines.

These guidelines are advisory in nature and here termed "articles", to distinguish them from the existing Statutes and By-laws. They are based, not on legalities, but on assumptions of goodwill, good faith and integrity of IAH members and their NCs. It is intended that these guidelines, modified if necessary in the light of experience and consultation, should form the basis of future By-laws. From time to time the Officers and Council of IAH may issue further guidelines (articles) on other aspects of the activities of National Committees.

Art.1. National Committees must operate within the framework of the Statutes and By-laws of IAH, but may make further rules appropriate to their particular circumstances. Any such rules must not conflict with IAH Statutes and By-laws and must have the approval of the council of IAH.

Art.2. Each member of IAH is encouraged to belong to a National Committee (if one exists in the country concerned) but no one can be a member of a National Committee without being a member of IAH.

Art.3. Each member should send his/her annual fee (in Deutsch Marks) directly to the IAH Treasurer. However the Council may approve the payment of fees through an appropriate National Committee (but may rescind the approval at its discretion). Failure to pay memberships fees may result in cancellation of membership, in accordance with the Association's Statute 111.4. The individual membership fee is currently 30 DM (plus 10DM for mailing expenses) according to the decision of the council at its session of 8th January 1985 in Tucson (Arizona).

Art.4. When membership fees are paid through National Committees, the NC concerned must send each year all membership fees, together with a list of the names and addresses of the members who have paid, to the IAH Treasurer by 1st April following the calendar year concerned.

Art.5. Each National Committee is authorized to collect additional dues to take care of their local obligations. Such local dues should not normally exceed half the membership fee. National committees can also obtain financial support by sponsorship of meetings, funding of publications, donations, etc. In some cases, NCs can get financial support (or guarantee against loss) from the IAH Council to perform a specific task. These types of support will be well known to members through the information in the Bulletins or Newsletters of the IAH.

Art.6. When a National Committee proposes to hold a congress or symposium for which it requests financial support (or guarantee against loss) from the Council, the Council may negotiate with the NC concerned the proportion of profit (if any), from the congress or symposium, to be paid to the IAH central account in Hannover. The basis for the calculation of profit will also be agreed in advance, but will normally be considered to be the monies remaining after all relevant debts and loans have been fully paid. In all cases a clear agreement must be signed by the participant concerned.

Art.7. The Council wishes to receive financial information from NCs in order to protect the interests of members. Thus each NC should send a financial statement in respect of the previous calendar year, by the 1st April annually, to the Secretary-General and Treasurer of IAH, for consideration by the Council at its next meeting. The information can be included in the annual report which should be presented each year to the Council (Statute IX). The IAH parent body is not responsible for the financial debts of any of the National Committees unless a commitment or guarantee against loss for a particular function has been made. National Committees are solely responsible for their own debts including membership fees to the parent body.

Art.8. In countries with non-convertible currencies, members or NCs may find it difficult to fulfil their financial obligations (By-law 13). In some cases their problems can be solved through the use of UNESCO coupons or similar ways of international payment. In other cases, NCs of countries with such problems can fulfil their financial obligations by funding IAH publications and by sponsorship of international meetings; nevertheless every NC should contribute directly, at least with the cost of postage. This type of solution has to be approved according to individual and national circumstances by the Council. In each case the corresponding NC should submit a financial statement annually, by 1st April, to the Secretary-General and the Treasurer, and this report will be considered by the Council.

Art.9. The Treasurer will report annually at the first Council meeting after the 1st April, the amounts received from each NC and the names of members who paid either directly to the IAH Treasurer or to their NC. He will also submit to the Council the financial statements received from National Committees under Articles 7 and 8.

### 3.2 Australian Geoscience Council Inc.

As part of its overall objective to develop and disseminate information of interest to earth sciences through the holding of workshops and seminars, the Australian Geoscience Council planned a one-day workshop which was held at the University of New South Wales, Kensington on Friday 29th November, 1985. This Workshop on the topic of Tertiary Geoscience Education in Australia was to further another aim of the AGC in the promotion and development of earth science education in Australia. AGC is currently negotiating with the Commonwealth Tertiary Education Commission (CTEC) to encourage CTEC to conduct a

survey of tertiary education in geoscience as soon as possible. It is hoped that the conclusions developed from the workshop will be of value and enable the CTEC to further this objective. The results of the workshop will be compiled in a feature article in the next issue of Australian Geoscience, the annual report of the AGC. The one-day programme included a morning session of speakers from various disciplines in geoscience which was followed by a group discussion and a final plenary session from which some recommendations emerged. Australian Geoscience 1984 has now been released and is crammed with interesting information on geosciences in Australia. It includes status reports of particular disciplines together with reports from State Geological Surveys, the BMR and CSIRO and AMF. An article on the effect of geoscience careers on family life entitled "Women and Children First?" completes the publication of findings from the Human Resource Survey conducted by the AGC. It has been decided that in future only every third issue of Australian Geoscience will contain the status reports and in intervening years feature articles such as the one on the findings from the Tertiary Geoscience Education will be included instead.

Other activities currently undertaken by the AGC include a plan to co-ordinate an annual survey of employment in the geosciences in co-operation with AMIC, APEA and ASSS. AGC will also represent its member societies in the newly formed Federation of Australian Scientific and Technological Societies (FASTS). Over 90 societies are eligible to join the Federation, representing about 80 000 scientists and technologists. The management board of a maximum membership of 20 will include a member representing the AGC. Colin Branch, Past-President of the AGC has been nominated for this position. It is interesting to note that the draft constitution of FASTS is in large part based on the AGC constitution.

Finally, AGC is continuing to maintain a calendar of geoscience meetings in Australia and copies can be obtained from the Secretary. The Secretary should also be kept informed of additions.

### 3.3 Australian Academy of Science

#### 1) Academia Sinica - Exchange Agreement 1986/87

A scientific exchange agreement between the Australian Academy of Science and Academia Sinica (Beijing) has been in operation since 1977. Applications are invited from scientists wishing to participate in the 1986/87 programme.

The Academy funds exchanges in the field of natural science. Applications from individual scientists or groups (up to a maximum of six in number) should have a specific programme or project in mind, preferably one that has been developed in consultation with the Academia Sinica Institutes which applicants wish to visit. Visits may be short-term (3 to 4 weeks) exploratory or fact-finding visits or long-term (up to 12 months) visits to carry out joint research work or field studies.

Under the terms of the agreement, travel expenses to and from China are the responsibility of the Academy, and expenses within China are the responsibility of Academia Sinica. The Australian side of the agreement is funded by the Commonwealth Government.

Application forms and a list of Academia Sinica Institutes are available from the Academy.

#### 11) Japan Society for the Promotion of Science - Exchange Agreement 1986/87 (With support from the Australia Japan Foundation)

The Australian Academy of Science invites applications from scientists resident in Australia to participate in an exchange programme with the Japan Society for the Promotion of Science. Applications will be considered from biological and physical scientists for short-term visits and for post-doctoral fellowships.

Senior scientists may apply for short-term visits which will not normally exceed four weeks. The purposes of the visits is to exchange lectures, information and ideas between scientists in the two countries.

For short-term visits, the Academy provides APEX international airfares and the Japan Society for the Promotion of Science provides maintenance allowances and the cost of travel within Japan.

Scientists who have less than five years of post-doctoral experience may apply for fellowships to visit Japan for six to twelve months.

For fellowships, the Academy provides APEX international airfares and the Japan Society for the Promotion of Science provides remuneration.

Scientists interested in participating in either of the exchange programs outlined above in the 1986/87 financial year may obtain more information about the programmes and application forms from:

International Relations Section  
The Australian Academy of Science  
GPO Box 783  
CANBERRA ACT 2601

Applications should reach the Academy by 1 February 1986.  
For enquiries, please telephone 47-3966.

#### 3.4 Report on Meeting of IAH Commission on Hydrogeological Maps (COHYM) held Cambridge (U.K.) 10-11 September 1985

COHYM has evolved from a European to a truly international body and new members from countries outside Europe are recruited, to ensure a world-wide representation of interested hydrogeological map makers and to render the scientific work of the commission more productive. The development and finalization of the European map series still occupies a considerable share of COHYM's work, and COHYM meetings are usually coupled with meetings of the Committee of Scientific Editors for the International Hydrogeological Map of Europe.

However, other mapping projects are progressing, and the IAH Commission is paying great attention to these projects, giving advice and comments and supporting the developments of the projects by providing experience acquired during the preparation of the European Map to the non-European map makers. So has COHYM contributed to and is supporting the international hydrogeological map projects of Africa, South America, South and East Asia and the Arab Countries as well as several national mapping programmes, e.g. Australia, Brazil and India.

The work of COHYM focusses on three major topics, i.e.

- i) to develop and outline methods of hydrogeological mapping including methods of representation,
- ii) to promote and advise map projects
- iii) to finalize the European hydrogeological map project.

Owing to the wide variety of working fields of COHYM both thematically and geographically a flexible approach towards membership is useful. Consequently, the Commission consists of a number of permanent members as well as of numerous temporary members who can adhere to COHYM as long as their mapping programmes last. Moreover the Commission is open to interested map makers who wish to present novelties on hydrogeological mapping or map projects and use the COHYM forum for discussion.

At present the following specialists are members of COHYM: W Struckmeier, Chairman (F.R. Germany), Chen Mengxiong (P R China); J B W Day (U.K.), G B Engelen (Netherlands), Ch. Fezzani / M Safar-Zitoun (African Map), M R Habermehl (Australia), J Khouri (Arab Countries), C Kolago (Poland), J Krasny (CSSR), J Margat (France), B Mijatovic (Yugoslavia), Nelson Da Franca (Brazil, South American Map), B D Pathak (India, South and East Asian Map), G Person / J Poussette (Sweden), Soetrisno S. (Indonesia), R Stein (Canada), G S Vartanyan / Vsegingeo (USSR), and all editors and authors contributing to the International Hydrogeological Map of Europe.

All members contribute voluntarily to the Commission's work, since COHYM does not dispose of its own budget. The total lack of funds is of course a handicap for COHYM's work, which can only be balanced by great personal efforts of COHYM members.

COHYM meetings are held annually, usually in connection with symposia or congresses of the IAH. In addition, regional editorial meetings are convened to advance the preparation of sheets and explanatory notes of the International Hydrogeological Map of Europe.

#### Publications

Essentially two kinds of publications are developing from the work of the IAH Commission on hydrogeological maps:

- i) the maps and explanatory notes of the series of the International Hydrogeological Map of Europe,
- ii) the international legend for hydrogeological maps.

International Hydrogeological Map of Europe, - scale 1:1 500 000

At present 21 map sheets out of the series of 30 sheets are printed either as proof or edition prints. However, only 9 sheets are published together with the accompanying explanatory notes, 3 more sheets and notes being in the course of printing in 1985.

#### International legend for hydrogeological maps

After the publication of the revised edition of the IAH/IAHS/UNESCO/IGS legend (1970) as a technical document of UNESCO in 1983 the Commission is devoting considerable work in the elaboration of a guidebook for hydrogeological mapping which will include a methodological approach to hydrogeological mapping as well as selected legends and case studies of hydrogeological maps. A working party within COHYM is elaborating an outline of this guidebook and will check contributions and proposals submitted to COHYM.

#### Reports on Hydrogeological Mapping Projects

##### Africa

Mr Safar-Zitoun, permanent co-ordinator of the international programme for hydrogeological mapping in Africa outlined the programme and presented the legend for a map at the scale of 1:5 million. He mentioned that a comprehensive documentation of African hydrogeological literature and a list of African hydrogeologists has been prepared by the co-ordinating institution (African association for cartography, AAC), to run the project more efficiently. Mr Struckmeier announced that the Federal Republic of Germany will organize together with AAC a regional workshop for the African map in western Africa, at which a first test sheet of the map should be prepared.

## Asia

Messrs Chen Mengxiong and Soekardi said that the Asian hydrogeological map is obviously lacking progress. No news has been received from the convener, Dr Pathak (India). Mr Chen Mengxiong proposed to convene a workshop on hydrogeological mapping in Asia, to be held in Autumn 1987 in the Peoples Republic of China (Shih-jia-zhuang city). This workshop should be organized by the IAH National Committee of China in collaboration with ESCAP and UNESCO, supported by the Ministry of Geology and the Geological Society of China, IAH and IAHS.

## Australia

Messrs Habermehl (BMR, Canberra) and Commander (GS Perth) reported that hydrogeological mapping in Australia is witnessing exceptional progress during the past few years. It was stressed that on the basis of common efforts of all States of Australia and using the IAH/UNESCO legend the whole Australian Continent is being covered by a hydrogeological map, scale 1:5 million, for the first time.

## South America

Mr Nelson Da Franca presented a review on the hydrogeological mapping activities in South America. He emphasized that in the framework of the international hydrogeological map of South America, scale 1:5 million, all South American countries have intensified their national hydrogeological mapping programmes. He presented the new hydrogeological map of Brazil, scale 1:5 million, as an example.

Attendants reported briefly on national or regional map projects in Botswana, Canada, China, Costa Rica, Cyprus, France, Ghana, Indonesia, Italy, The Netherlands, Poland, Spain, Sweden, Turkey and the United Kingdom.

## 4 REPORTS

### 4.1 Notes from U.K Newsletter

#### North London Artificial Recharge Scheme, Thames Water Authority

A substantial water resources deficit is forecast by 1991/92 in the Lower Thames and Lee Valley areas, with the greatest need for additional resources during times of drought. Various projects have been proposed to meet this shortage; one, now in the course of development, is an extension to the Artificial Recharge Scheme in the Lee Valley for use under drought conditions.

The Enfield-Haringey area, to the west of the existing Lee Valley sites, was considered the most favourable site hydrogeologically for exploitation. It is estimated that there is some 20,000 t.c.m. storage capacity in the area within the Chalk and overlying Basal Sands. When fully utilised this could yield 100 t.c.m.d. for 200 days during a drought. With the existing Lee Valley sites this would yield a total of about 170 t.c.m.d. for 200 days.

The development of the Enfield-Haringey area will proceed in stages. Two sites are currently being developed. At Stoke Newington three production boreholes have been drilled and test pumped. Six observation boreholes were already in existence. A third production borehole has now been drilled and test pumped. Several further sites are currently being evaluated and further tests including recharge tests will be conducted at Stoke Newington, Ridge Avenue and other sites during the next year.

The economics of the scheme depend on an available supply of off-peak mains water for recharging the aquifer. The present aim is to recharge the aquifer at a steady annual rate

until the storage capacity has been utilised. At present the Enfield-Haringey area is about 50% full and the Lee Valley area about 75% full.

#### Development of Nuclear Magnetic Resonance Logging for Boreholes British Geological Survey (Hydrogeology Group) and Thorn-EMI

One area of instrumental research which looks like being thoroughly successful concerns the development of a borehole logging probe to measure in situ porosity and permeability, using the principle of Nuclear Magnetic Resonance (NMR), originally developed for medical use in body-scanning. Porosity measured by conventional logging tools in a saturated formation is total and does not differentiate between water free to move under hydraulic gradient and water bound to solid material or to clay materials. Although the precise correlation is yet uncertain, the nuclear magnetic response does differentiate between free and bound water and will give measurement of effective porosity and permeability.

BGS/NREC, with funding assistance from the British Technology Group, have let a contract with Thorn-EMI to develop a prototype NMR logging probe; this probe is currently being tested, with promising results.

Historically, an original American NMR sonde (35 ft long, weighing 700 lb) sent large magnetic pulses into the formation and observed the precession of the hydrogen nuclei within the geomagnetic field. This tool necessitated large quantities of direct current power (up to 300 amps) and required seeding the borehole fluid with magnetite to couple the energy to the formation and negate unwanted signal from the borehole fluid.

The BGS/Thorn-EMI modification has resulted in a much smaller tool which can be surface powered and has a conditioned field which observes signals from a specific zone ranging from 18-22 cm radius from the tool.

#### 4.2 CSIRO Division of Groundwater Research

This Division was created in July 1982 in a reorganization to enhance CSIRO's activity in the water resources sector. In broad terms the Division investigates processes affecting the quality and quantity of groundwater and the responses of groundwater systems to various anthropogenic stresses. Major thrusts of the 29 professionals are concentrated in the estimation of recharge from rainfall, mapping and characterizing transport of agricultural phosphate and organic contaminants from landfills, quantifying hydrologic aspects of landscape salinity problems, applications of remote sensing, and development of techniques for better management of water use. Most of the field work is presently conducted at various sites in the south-west of WA. Some of them are mentioned below.

##### Collie catchment salinity study

An essential component of this study is the effect of agricultural clearing on the net recharge rate to aquifers in the mantle of deeply weathered material overlying crystalline basement rocks in this area. During the past year work has continued on mechanisms and patterns of recharge. There is good evidence of substantial variation of recharge rates over distance of only a few metres with flow concentrated in much more conductive structures beneath a shallow ephemeral water table aquifer during rainstorms.

A grant was received from the AWRC to examine the dynamics of salt leaching from a small catchment after clearing for agriculture. This project used long sequences of daily data from neighbouring small catchments. There is no clear sign of a return towards a salt balance 9 years after clearing in this high-rainfall (about 1200 mm/yr) area. Results of the Collie salinity study will be discussed at a symposium in Perth during April 1986.

### Gnangara recharge study

The Water Authority of WA is supporting work to estimate recharge rates under softwood plantations and natural banksia woodland of the Gnangara mound, a major water table aquifer on the northern outskirts of Perth. Leaching of applied bromide indicates a substantial local variation of recharge in what is superficially a relatively homogeneous sand mass. This has implications with respect to sampling for recharge estimation using natural tracers such as chloride or stable isotopes, or any other small scale measurements in the unsaturated zone.

### Canning Vale waste disposal

Analysis of methane in gas samples taken from only a metre or so beneath the ground surface has been shown to be a simple and effective technique for defining the pollutant plume from a waste disposal site. Research is continuing into the transport of methane from within the aquifer. This disposal site is closing, and research is beginning at a new location in the Perth suburbs.

### Domestic water use in Perth

In collaboration with the Water Authority of WA, a major study of domestic water use in Perth has been completed. This will be reported and reviewed at a national workshop in the coming year.

### General news

Professor L W Gelhar of MIT visited Perth in January to run a joint CSIRO/UWA workshop on stochastic aspects of groundwater hydrology. Other distinguished visitors during the year were Professor D E Elrick of Guelph University, Ontario (solute dispersion) and Dr E G Youngs of the UK (drainage theory).

A landscape salinity project in Thailand began with ACIAR funding and Adrian Peck as Program Co-ordinator. This project is designed to define areas of recharge and flow paths of water and solute which are affecting rice yields over a large area of NE Thailand. David Williamson supervised the installation of 37 piezometer nests by local contractors, and Adrian Peck visited Thailand for a data interpretation session with Thai collaborators.

To provide advice from the water industry, the Division established a Consultative Committee consisting of Mr Bernie Credlin (Queensland WRC), Mr Don Woolley (NSW WRC), Mr Ray Frost (BHP), Mr Doug Lane (South Australia E and WS) and Mr Ken Webster (Water Authority of WA). This Committee met in Perth during June and prepared a report on future research directions for the Division.

Adrian Peck chaired a meeting of the Working Group for IHP III Project 2.4.d. This group is acting for the IAHS International Commission on Groundwater in preparing a report on the consequences of aquifer variability and data limitations for groundwater modelling practice. The meeting was held in Cambridge UK immediately before the 18th Congress of the IAH in September.

Munna Sharma visited Bangkok and Jakarta in the preparation of a report on urban groundwater problems in SE Asia. This study was commissioned by the East-West Centre of the University of Hawaii.

Peter Dillon is spending a year with the Division on a CSIRO Post Doctoral Fellowship. He is working on groundwater monitoring network design and analysis and techniques for flow estimation. Other visiting scientists include Dr Clive Seligman (University of Ontario), Dr Eiichi Shimojima (Natural Disaster Research Institute, Kyoto University), Dr Peter

Crown (University of Alberta, Edmonton), Dr Bill Martin (University of Arizona) and Dr Arnon Arad (Israeli Geological Survey).

The Division was subjected to a full-scale review in November. Members of the Review Committee are David Constable (Victorian RWC), Ray Bond (CSIRO Officers Association), Barry Brady (CSIRO Geomechanics), Stephen Hancock (AGC), Keith Johns (SA Mines and Energy), Alan Reid (CSIRO Institute Director) and Bill Williamson (NSW Consultant). Their report is expected in the New Year.

#### 4.3 Summary of Activities 1985, BMR Division of Continental Geology, Hydrogeology Research Group

The Hydrogeology Research Group comprises four hydrogeologists (1 Research Scientist and 3 Scientists) who study the regional hydrogeology of three large sedimentary basins to determine the hydrodynamics and hydrochemistry of these major Australian groundwater resources as a basis for their assessment and development.

The Group carries out activities in:

- 1 Murray Basin (NSW, VIC., SA)
- 2 Great Artesian Basin (QLD, NSW, SA, NT)
- 3 Amadeus Basin (NT)

Murray Basin - the detailed geology, stratigraphy correlations, and aquifer geometry have been prepared during the last few years and a subsurface data base established on a microcomputer. A three dimensional finite difference model has been developed for the Basin to simulate groundwater flow and the basin has been sampled on a regional scale for hydrochemistry and environmental isotopes. Planned activities for 1985/86 include further work on the hydrochemistry and isotope hydrology, and continuation of modelling activities, including the development of a solute transport model.

Great Artesian Basin - extensive geological, hydrogeological, modelling, hydrochemical and isotope studies have been carried out. Recent activities include further sampling of wells and springs for hydrochemistry and isotopes, and sampling of fossil spring deposits, to interpret the palaeohydrology of the basin.

Amadeus Basin - data are being collected to prepare a conceptual and mathematical model of the basin, study the hydrochemistry and isotope hydrology, and monitor the discharge zone.

#### National Water Resources Data Strategy Program

Funds were allocated to BMR in 1984/85 to develop and co-ordinate a program relating to groundwater components of the National Water Resources Data Strategy Program (NWRDS).

This program included :

- . Review of data holdings of all States and preparation of recommendations for the design for a national groundwater data base.
- . Development of detailed proposals for a five-year national hydrogeological reconnaissance and exploration program for commencement in 1986-87.
- . Undertake a pilot study on establishing a data base system using an existing BMR hydrogeological data set.
- . In co-operation with Department of Resources and Energy prepare the groundwater section of the Review 85 report.
- . Prepare a 1:5 000 000 national hydrogeological map as part of Review 85.

- . In co-operation with the States undertake a pilot study on the compilation and production of a 1:1 000 000 hydrogeological map by computer-assisted cartographic techniques.

#### 4.4 New South Wales

##### W.R.C. 1985 - Regional Investigations

- . Namoi Valley - Two rigs continued work in the Cox's Creek/Gunnedah area in the final stages of the investigation drilling in this area. A comprehensive report on the lower Namoi Valley groundwater is at draft stage.
- . Macquarie Valley - Drilling in the upper sections of the valley was completed, and a report has been commenced. Drilling in the downstream area (west of Narromine) commenced late in the year.
- . Lachlan Valley - Drilling continued in the Lake Cowal - Bland Plain area, a major tributary to the Lachlan Valley from the south. A major aquifer system has apparently been located in this alluvial infill, but drilling is still in progress. The find is an important and timely one as it might provide a possible alternative to augmentation of water supply schemes in this area by pumping more water from bores in the Murrumbidgee alluvium. Drilling of four bores south of Roto indicated an aquifer system associated with a palaeochannel of the Lachlan River system which trends west from Euabalong to Roto. Groundwater is brackish and further investigation is not warranted. A comprehensive report on the investigation program in the Lachlan Valley between Cowra and Jemalong Weir is in draft form and should be released in 1986.
- . Murray Basin - Drilling commenced in a highly prospective area between Tocumwal and Deniliquin during the year, and early holes indicate high yielding, low salinity aquifers at depths around 300m. A recommencement of drilling in the Corowa-Jerilderie area towards the end of the year should also provide useful information, in an area now subject to more interest in its coal deposits. Also towards the end of the year, a deep bore is planned for the Lake Prungle area in the southern part of Willandra Lakes World Heritage Region.

Seismic refraction traverses were continued in the western part of the Basin, in a continuing program of mapping the configuration of the ridge system in the pre-Tertiary basement and its consequent effect on groundwater movement. A compilation of seismic data in the NSW part of the Basin was scheduled for completion and release late in the year.

*Hydrogeological Maps - Compilation of a hydrogeological map of the Forbes 1:250 000 sheet area was undertaken during the year, and a colour proof is expected to be available by late November. The UNESCO legend, with modifications similar to those adopted by Western Australia has been used. This map will be used to assess likely future directions which the Commission might take in this field.*

Organisational matters - Hydrogeologists were posted to Leeton and Dubbo during the year as a first stage in regionalisation of the Hydrogeological Sections activities. Current action, concerned with restructuring of the Commission and implementation of a variety of reviews, may result in further transfers to country offices. In addition, major changes to the structure of the Commission are likely within the next few months.

#### 4.5 South Australia Department of Mines and Energy

After several years of a slow erosion of numbers, the Groundwater and Engineering Branch is expanding with the addition of four base grade geologists and the resurrection of a Principal Geologist position. As mentioned in the recently prepared Branch Strategic

Plan, the Branch will be reorganised so as to more effectively service its 4 major functional areas:

- 1 Management Oriented Investigations directed to areas of groundwater stress
- 2 Regional Groundwater Assessment Projects
- 3 Provision of groundwater and engineering geological services
- 4 Research, Development and Training.

Major projects include:

#### Keith-Bordertown Irrigation Areas

Fred Stadter of the Naracoorte Office has been carrying out extensive drilling, aquifer testing and recharge studies to determine a water budget for the shallow limestone aquifer in this area of expanding irrigation which has been proclaimed under the Water Resources Act. Fred appreciates the change from addressing hostile farmer meetings about dewatering the proposed Kington coal deposit that was.

#### Adelaide Metropolitan Area

Nabil Gerges has been perforating the metro area for several years and could finish the project any decade now. Aquifer testing and C14 show that recharge through fractured rock aquifers of the adjacent Mt Lofty Ranges play an important part in the water budget of the Quaternary alluvium and confined Tertiary aquifers.

#### Murray Basin

After a five year drilling programme and 150 investigation holes Steve Barnett is finally commencing data compilation and analysis. A computer model of the basin south of the River Murray with the eastern boundary being the eastern extent of the Murray Group limestone in Victoria is being cranked up. Detailed work has also been carried out in the Mallee Proclaimed Area for the determination of a management plan. Steve is also investigating relationships between groundwater salinity and the consumption of wine.

#### Woolpunda Groundwater Interception Scheme

Groundwater inflows from the Murray Group limestone have been shown to be the cause of increases in salinity of the River Murray between Overland Corner and Waikerie. Zac Sibenaler and Dennis Edwards have been involved in detailed investigations (drilling and a three week aquifer test with 8 observation holes). It is hoped that the large number of holes drilled in this programme will not markedly increase the recharge rate.

#### Eyre Peninsula and Adelaide Hills

Peter Smith has been investigating the Quaternary aeolianite aquifer on E.P. for town water supplies for Streaky Bay, Coffin Bay and Port Kenny. Peter has also been monitoring extensive potato irrigation in the Adelaide Hills (for "Smiths Crisps"?) and recently conducted a sampling and flow gauging exercise at Dalhousie Springs (G.A.B.) as part of a multi-disciplinary study of the environmental resources.

#### Future Energy Advisory Committee

Don Armstrong and John Morris spent many a long hour analyzing and presenting hydrogeological and geotechnical aspects of various proposed coalfields to the aforementioned high powered committee which made recommendations to the Government on electricity generating options and requirements.

## General

Dave Clarke at the Crystal Brook office has been generating endless software programmes on all manner of hydrogeological applications for the section's microcomputer, (any queries, his postal address is P O Box 118, Crystal Brook 5523). In his spare time he carries out well surveys, aquifer tests and monitors observation networks in the Mid-north area of S.A.

The Mount Gambier office, under Jeff Lawson, continues to monitor groundwater pollution sites (potential and existing) for the Gambier Limestone aquifer together with town water supply work and aquifer testing.

Bob Read, the fractured rock guru, fresh from a resounding success at Leigh Creek South, has been drilling in the arid areas with mixed results.

## Water Resources Branch, E & W S Department

Bryan Harris and Jeff Read have been involved in the formulation of management plans and computer models for the various Proclaimed Regions and other areas of management interest. Areas currently under the microscope are the G.A.B., the Mallee, Angas-Bremer Irrigation Area, the Woolpunda G.I.S. and various locations on Eyre Peninsula. The S.A./Victoria Groundwater Sharing Agreement has also been successfully formulated and is to be steered through parliament in the coming session.

## Consultants

After 14 years with the DME, Mike Cobb resigned in February and formed WATERSEARCH. Apart from the odd well siting job for landowners in the Barossa Valley area where he is based, Mike has carried out quick appraisals of the groundwater situation in localized sedimentary basins in the Mt Lofty Ranges area for the Water Resources Branch, as well as groundwater resource investigations for local government. Mike is unfortunately learning that the velocity of payment often approximates that as calculated by Darcy's Law.

Chris Bleys of CHRIS BLEY & ASSOCIATES is having a bit of a quiet time this year and is concentrating mainly on well siting jobs for property owners.

AUSTRALIAN GROUNDWATER CONSULTANTS (manned by Ian Rowan and John Waterhouse) are carrying out routine monitoring after intensive investigations in two major projects - Roxby Downs and the proposed Lochiel Coalfield. At Roxby, groundwater supplies from the GAB were developed some 100km to the north of the mine site. Effects of large withdrawals on basin pressures have been simulated and groundwater inflows to the main shaft at the mine site are being monitored. Geotechnical and dewatering investigations were carried out at the proposed Lochiel Coalfield, 100km northwest of Adelaide.

Chris Johnson of COFFEY & PARTNERS is based in Adelaide for three months to assist in detailed hydrogeological investigations for the Woolpunda Groundwater Interception Scheme.

## 4.6 Western Australia

### Meetings :

May 14, 1985 - "Waste Disposal and Groundwater Contamination".

Speakers: Dr K Hirschberg - Liquid Waste Disposal in the Perth Metro. Area.

Mr K Haselgrove - The Disposal of Bauxite Residue: Kwinana.

October 22, 1985

Speakers: Mr A C Deeney - "An Overview of the 18th IAH Congress"

Mr R K J Vogwill - "Hydrogeological Studies Associated with Underground Coal Gasification".

### Membership

Membership of the WA Branch continues to grow. Current membership stands at 46. Average attendance at meetings is usually 20-25.

### Programme for 1986

The meetings calendar for 1986 has been arranged. We look forward to two guest speakers from Israel during 1986.

### General

Messrs Commander, Deeney, Peck and Vogwill attended the 18th IAH Congress in Cambridge, England during September 1985. In between punting on the Cam River and the numerous social events, Allan Deeney (The Phosphorous input to the Peel inlet by Groundwater Flow) and Richard Vogwill (Muja Open Cut Dewatering, Collie Basin) found time to present Technical Papers.

### Revised Meetings Calendar

- |   |                                |  |
|---|--------------------------------|--|
| 1 | December 3, 1985               | "Groundwater in darkest Africa"  |
| 2 | January 28 or February 4, 1986 | Professor Arnon Arad, Israel : "Overview of the Hydrogeology of Israel"  |
| 3 | March 4 1986 - Joint Meeting   | Institution of Engineers (At University)<br>Professor E Mazor, Israel<br>"Natural Isotopes and Chemical Parameters for determining Groundwater Quality and Quantity" |
| 5 | July 14, 1986 - Joint Meeting  | Institution of Engineers (At Institute of Engineers)<br>"Perth Urban Water Balance Study"  |
| 6 | October 1986                   | "Groundwater Licensing - Rationale and Areas"  |

### The Richard G Barnes Scholarship in Hydrogeology University of Western Australia

It is proposed that money for this scholarship will be raised from the IAH membership, friends and industry. The scholarship would be awarded to a 4th year Honours Geology student at the University of Western Australia, who will do an honours thesis on a hydrogeological subject. In this way it is felt that the scholarship will be an incentive for geology students to enter the field of hydrogeology. The scholarship will probably be valued at \$400 - \$500 and will be awarded by the University of Western Australia in consultation with the IAH. Hopefully any contributions made to the scholarship fund will qualify as tax deductible.

All members are asked to consider giving generously to this scholarship fund for it will perpetuate Richard's memory as well as advancing our science. Donations should be directed to, Richard I J Vogwill, Chairman WA Branch IAH, C/- Groundwater Resource Consultants, 273 Stirling Street, Perth, WA 6000.

#### 4.7 Victoria

**Resource Evaluation.** Major groundwater investigations continued in the south western region (eastern Oroy Basin) and the Gippsland Basin. Several deep piezometers were installed in the latter basin to monitor the effect of offshore petroleum extraction on onshore groundwater levels. Seven of forty-five proposed piezometers were installed along the Victorian side of the SA/VIC border, as part of the monitoring system for the SA/VIC Groundwater Sharing Agreement, recently proclaimed by both State Governments.

**Salinity Investigations.** Salinity and associated land degradation has been recognised as the major environmental problem in Victoria and the State Government has made a major commitment to investigation and research programs directed towards the resolution and amelioration of this problem. The research and investigation program is now being co-ordinated to eliminate overlap and expose gaps in the current programs being pursued by Government Departments and their Consultants. A Ministerial Task Force has been established and meets regularly to review progress.

**Groundwater Pollution.** A recent chemical fire at Footscray in Melbourne resulted in the contamination of a tidal channel and shallow groundwater due to the application of over 30 ML of fire fighting water. The liquid from the mixture of fire fighting water and chemicals in the fire at the freight terminal was a green-brown syrupy fluid. Shallow bores at the site indicate that the 'soup' from the fire has made its way into the groundwater system. Thus far the chemical fire has cost public authorities around \$4M to clean up.

The freight terminals customers lost between \$1-2M in chemicals and food stuffs in the inferno. The clean up so far has involved removal of contaminated soil from the channel and the site. The channel was shut off and water tankered away for treatment. Groundwater aspects are undergoing investigation by consultants to the EPA.

**Branch Meetings.** Four technical meetings were held in Victoria during 1985. Speakers included Dr W Nesbett (Hydrochemistry), Dr J Bowler (Arid Zone Hydrology), Dr J Patterson (Water Law) and Dr P Macumber and Mr G Hunter (a joint presentation on Salinity issues).

#### 4.8 18th IAH Congress "Hydrogeology in the Service of Man" Cambridge 8-13 September 1985

Australia was well represented at the Congress, having seven participants, namely Philip Commander, Richard Vogwill and Allan Deeney (WA), Adrian Peck (CSIRO, WA) Rein Habermehl (BMR Canberra), Colin Dudgeon (University of NSW) and Bill Williamson (Sydney).

There were 13 keynote papers, one of which, "Groundwater in Australia", was given by Rein Habermehl. Other Australian papers were by Colin Dungean (Effects of non-darcy flow and partial penetration on water levels near open-put excavations) and by Richard Vogwill and Ian Brunner (Dewatering and depressurization at the Maja Open Cut, Collie Basin, Western Australia).

The 94 papers of the Congress were pre-published in 4 volumes : Part 1, Keynote Papers; Part 2, Economic v Social Influence; Part 3, Energy Sources and Groundwater Control; and Part 4, Groundwater Quality Management. As would be expected from the theme of the Congress, the papers cover a broad spectrum of hydrogeology. They make a valuable contribution to its literature.

## 5 SYMPOSIA, CONFERENCES AND MEETINGS, 1986

MAY 11-16 : INTERNATIONAL CONFERENCE ON GROUNDWATER SYSTEMS UNDER STRESS, Brisbane. Venue: University of Queensland. Sponsored by AWRC, IAH and Inst. Eng. Aust. Contact: The Conference Manager, Groundwater Systems Under Stress, Uniquet Conference Systems, Univ. of Queensland, St Lucia 4067. See 6.1.

JULY 2-10 : 2nd SCIENTIFIC GENERAL ASSEMBLY FOR THE INTERNATIONAL ASSOCIATION OF HYDROLOGICAL SCIENCES, Budapest, Hungary. Sponsored by UNEP, UNESCO and WMO. Contact: Dr A Syallasi-Nagy, Executive Secretary, 2nd IAHS Scientific Assembly, Water Resources Research Centre (VITUKI) H-1453, Budapest, P O Box 27, Hungary. Telephone (361) 338-160.

AUGUST 26 - September 28 : POST-GRADUATE TRAINING COURSE ON GROUNDWATER TECHNIQUES, Graz, Austria. Contact: Prof. H Holmer, Institute of Technology, Rechbauerstrasse 12, A-8010 Curay, Austria.

SEPTEMBER 8-15 : 19th CONGRESS OF THE INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS, Karlovy Vary, Czechoslovakia. Sponsored by UNESCO. Contact: Stavební Geologie, Praha, Garkeho namesti 7, 113 Q9 Praha 1, Karlovy Vary, Czechoslovakia. Telephone: 24 8751; Telex: 12

SEPTEMBER 22-27 : 5th International Symposium on Underground Water Tracing, Athens Greece. Contact : The Organizing Committee, 5th SUWT, Institute of Geology and Mineral Exploration, 70 Messaghion Street, 11527 Athens, Greece.

NOVEMBER 25-27 : Hydrology Conference, Brisbane. Contact : The Conference Manager, The Institution of Engineers, Australia. 11 National Circuit, Barton ACT 2600.

### 5.1 Third Annual Canadian/American Conference on Hydrogeology

Hydrogeology of Sedimentary Basins: Application to Exploration and Exploitation. Banff, Alberta, Canada June 22-26, 1986.

Sedimentary basins occupy vast areas of the continents and the adjacent off-shore regions. They are the repositories of effectively all world energy resources, much of the mineral resources, and are locations for hazardous waste disposal. Extraction of resources or addition of wastes has both local and regional implications for the natural hydrogeological situation. Understanding of the regional hydrodynamics, hydrochemistry and geothermal regime can assist in maximizing opportunities for resource exploration and exploitation, and minimizing environmental damage due to deep injection of fluids. Papers which address these broad regional concerns are welcome.

In keeping with the format established at previous conferences, speakers who are widely recognized as leaders in their fields will be invited to present substantial lectures on specific topics in sedimentary basin hydrogeology. A tentative list of invited speakers includes:

Dr John Bradley	Amoco Production Co., Tulsa
Dr Andre Chiarelli	Elf Aquitaine, France
Prof. Grant Carven	Johns Hopkins University, Baltimore
Dr Brian Hitchon	Alberta Research Council, Edmonton
Dr Allan Jessop	EMR, Earth Physics Branch, Ottawa
Dr Yousif K Kharaka	U.S.G.S, Menlo Park
Prof. Fred Longstaffe	University of Alberta, Edmonton
Prof. Jozsef Toth	University of Alberta, Edmonton

Papers of 15 to 20 minutes duration, dealing generally with regional case studies with emphasis on an integrated hydrodynamic-hydrochemical-geothermal approach, will be considered. Suggested relevant topics include:

- . Integrated hydrodynamic-hydrochemical-geothermal approach to petroleum exploration
- . Integrated hydrodynamic-hydrochemical-geothermal approach to the search for mineral deposits in sedimentary basins
- . Geothermal regimes and geothermal resources
- . Dating of formation waters and hydrodynamic patterning
- . Integrated case studies of deep waste disposal
- . Effect of diagenetic processes on regional flow systems
- . Origin and maintenance of geopressured systems
- . Evaluation of paleohydrogeological systems
- . Non-Darcian flow systems in sedimentary basins
- . New developments in fluid-heat-mass transport processes.

#### Registration Information

Registration fee for the conference is \$450 Canadian. This fee includes the banquet, a wine and cheese party, the program book with field trip notes and published transactions. The fee for the field trip is \$30 Canadian. We kindly urge you to reserve your place at the conference as soon as possible due to the fact that attendance will be limited to 300 people.

#### Abstracts and Biographical Sketches

Abstracts will be accepted dealing with the previously mentioned topics and presentations can be either oral or poster. If your paper is accepted and we run out of oral presentation slots, we will assign you a poster to assure that we can accommodate your paper. Abstracts should not be longer than 250 words. Give the names and affiliations of all contributors. The name of the speaker should be underlined.

Biographical sketches are needed for all authors. These must accompany your abstract (no resumes will be accepted). Sketches should be 100 words or less and in paragraph form. Full mailing address and telephone number should be included with biographical sketches.

#### Deadlines

Receipt of abstract and biographical sketches - April 1, 1986.

Receipt of complete written manuscript - June 15, 1986.

All authors will receive timely notification of the status of the papers. All papers accepted for presentation at the conference must be submitted to the conference convener by the above-mentioned date. Authors whose written papers are not received by this date will not present their papers at the meeting. All paper submissions are to be in the format of Groundwater Journal and are subject to peer review prior to publication in the proceedings volume.

Abstracts should be submitted to Canadian/American Conferences on Hydrogeology/Brian Hitchon/Alberta Research Council/4445 Calgary Trail South/Edmonton, Alberta, Canada. (Telephone (403) 438-0555, extensions 262 or 275.

#### Field Trip

An optional one-day field trip to sour gas scrubbing plants in the Calgary area will be led by Tad Dabrowski, Piteau Consulting Ltd., in co-operation with PetroCanada and Shell Canada Ltd. The trip will be held on Thursday, June 26 and will demonstrate practical aspects of site characterization and monitoring for protection of air, soil and water quality in areas surrounding the gas plants. The area is an especially scenic locality in the foothills of the Canadian Rockies.

I.A.H. Australian  
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