



# International Association of Hydrogeologists

AUSTRALIAN NATIONAL CHAPTER

## NEWSLETTER

Vol. 10 No. 2 DECEMBER 1993

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## FROM THE PRESIDENT

At the first International Groundwater Conference "Groundwater and Man" held in Australia at the University in 1983, the Australian Chapter of IAH was formed. The meeting of enthusiastic "would be" IAH Members was well attended I remember. At this meeting our Victorian colleagues were voted in to begin the enterprise as members of the first executive with Bill Williamson as President. So IAH Australia has reached the ripe old age of 10! From Victoria the executive moved to Perth where a very constructive 4 years of managing our affairs was contributed and culminated in the Big Basins Conference in 1990. At this conference the NSW Branch took over and we will complete our reign in 1994 at the Water Down Under Conference.

Looking back over the last 10 years one can see the groundwater profession growing and maturing. We now have over 200 members and both the Community and Governments have a greater awareness of groundwater, especially as it relates to Salinity and Contamination. We have had some very successful and regular International groundwater Conferences;

- 1983 Groundwater and Man, Sydney,
- 1986 Groundwater under stress, Brisbane,
- 1990 Big Basins, (Perth) and to come the;
- 1994 Water Down Under (Adelaide)

Interspersed with these conferences there have also been other workshops (Murray Darling Basin especially) and National Conferences e.g. Aquifers at risk 1993, Canberra). Many of the State branches have regular meetings with speakers delivering stimulating and informative talks.

Research and Education in the groundwater field have grown considerably over the ten year period as well. Prior to, and continuing through the period, the National AWRC sponsored two week Groundwater Schools have formed a foundation role to professional education. The successful 12th School was recently run by the Centre for Groundwater Studies under Peter Dillon's Leadership.

In 1987, the Australian Water Research Advisory Council (AWRAC) gave further recognition to Groundwater by financially supporting (in part) two National Centres out of 13; one at Adelaide and one in Sydney. As we come up 1994 we now have active postgraduate groundwater degree training by way of formal coursework Masters and Research Degrees (Masters, PhDs) at University of Technology, Sydney, University of N.S.W., University Melbourne and, Combined Universities of Adelaide, Flinders and South Australia. Other Universities take in Masters and PhD's by research and many have some training at undergraduate level.

Research proceeds at a growing pace in various CSIRO Divisions, Universities, Government Water Resource Management Agencies and some consultancy companies. The offering of over 350 Abstracts for the forthcoming Water Down Under 94 conference bears testimony to the research activity in progress.

As groundwater problems emerge and there is a need for further rapid information transfer, specialised short courses have been developed by the Groundwater Centres and others to respond to the situation.

The technological and professional advances we have seen in the groundwater field over the last ten years are just the beginning. The next decade will, I am sure see a consolidation of the profession and further exciting advances at the leading edges. The 25th IAH Congress (Water Down Under 1994) in Adelaide will be the beginning of a rewarding new era that will lead on towards the new century. Try and plan to be here. This is your opportunity.

In closing, the Sydney Executive and I would like to wish you, your families and colleagues all a joyous Christmas and a productive New Year.

## **NOTES FROM THE NATIONAL SECRETARY**

**December 1993**

We have been sent a copy of the IAH China newsletter that will be forwarded to all state liaison officers for distribution to interested members on a state basis.

We remind members that advertising space is available at \$100 per page. We apologize for omitting the "advertisement" heading on an article in the previous newsletter, but hope that it will encourage both private and public organizations to consider letting the moths out of their wallets and advertise. Every advertisement is equal to a member subs for the year and helps us all.

A conference on "Engineering Geology of the Newcastle - Gosford Region" will be held in Newcastle in February 1995, and Philip Hitchcock is preparing a paper on Hydrogeology of the Tomago and Newcastle coal measures, and the Narabeen Group. If any members have water quality and aquifer parameters for these groups, Please contact Philip on (049) 26 2766.

We appreciate feedback from members, and letters to the committee are welcomed. Please be assured that although we do not always have the time to reply quickly all matters will be considered as soon as possible. The mailing list to the international body is continuously updated. We hope that the change of IAH International central address system to the UK does not cause too many problems in the proceedings reaching all members.

## **IAH EDUCATION SURVEY 1993**

### **SUMMARY OF RESPONSES**

A survey was sent out to a number of Educational Institutions to collate information on courses available for undergraduate and post-graduate students in Hydrogeology and related disciplines in Australia. The following summary is designed to provide a quick reference to the responses received. The results of the survey will be of particular use to students considering a career in hydrogeology, and to prospective employers looking for the most likely source of good-quality employees. The previous issue of the newsletter contained detailed descriptions of the courses at the University of New South Wales and University of Technology, Sydney. We thank everyone who has contributed to the collation of the survey, and we hope it is a useful reference. The order of presentation is purely random.

#### **Flinders University of South Australia**

Contact: Dr Gordon Stanger  
School of Earth Sciences  
Flinders University of SA  
Box 2100 Adelaide 5001  
ph (08) 201 2709  
fax (08) 201 2676

Offers: 6 semester courses in surface and subsurface hydrology (incl an honours subject) for undergraduates. A fee-based masters is offered in conjunction with the University of Adelaide, Centre for Groundwater Studies, Australian Centre for Water Quality Research and the University of South Australia. MSc and PhD by research are also offered.

#### **The University of Western Australia**

No specialist programme in hydrogeology, but work with the Dept of Applied Geology at Curtin.

Contact: Prof. C MCA Powell  
The University of Western Australia  
Dept of Geology and Geophysics  
Nedlands, Perth WA 6009

## **James Cook University of North Queensland**

Contact: Prof R.E. Volker  
Dept of Civil and Systems Engineering  
James Cook University  
Townsville, QLD 4811

Ph 077-814270  
fax 077-751184

Undergraduate programme - some subjects in Bachelor of Engineering (Civil) degree. Graduate Diploma in Engineering may be taken with most coursework in hydrogeology and related areas plus project work. Master of Engineering may include a significant component of subjects relevant to hydrology as well as a dissertation. Master of Engineering Science (predominantly by research) may include some coursework. PhD also offered.

Substantial laboratory facilities exist including two sand boxes for 2d and 3d flow.

Entry requirements for postgraduate courses are normally a first degree. Flexible options for commencement of studies.

## **University of New South Wales**

Contact: Dr Ian Ackworth  
c/ Water Research Laboratory  
University of New South Wales  
King Street  
Manly Vale NSW 2093

Hydrogeology forms a core component of undergraduate studies in Engineering and Applied Geology. 10 hours introductory hydrogeology, 42 hours of contaminant transport and 28 hours of environmental/hydrogeology are offered in the undergraduate programme.

In post-graduate courses, a 30 credit groundwater studies programme is offered which includes groundwater modelling groundwater environment, geophysics, hydrogeochemistry, hydrological processes, contaminant hydrogeology, remote sensing and GIS systems, and includes a research project.

Extensive chemistry laboratory facilities available, and computing facilities.

A Graduate short course in hydrology can be taken as a 14 week course which has surface and groundwater options.

Entry requirements to the groundwater studies programme is by a first degree in geology or engineering. Entrance timing is flexible.

The groundwater studies programme has been revised for 1994. Extensive field laboratory studies are possible at a number of nested piezometer sites, and salinity investigations and remote sensing methods topics are available.

### **Queensland University of Technology**

#### **Academic:**

Dr Malcolm Cox  
School of Geology  
QUT  
GPO Box 2434  
BRISBANE QLD 4001  
Tel: (07) 864 1649  
Fax: (07) 864 1535

#### **Administrative:**

Mrs Cathy Fielding  
School of Geology  
QUT  
GPO Box 2434  
BRISBANE QLD 4001  
Tel: (07) 864 1645  
Fax: (07) 864 1535

Undergraduate Programme - BAppSc Course with a major in Geology includes 8 semester length (14 weeks), 5 hours per week, 12 credit points subjects including Field Techniques, Sedimentology, Geomorphology, Geochemistry, Hydrogeology, Engineering Geology, Geology of Fossil Fuels and Geological Investigations.

Graduate or Honours Course(s) Offered in Hydrogeology or related are the one-year Honours course in Geology which allows students to undertake coursework and a research project related to Hydrogeology. The first half-semester consists of course work and the research project takes up the remaining semester and a half.

Coursework units are based on formal class-work and are 5 hours per week for 7 weeks. Relevant coursework units are Geological Case History, Environmental Geochemistry, Advanced Engineering Geology, Advanced Sedimentology & Stratigraphy and Coastal Zone Environment Studies

The Graduate Diploma is a full year of coursework and is the same as the first year of the MAppSc Course

The MAppSc degree is usually 2 years full-time or 4 years part-time and involves 2 semesters of course work and 2 semesters of research.

The PhD program is mostly research-based, with a small amount of coursework if considered to be required.

A number of related subjects or courses in other faculties are offered

Laboratory Facilities in the School of Geology include the following:

- Geochemistry lab with clean room
- Environmental Geoscience Lab.
- Sedimentology Lab.

Options for Timing Commencement of Studies vary according to the type of degree.

### **Monash University, Clayton Campus**

Contact: Assoc Professor R. G. Mein  
Dept of Civil Engineering  
Monash University  
Clayton, Vic 3168

Undergraduate programme does not offer any courses in hydrogeology, but some subjects have hydrogeology components. One post-graduate course in Groundwater hydrology is offered once every 2 years. Soils laboratory facilities are available. Entry requirements are: honours degree or equivalent for post-graduate programme.

### **The Australian National University (1)**

Contact: Dr F. Ghassemi  
CRES/ANU  
GPO Box 0200  
Canberra ACT 2605  
Ph (06) 249 0653  
fax (06) 249 0757

Undergraduate course - Water Resources science and management. No post-graduate courses, but MSc and PhD offered by research. No laboratory facilities, but computing facilities available.

## **The Australian National University (2)**

**Contact:** Dr R.A. Eggleton  
Dept of Geology  
Australian National University  
GPO Box 0200  
Canberra ACT 2605  
Ph (06) 249 2060  
fax (06) 249 5544

No undergraduate courses in hydrogeology. A graduate school program is offered in Regolith and Quaternary studies through CSIRO, AGSO and CRES.

## **University of South Australia**

**Contact:** J.B. Jago  
Dept of Applied Geology  
University of SA  
The Levels SA 5095  
Ph (08) 302 3107  
fax (08) 302 3378

Undergraduate programme offers 10 lectures in hydraulics, 12 hours of hydrogeology in the third year of studies. A B. App. Sc. (Hons) is offered in hydrogeology. Related courses are offered in Civil Engineering.

## **Swlnburne University of Technology**

**Contact:** Stephen Mills  
Box 218  
Hawthorn Vic 3122  
Ph (03) 819 8033  
fax (03) 819 6443

No courses are offered in hydrogeology or related areas.



## **Victorian University of Technology**

Contact: Peter Lechte  
Dept. of Civil and Building Engineering  
Victorian University of Technology  
P.O. Box 14428 MMC  
Melbourne Vic 3000  
Ph (03) 6884438  
fax (03) 6884096

No undergraduate programme in hydrogeology but, 3 related subjects offered in civil engineering degree programme. 4 courses in related fields offered in a Graduate Certificate in Water Engineering. Substantial laboratory facilities in hydraulics, chemistry and microbiology. Graduate certificate in Water Engineering requires qualifications suitable for GradIEAust plus 1 years experience. Some flexibility in commencement.

## **University of Technology, Sydney (UTS)**

Contact: Assoc. Professor Michael J. Knight  
National Centre for Groundwater Management  
University of Technology, Sydney (UTS)  
Po Box 123, Broadway 2007 NSW  
Ph (02) 3301984  
fax (02) 3301985

*Undergraduate Programme* B.AppSc. Course with a major in Geology includes Hydrogeology at Stages 5 and 6 in the context of Engineering Geology and Environmental Geology. Also the project in Honours year may also include some Hydrogeology

*Post-Graduate Courses* A sixty credit Masters and 45 Credit point Graduate Diploma in Hydrogeology and Groundwater Management may be taken over 1 year full-time, and 2-3 years part-time. The Coursework/project Programs are MSc, M.E., GradDip (Science or Engineering). Subjects covered include; Hydrogeology, Groundwater Modelling, Hydrogeochemistry, Surface Hydrology and Groundwater, Contaminated Site Management, Geopollution Management Groundwater Geophysics and Remote Sensing of Groundwater Resources, Computing for Groundwater Specialists. The project is 30 credit points (Masters) or 15 credit points (GradDip).

Masters and PhDs by Research may also be taken on Groundwater and related topics through either Engineering or Science Faculties there is also a fee paying Graduate Course in Groundwater Management that extends over 3 months each year.

There are extensive laboratory computing and field facilities available. Entry to Postgraduate Programs is by First degree in Geology or Engineering.

The National Centre for Groundwater Management is running research programs valued at over \$1 million both in Australia and overseas. These involve salinity, contaminated sites and polluted groundwater pesticide transport, modelling and geophysics.

**Note:** The Executive notes that there are some institutions that do not appear to have returned their 1993 Education Survey Information. The Newsletter editor would still like to receive this data and will publish it in the next Newsletter. Please follow the format of this inventory.

## NATIONAL COMMITTEE NEWS

### TREASURER'S REPORT

#### Membership Subscriptions for 1993

All members were recently sent invoices for their 1993 subscriptions. If you have not already paid your subscription for the year (\$60), could you please forward it to the Treasurer as soon as possible. My address is given below. Do not send your fees to your State Branch Secretary/Treasurer.

#### New Members

Membership has continued to grow during 1993 with another 27 new members since our last newsletter. Thanks to all those State branches actively signing up new members and promoting IAH. The following new members are welcomed :

Mr D Batchelor (QLD)	Mr S Benton (NSW)
Mr F Mollica (VIC)	Mr D Casey (NSW)
Mr K Seddon (VIC)	Mr T Katopodis (VIC)
Mr A Fothergill (VIC)	Ms A Dimos (VIC)
Mr T Carmichael (NSW)	Mr D Irvine (QLD)
Mr C Prangley (WA)	Mr I Smith (NT)
Mr D Dempster (QLD)	Mr K Berry (WA)
Mr K O'Neill (NSW)	Mr D Smirk (WA)
Mr J Bornman (WA)	Mr P McGarry-Heaton (QLD)
Ms S Carapina (VIC)	Dr F Abo (VIC)
Mr M Easton (VIC)	Mr A Harrison (VIC)
Ms T Weaver (VIC)	Mr A Nunn (VIC)
Mr J Schaeffer (VIC)	Mr B Coleman (VIC)
Mr J Hadwen (VIC)	

(NOTE. Those who joined after 1 July 1993 are financial members for the balance of 1993 and the whole of 1994 as this is the first year they will receive publications from overseas).

#### New 1994 Fees

The International body of IAH has advised that the membership fees for 1994 will be increased for the first time since 1990. The 15DM increase will be passed on to all Australian members next year when subs are due mid year. The membership fee will rise to \$75.

However for all new members who join IAH, the increase is effective from 1 November 1993.

State Branches will benefit from the new fee structure as \$5 per financial member is to be returned to each State Committee for IAH activities in the respective States. This arrangement has commenced from 1993, one year ahead of schedule.

#### Membership Categories

There have been several enquires recently as to whether IAH offers student and retired membership categories. I have contacted the

International body and they have advised that a new student category has been created for 1994 bringing the number of membership categories to four. A new category for retired members was considered but rejected. Australian NC membership fees for these categories for 1994 are shown below:

Student - \$45  
Individual - \$75  
Corporate - \$375  
Sponsored - \$115

In order to qualify for student membership you must be under 30 years of age and be in full time education. The category is only available for two years and each student must produce a copy of their id card or have their application certified by academic staff. Please supply me with the relevant details if you wish to change membership categories.

### Publications

All 1992 and some 1993 members should have received two volumes from overseas during the year -

"Annotated Bibliography of Karst Terranes" -  
Volume 15 in the International Contributions  
to Hydrogeology Series, and  
"Selected Papers on Aquifer Overexploitation" -  
Volume 3 in the Hydrogeology Selected Papers  
Series.

The National Committee expects to mail out copies of the proceedings of the "Aquifers at Risk" conference to all members in the near future. This follows the circulation of the AWWA Water Journal which had a hydrogeology theme earlier in the year.

For 1994 and continuing years, all members will receive four issues of the new *Applied Hydrogeology* journal as well as the special volumes from overseas for their \$75.

### Address Changes

Members are reminded to send any changes of address to me at the following address :

JB ROSS  
IAH Treasurer Fax (02) 8915884  
c/- Hydrogeology Unit  
Dept. of Water Resources  
PO Box 3720  
PARRAMATTA, NSW, 2124

### Member's Addresses

The full list of members hasn't been published for 12 months, so here are our 289 members on a State by State basis as at the 7th November 1993.

NEW SOUTH WALES

SURNAME	TITLE COMPANY	ADDRESS	TOWN/SUBURB	STATE
ACMORTH	DR R I UNIVERSITY OF NSW	KING ST	MARLY VALE	NSW 2193
ALAR	DR SMH	679 UNSIED CRESCENT	HILLSDALE	NSW 2036
BENJON	MR SG KIMMILL HYFICAL & EDDY	PO BOX 78	RAILWAY SQUARE	NSW 2000
BERNHARD	MR ZZ DEPT OF WATER RESOURCES NSW	PO BOX 3720	PARRAMATTA	NSW 2124
BISH	MS S DEPT OF WATER RESOURCES NSW	9 LYON AVE	TURRAGURRA	NSW 2074
BUGODA	MR KR DEPT OF WATER RESOURCES NSW	PO BOX 705	DEWIL EQUIVA	NSW 2710
BRADD	MR JM ANSTO	48 WALLER ST	MORTDALE	NSW 2223
BROUGHTON	MS AK DEPT OF WATER RESOURCES NSW	PO BOX 546	BLONDI DAH	NSW 2380
BULMAN	MS I ADI - IOB	LOCKED BAG 80	LIDCOMBE	NSW 2141
LALVERT	MR CH UNI OF NSW - WATER RESEARCH LAB	KING ST	MARLY VALE	NSW 2093
CARRICHAEL	HI I CAMP SCOTT AND FURPHY	PO BOX 201	CHATSWOOD	NSW 2068
LARDSONE	DR F AGC - WOODWARD CLYDE P/L	11/19 GOUCHAP RD	CHATSWOOD	NSW 2067
CARR	DR NS LAWSON & IRELAND PIV LTD	PO BOX 799	NORTH SYDNEY	NSW 2060
CASBY	MR BA TR - SITU AUSTRALIA P/L	GPU BOX 1630	SYDNEY	NSW 2041
COULIN	MR D DEPT OF WATER RESOURCES NSW	1 WATILE CRESCENT	MOREE	NSW 2400
DALL	MR M J GROUNDWATER TECHNOLOGY P/L	35 PEIMORE ST	ROHILL	NSW 2039
DAMKINS	MR AP ENVIRONMENTAL & EARTH SCIENCES	21 MARRICK ST	SPAINMORE	NSW 2048
DUDGLOM	MR BA AGC WOODWARD - CLYDE P/L	273 ALFRED ST NTH	NORTH SYDNEY	NSW 2060
DUNDOON	MR P AGC - WOODWARD CLYDE P/L	486-494 PACIFIC HWY LVL 6	ST LEONARDS	NSW 2065
ELLIOTT	MR JM LUMEC PIV LTD	66 GIPPS ST	BALMAIN	NSW 2041
GATTS	MR G DEPT OF WATER RESOURCES NSW	PO BOX 3170	PARRAMATTA	NSW 2124
GIBSON	DR DV ANSTO	PRIVATE BAG 1	MEHAI	NSW 2234
HARWOOD	MR RC GROUNDWATER TECHNOLOGY P/L	17 FORRESTER RD	KINGSGRUVE	NSW 2706
HATLEY	MR RK AGC - WOODWARD CLYDE P/L	486 PACIFIC HIGHWAY LEVEL 6	ST LEONARDS	NSW 2065
HITCHCOCK	MR PW DJ DOUGLAS AND PARTNERS P/L	1 NATIONAL PARK ST	NEWCASTLE WEST	NSW 2302
HINDI	MR H	777 UMARA ST	NEWCASTLE WEST	NSW 2194
JEWELL	MR CH CH JEWELL AND ASSOCIATES P/L	4 PANDORRA CRESCENT	NEWMORTH FALLS	NSW 2182
JINAN	DR JS DEPT OF WATER RESOURCES NSW	8 TALBOT ST	BULLIOFORD	NSW 2161
KIDD	MR C AGC - WOODWARD CLYDE P/L	486 PACIFIC HWY LEVEL 6	ST LEONARDS	NSW 2065
KNIGHT	DR MJ NATIONAL CENTRE GW MANAGEMENT	54 WATILE ROAD	JANMILL	NSW 2226
KONTOS	MR MA COFFEYS	12 WATERLOO RD	NORTH SYDNEY	NSW 2113
LANSLOW	MR SJ DEPT OF WATER RESOURCES NSW	PO BOX 156	LILTON	NSW 2705
LE	MR VI ADI	6RD FLOOR 77 PARRAMATTA RD	SILVERWATER	NSW 2161
LYTTON	MS LN DEPT OF WATER RESOURCES NSW	12 TURRANA AVE	LOGGIE	NSW 2034
MACRIE	MR CD MACRIE MARTIN AND ASSOCIATES	14 EDGEMORTH DAVID AVE	HORNBY	NSW 2077
MERRICK	MR N NATIONAL CENTRE GW MANAGEMENT	UNIVERSITY OF TECHNOLOGY	BOX 123 BROADWAY	NSW 2007
MILNE-MORE	DR M NATIONAL CENTRE GW MANAGEMENT	UNIVERSITY OF TECHNOLOGY	NORTH SYDNEY	NSW 2060
MULVEY	MR PJ ENVIRONMENTAL & EARTH SCIENCES	PO BOX 380	BOX 123 BROADWAY	NSW 2007
McLAUGHLIN	DR R NATIONAL CENTRE GW MANAGEMENT	UNIVERSITY OF TECHNOLOGY	NORTH SYDNEY	NSW 2059
O'MILL	MR RM ENVIRONMENTAL & EARTH SCIENCES	PO BOX 380	NORTH SYDNEY	NSW 2059
PANTALIS	DR G ANSTO	PRIVATE MAIL BAG 1	MYNAT	NSW 2214
PHILLIPS	MR SS	4 POPULAR PLACE	STRAMBLE	NSW 2232
PRATT	MR M DAMES AND MOORE	4 MORRILL AVE	RIVERLY HILLS	NSW 2709
PUNALOVICH	MR AA MACRIE MARTIN AND ASSOC	21/14 EDGEMORTH DAVID AVE	HORNBY	NSW 2077
RITCHIE	DR ATR ANSTO	22 BORDIA PDE	ELGARUO	NSW 2210
RIVIRA	MR WC GW TECHNOLOGY	17 FORRESTER RD	KINGSGRUVE	NSW 2708
ROBERTS	MR P DEPT OF WATER RESOURCES NSW	6 HARRINA CRESCENT	MORLE	NSW 2400
ROSS	MR JB DEPT OF WATER RESOURCES NSW	17A ROPER LINES	SIVANTIA WATERS	NSW 2274
SCOTT	MR D MACRIE MARTIN AND ASSOCIATES	14 EDGEMORTH DAVID AVE	HORNBY	NSW 2077
SUNARATNE	MR NR DEPT OF WATER RESOURCES NSW	PO BOX 1170	PARRAMATTA	NSW 2124
SULLIVAN	MR HK GOLDER ASSOCIATES PIV LTD	661A CUPPLAND RD	EAST BERRIGILL	NSW 2119

## NEW SOUTH WALES

SURNAME	TITLE	COMPANY	ADDRESS	TOWN/SUBURB	STATE
VAN EIJNDEN	MR C		27 ROSIBERY ST	MOSMAN	NSW 2088
WARR	MRS ST	DEPT OF WATER RESOURCES NSW	PO BOX 297	MUSWELLBROOK	NSW 2333
WILLIAMS	DR GR	DEPT CIVIL ENG AND SURVEY	UNI OF NEWCASTLE	CALLAHAN	NSW 2308
WILLIAMS	MR RM	DEPT OF WATER RESOURCES NSW	PO BOX 3720	PARRAMATTA	NSW 2124
WILLIAMS/IN	MR MH		6 HIGHS AVE	EMINGTON	NSW 2115
WINDRIDGE	MR DJ	MAKIE MARTIN AND ASSOC P/L	75 LYONSIDE AVENUE	WILLUGHBY	NSW 2068
WINDLEY	MR DR	DEPT OF WATER RESOURCES NSW	3 BARMON AVE	TURRAMURRA	NSW 2074
YU	MR I	PHD STUDENT UNSW	DEPT APPLIED GEOLOGY UNSW	PO BOX 1 PARRINGTON	NSW 2033

## QUEENSLAND

SURNAME	TITLE	COMPANY	ADDRESS	TOWN/SUBURB	STATE
BATCHLOR	DR DAF	COFFEYS	65 BLUE GRASS CRESCENT	EIGHT MILE PLAINS	QLD 4169
BEHIND	MR KA	QLD WATER RESOURCES COMMISSION	4 MOORANA RD	THE GAP	QLD 4061
BIRCH	MR I	COFFEY & PINRS INTERNATIONAL P/L	PO BOX 4011	EIGHT MILE PLAINS	QLD 4113
BRUCE	MR I		152 WARRIEMOOD ST	EMERALD	QLD 4155
CALLOW	MR IP		39 TAIT STREET	TEWANTEE	QLD 4565
CHEE	DR ME	SCHOOL OF GEOLOGY - UQT	6PO BOX 2434	BRISBANE	QLD 4001
CHEE	MR R	QLD WATER RESOURCES COMMISSION	4 WELAND ST	THE GAP	QLD 4061
CHAMBERLAIN	MR B	GNRL	PO BOX 910	BURKHEAD RG	QLD 4670
CHILDS	MR R I	QLD WATER RESOURCES COMMISSION	PO BOX 316	MOOROOKA	QLD 4105
CLARK	MR PA	QLD WATER RESOURCES COMMISSION	42 LINCOLN GREEN DRIVE	FORESTDALE	QLD 4118
CLARK	MR BD	GEOLOGY DEPT, QLD UNI OF TECH.	6PO BOX 2434	BRISBANE	QLD 4001
CLARK	MR YK	HOLLINGSWORTH DAMS & MOORE P/L	11 ORIENTALS CRESCENT	CARINDALE	QLD 4152
CLARK	MR JR	GROUNDWATER RESOURCE COMS	136 SEVENTEEN MILE ROCKSWD	OXLEY	QLD 4075
CLARK	MR B I	QLD WATER RESOURCES COMMISSION	11 TATOOMA CRESCENT	TORNOMONBA	QLD 4250
CLARK	MR LJ	DJ DOUGLAS AND PARTNERS P/L	27 JEAYS ST	BORLEN HILLS	QLD 4006
CLARK	MR ID	AGC - WOODWARD CLYDE P/L	6 DUALTROUGH ST	BURANDA	QLD 4102
CLARK	MR JD	AGC - WOODWARD CLYDE P/L	6 DUALTROUGH STREET	BURANDA	QLD 4102
CLARK	MR J	MAKIE MARTIN & ASSOCIATES	34 ALTON TEE	THE GAP	QLD 4061
CLARK	MR JR	QLD WATER RESOURCES COMMISSION	38 LYHAM ST	INDOODROOPILLY	QLD 4068
CLARK	MR AM	GNRL	47 BARRYMOUNT CRESCENT	TOONDOOMBA	QLD 4750
CLARK	MR WJ	QLD WATER RESOURCES COMMISSION	6PO BOX 2454	BRISBANE	QLD 4001
CLARK	MR DM	AGC - WOODWARD CLYDE	35 LOOLGARDIE ST	SUNNYBANK HILLS	QLD 4109
CLARK	MR C	AGC LAYING AND ASSOC	3319 MCGILL RD	BELLBOURIE	QLD 4070
CLARK	MR RW	QLD WATER RESOURCES COMMISSION	6 PETERS ST	WARREROO	QLD 4880
CLARK	MR I		7 TWELFTH A AVE	WANE HILL	QLD 4806
CLARK	MR J		26 EDWARD ST	WHL. ROCKHAMPTON	QLD 4701
CLARK	DR DA	DEPT OF CIVIL ENGINEERING	UNIVERSITY OF QUEENSLAND	BRISBANE	QLD 4072
CLARK	MR EG		6PO BOX 2514	BRISBANE	QLD 4001
CLARK	MR P		51 MADINE ST	GRACEVILLE	QLD 4075
CLARK	MR B	QLD WATER RESOURCES COMMISSION	168 FLOODING ST	EVERTON PARK	QLD 4053
CLARK	DR MA	QLD WATER RESOURCES COMMISSION	6PO BOX 2454	BRISBANE	QLD 4001
CLARK	MR JA	GROUNDWATER TECH AUSTR P/L	5/31 THOMPSON ST	POWEN HILLS	QLD 4096
CLARK	MR M	DAMS AND MOORI	FAHIE ROAD	TIARO	QLD 4630
CLARK	MR PE	WASTE SOLUTIONS AUSTR P/L	12 LINMAYRD ST	ASHGROVE	QLD 4060
CLARK	MR B	HOLLINGSWORTH DAMS & MOORE	33 PILASSO ST	LARINA	QLD 4152
CLARK	MR IN		24 VIPS PD	WHITESIDE	QLD 4513
CLARK	MR WD	WINDHILL CAMERON McNAMARA	7 CARAMATHA ST	EVERTON PARK	QLD 4053

# VICTORIA

SURNAME	TITLE	COMPANY	ADDRESS	TOWN/SUBURB	STATE
ABO	DR F		16 WARRONGA CRES	GREENSBOROUGH	VIC 3188
ANDERSON	MR RB	COFFEYS	13 NAVAL ST	HAMPTON	VIC 3188
BARTLEY	MR JB	DEPT OF WATER RESOURCES	17 DAILY ST	CLIFTON HILL	VIC 3068
BASBOK	MR C		4 THOMAS COURT	HAMPTON PARK	VIC 3176
BLAKE	MR R	R BLAKE AND ASSOCIATES	671 STATION ST	NORTH CARLTON	VIC 3054
BOLGER	MR PF	RURAL WATER CORPORATION	590 ORRONG RD	ARNADALE	VIC 3143
BRAWLEY	MR JM	RURAL WATER CORPORATION	590 ORRONG RD	ARNADALE	VIC 3143
BUNNIE	MR AJ	RURAL WATER CORPORATION	590 ORRONG RD	ARNADALE	VIC 3143
BRUNLEY	MR J		49 LORAIN ST	TERPLESTONE	VIC 3106
LALAZI	MR P		38 PHILLIPSON ST	ALBERT PARK	VIC 3146
CARAPINA	MS SM	AO1 - 100	PO BOX 22	NIGHTINGALE CITY	VIC 3037
LULLMAN	MR D		14 OXFORD CLOSE	CRUICKSON HILLS	VIC 3136
BAHLMANS	MR PG	GEOLOGY DEPT BALLARAT UNIT	PO BOX 663	BALLARAT	VIC 3153
DAY	MR C	DEPT OF CONSERVATION & ENVIRON	PO BOX 401	BENDIGO	VIC 3550
DEWEY	MR AC	DAMES AND MOORE	25 BUCKINGHAM ST	SOUTH MELBOURNE	VIC 3145
DIMES	MISS A	PMC	590 ORRONG RD	ARNADALE	VIC 3143
DODDING	MR M	RURAL WATER CORPORATION	590 ORRONG RD	ARNADALE	VIC 3143
EASTON	MR MN	PETER HANSEY & ASSOC P/L	222 KINGSWAY	SOUTH MELBOURNE	VIC 3205
FLOER	MR GM	DEPT OF WATER RESOURCES	1735 SPRING STREET	MELBOURNE	VIC 3000
EVANS	DR R	RURAL WATER CORPORATION	5 PLEASANT AVE	KEM	VIC 3161
FOTHERGILL	MR AJ	DAMES AND MOORE	25 BUCKINGHAM ST	STH MELBOURNE	VIC 3205
GURA	MR SM		28/19 MARINE PARADE	ST KILDA	VIC 3182
HADNEN	MR JP		5/34 WOODWARD AVE	GLENMOUNTLY	VIC 3163
HAMLOCK	MR S	AGC - WOODWARD CLYDE P/L	90 CLAPHAM AVE	HALVERSTON	VIC 3144
HARRISON	MR AA	RURAL WATER CORPORATION	590 ORRONG RD	ARNADALE	VIC 3143
HODLEY	MR GP	RURAL WATER CORPORATION	17 HILARY CLOSE	MO EVELYN	VIC 3196
IFE	MR D	AGC - WOODWARD CLYDE	40 VICTORIA RD	EAST HAMMORN	VIC 3123
INEFFEN	MRS PJ	GROUNDWATER TECHNOLOGY P/L	3756 SUTHERLAND RD	ARNADALE	VIC 3143
INGRAM	MR T	RURAL WATER CORPORATION	11 GREEN ST	EAST RINGWOOD	VIC 3125
JUYCE	MR EB	DEPT. OF GEOLOGY	UNIV. MELBOURNE	PARKVILLE	VIC 3052
KATOPODIS	MR T	DAMES AND MOORE	25 BUCKINGHAM ST	STH MELBOURNE	VIC 3205
KAVIN	MS P	DEPT OF CONSERVATION & ENVIRON	PO BOX 401	BENDIGO	VIC 3550
KAVEY	MR DC		32 BLAIR ST	COBURG	VIC 3058
LANE	MR AP	DJ DOUGLAS AND PARTNERS	31 COLMORNE ST	RICHMOND	VIC 3121
LAWRENCE	DR CR	SCHOOL OF EARTH SCIENCES	UNIVERSITY OF MELBOURNE	PARKVILLE	VIC 3052
MALMUEHLER	DR P	DEPT OF WATER RESOURCES	20 HANFORD AVE	HEATHAM	VIC 3142
MALLOY	MR D P	DAMES AND MOORE	14 AUSTRAL AVE	BRUNSWICK	VIC 3056
MELLIKA	MR F J	GHD	280 LINDSAY ST	MELBOURNE	VIC 3000
MURRAY	MR CV		78 LEWISHAM RD	PRAHRAN	VIC 3188
MULLEN	MR JB	GHD	9 BELFORD AVE	FLEMINGTON	VIC 3102
MOTI	MR R B	RURAL WATER CORPORATION	13710 HIGHWAY GROVE	PRAHRAN	VIC 3180
MURPHY	MR AA	CHPS & P	390 ST KILDA RD	SOUTH MELBOURNE	VIC 3004
O'DRISCOLL	MS ME	RURAL WATER CORPORATION	590 ORRONG RD	ARNADALE	VIC 3143
O'DRISCOLL	MR W		36 LUMMING ST	BURBANK	VIC 3125
OLSON	MR A	RURAL WATER CORPORATION	23 HIGHGATE GROVE	ASHBURTON	VIC 3147
OLSHINA	MR A	GEOLOGICAL SURVEY OF VICTORIA	1 DERMID ST	SOUTH DARTMOUTH	VIC 3167
PAGE	MR SJ	EARTHQUAKES	17 - PO CUMMARR MATRA RD	CUMMARR	VIC 3057
PELLIFER	MR G	DEPT. OF IND. TECH. & RES.	PO BOX 173	EAST MELBOURNE	VIC 3002
PULLIS	MR IM	RURAL WATER CORPORATION	590 ORRONG RD	ARNADALE	VIC 3143
REED	MR R	RURAL WATER CORPORATION	PO BOX 165	TATURA	VIC 3146
ROBINSON	MR PJ		PO BOX 170	LAMINGTON	VIC 3147

## VICTORIA

SURNAME	TITLE	COMPANY	ADDRESS	TOWN/SUBURB	STATE
ROBINSON	MR MA	RURAL WATER CORPORATION	75 DAFFODIL RD	ROBONIA	VIC 3155
RYAN	MS S	DEPT OF CONSERVATION & ENVIRON	PO BOX 401	BRUNNED	VIC 3550
SCHAEFFER	MR I	610 KING ALFRED P/L	PO BOX 42	MORWELL	VIC 3840
SHOEN	MR RD	MPA WILLIAMS & ASSOC P/L	533 MURFORD HWY	BONMFACE	VIC 3196
SHOEBRIDGE	MS LC	MAINHILL PLY LTD	17171 HOWARD ST	NTH MELBOURNE	VIC 3051
SHOEB	MR A	DEPT OF WATER RESOURCES	15 PAVE RD	NIDDIET PARK	VIC 3206
STEWART	MR G		22 MADON ST	BALWYN NORTH	VIC 3104
STRONWICK	MR D	DEPT OF CONSERVATION & ENVIRON	PO BOX 401	BENDIGO	VIC 3550
THURNE	MR R		34 SIMS ST	SANDRINGHAM	VIC 3191
WALKER	MR G		PO BOX 56	KOH MEE RUP	VIC 3901
WEAVER	MS TR	GOLDER ASSOCIATES	25 BURWOOD RD	HAWTHORN	VIC 3122
WILLIAMS	DR RJ	DEPT COMS AND NAT RESOURCES	15 PENDER ST	TRARALGON	VIC 3071
YIHNS	MR N	ENVIRONMENTAL PROTECTION AUTH.	779 CROMWELL RD	SOUTH YARRA	VIC 3141

## SOUTH AUSTRALIA

SURNAME	TITLE	COMPANY	ADDRESS	TOWN/SUBURB	STATE
ADAM	MR RG	SADMT	24 MARTIN AVE	MASHAMS BEACH	SA 5170
ARMSTRONG	MR D	SADMT	77 HAWTHORNE GENE DR	GENALTA	SA 5052
BARRETT	MR SR	SADMT	PO BOX 151	EASTWOOD	SA 5063
BIMBYR	MR DG	SANTOS LTD - EXPLORATION/DEVEL	101 GREENFELL ST	ADELAIDE	SA 5000
COPO	MR M	WATER SEARCH	PO BOX 191	ANGASTON	SA 5353
LOT	DR J	LRC - SOIL AND LAND MANAGEMENT	13 KOORANGERA ST	MALLETT COVE	SA 5150
DILLON	DR P	CENTRE FOR GROUNDWATER STUDIES	PRIVATE BAG 2	GLEN OSWORN	SA 5064
EVANS	MR SI	ENG & WATER SUPPLY DEPT	PO BOX 693	PORT LINCOLN	SA 5606
EVVE	MR AJ	SADMT	PO BOX 151	EASTWOOD	SA 5063
PENNER	MR MA	ENG AND WATER SUPPLY DEPT SA	68 VESTRAL WAY	HOBBSBY HEIGHTS	SA 5092
SMITH	MR PC	SADMT	PO BOX 151	EASTWOOD	SA 5063
STADTER	MR MH	SADMT	PO BOX 93	WARALDOOTE	SA 5271

## NORTHERN TERRITORY

SURNAME	TITLE	COMPANY	ADDRESS	TOWN/SUBURB	STATE
BANDEN	MR J		PO BOX 1184	MULLUMBUJ	NT 0881
BAPP	MS D	POWER AND WATER AUTHORITY	PO BOX 1096	DARWIN	NT 0801
MARTIN	MR PD	POWER AND WATER AUTHORITY	PO BOX 1096	DARWIN	NT 0801
MILMINDALD	MR P	POWER AND WATER AUTHORITY	PO BOX 1521	ALICE SPRINGS	NT 0871
PIDSLLEY	MR B	POWER AND WATER AUTHORITY	PO BOX 733	MOMAR SPRINGS	NT 0835
GURLESHI	MR M		25 MULAGI TRLS	SANDERSON	NT 0812
ROBSON	MR PA	POWER AND WATER AUTHORITY	9 KINGSTON PLACE	RAPID CR DARWIN	NT 0810
SANDERS	MR BA	POWER AND WATER AUTHORITY	PO BOX 1096	DARWIN	NT 0801
SCHMARTZ	MR T	POWER AND WATER AUTHORITY	10/304 CASUARINA DRIVE	DARWIN	NT 0810
SMITH	MR DL	PAMA	PO BOX 42355	CASUARINA	NT 0811
TICKELL	MR S		PO BOX 2374	DARWIN	NT 0801
TYSON	MS PL	POWER AND WATER AUTHORITY	PO BOX 37756	WINNIELLE	NT 0821
VERNA	MR M		14 MANDIE CREES ANULA	SANDERSON DARWIN	NT 0812
WISLAUSEN	MR JD		PO BOX 6740	ALICE SPRINGS	NT 0871
YIM FOU	MR D	POWER AND WATER AUTHORITY	PO BOX 7231	DARWIN	NT 0801
ZARR	MS U	POWER AND WATER AUTHORITY	15 ELEMATIS ST	NIGHTCLIFF	NT 0810

## AUSTRALIAN CAPITAL TERRITORY

SURNAME	TITLE	COMPANY	ADDRESS	TOWN/SUBURB	STATE
BAULD	DR J	AGSO	PO BOX 378	CANBERRA	ACT 2601
BRODIE	MR R	AGSO	PO BOX 378	CANBERRA	ACT 2601
MARINHEM	DR MA	AGSO	6PO BOX 378	CANBERRA	ACT 2601
JALUBSON	MR G	AGSO	6PO BOX 378	CANBERRA	ACT 2601
LAU	MRS JE GE & JE LAU & ASSOCIATES		51 INVESTIGATOR ST	RED HILL	ACT 2603
LIBRARIAN	THE	BUREAU OF MINERAL RESOURCES	6PO BOX 378	CANBERRA	ACT 2601
PLEASE	MS P M	AGSO	PO BOX 378	CANBERRA	ACT 2601



# WESTERN AUSTRALIA

SURNAME	TITLE	COMPANY	ADDRESS	TOWN/SUBURB	STATE
ALLEN	DR AD	GEOLOGICAL SURVEY OF WA	100 PLAIN ST	PERTH	WA 6004
APPIFYARD	DR SJ	GEOLOGICAL SURVEY OF WA	9 ALBERT ST	NOSMAN PARK	WA 6012
BADDOLEY	MR I	GEOLOGICAL SURVEY OF WA	100 PLAIN ST	PERTH	WA 6004
BARRIE	DR C	ESTRO	17 ALPINE RD	DARLINGTON	WA 6070
BARRETT	MR JC	DAMES AND MOORE	4 BIRD RD	KALAMUNDA	WA 6076
BERRY	MR KA	WESTERN MINING CORPORATION	PO BOX 91	BEILMONT	WA 6104
BEST	MR PJ	PLANNING DEPT	BHP IRON ORE	NEWMAN	WA 6753
BUTTON	MR G	PERKINWATER PTY LTD	10 PEPPIE BLACK EDGE	CONNOLLY	WA 6027
BURMAN	MR JC		PO BOX 206	ALBANY	WA 6330
BYRD	MR DW	WATER AUTHORITY OF WA	2720 SEASIDE GARDENS	MULLALOO	WA 6027
BUYES	MR B	AGC - WOODWARD CLYDE	8730 ALBANY HIGHWAY	VIC PARK	WA 6100
RHINIER	MR I	DAMES AND MOORE	11 IMPEN CRT	LEEMING	WA 6155
CHANDLER	MR M	DAMES AND MOORE	85 IVE ESPLANADE	SOUTH PERTH	WA 6151
CLARK	MR G	MINMONT	38 TALBOT DVE	KINGSLEY	WA 6026
COCK	MR PL		79 MARY ST	COMO	WA 6152
COLMAN	MR R	R COLMAN AND ASSOCIATES	209 CRAWFORD RD	INGLWOOD	WA 6052
COMPTON	MR DP	GEOLOGICAL SURVEY OF WA	100 PLAIN ST	PERTH	WA 6004
DAVIDSON	MR WA	GEOLOGICAL SURVEY OF WA	100 PLAIN ST	PERTH	WA 6004
DAVIES	DR JR	JIM DAVIES & ASSOCIATES	PO BOX 117	SUBIACO	WA 6008
DAVIS	DR GB	ESTRO DIV OF WATER RESOURCES	PRIVATE BAG	PO MEMLEY	WA 6014
DE ROSARIO	MR PC	RESOURCE INVESTIGATIONS	78 HENRY ST	EAST CAMBRINGTON	WA 6107
DEWHARTY	MR GC	PERKINWATER PTY LTD	64 TATE ST	WEST LEEDERVILLE	WA 6007
DOYLE	MR SJ	KH MORGAN AND ASSOCIATES	34 GERDES ST	VICTORIA PARK	WA 6100
GEHRIG	DR R	DEPT OF AGRICULTURE	PO BOX 1231	BURMINY	WA 6230
HARRIS	PROF P		8 DOOMAN RD	MEDLANDS	WA 6009
HASEL GROVE	MR K	ALEDA OF AUSTRALIA PTY LTD	17 CLEMENTS RD	BODRAGONG	WA 6154
HARRIS	MR GE		679 VICTORIA ST	NOSMAN PARK	WA 6012
HEAPNE	MR EJM	DOMINION MINING	10 RICHARDSON RD	WEST PERTH	WA 6015
HIRSCHBERG	DR K	GEOLOGICAL SURVEY OF WA	100 PLAIN ST	PERTH	WA 6004
HOMES	MR DW	DAMES AND MOORE	85 IVE ESPLANADE	SOUTH PERTH	WA 6151
HINE	MR P	AGC - WOODWARD CLYDE P/L	300 ALBANY HIGHWAY	VICTORIA PARK	WA 6100
KEPH	MR AH	GEOLOGICAL SURVEY OF WA	74 FLEMING ST	BARRINYUP	WA 6018
KUCHAKPOUR	DR A		73 AITKEN DRIVE	WINTHROP	WA 6150
LAMS	MR AT	GEOLOGICAL SURVEY OF WA	8 HILMONG WAY	KINGSLEY	WA 6026
LEECH	MR SJ	PANCONTINENTAL MINING P/L	PO BOX 1161	KALGOORLIE	WA 6430
LEWIS	MS H	DEPT OF AGRICULTURE WA	YORK RD	MURTHA	WA 6401
MARTIN	MR MW	GEOLOGICAL SURVEY OF WA	100 PLAIN ST	EAST PERTH	WA 6004
MARTIN	DR RE	MARLEE MARTIN - PPK	PO BOX 654	MEDLANDS	WA 6009
MATTHEW	MR TM		RRB 571	KOONARP	WA 6295
MEYER	MR GN	WESTERN MINING CORPORATION LTD	PO BOX 91	BEILMONT	WA 6104
MONCRIEFF	MR JS		36 SANSON ST	WHITE GUM VALLEY	WA 6162
MOUPE	MR RR	SELF-EMPLOYED	43 WESVIVEN ST	BARRINYUP	WA 6018
MORGAN	MR KH	K H MORGAN & ASSOCIATES	1074 QUEEN ST	BENTLEY	WA 6102
McAVAN	MR J	WATER AUTHORITY OF WA	24 LILGRAVE WAY	DUMPLING	WA 6023
McGOWAN	MR RJ	DAMES AND MOORE	474 GARDNER ST	COMO	WA 6152
McINTOSH	MR U	ALEDA OF AUSTRALIA LTD	PO BOX 252	APPLECROSS	WA 6153
McNAMARA	MS JM	AGC - WOODWARD CLYDE P/L	300 ALBANY HIGHWAY	VICTORIA PARK	WA 6100
McNULTY	DR AJ	MARLEE MARTIN - PPK	PO BOX 654	WEST PERTH	WA 6009
McSAL	MR V	GEOLOGICAL SURVEY OF WA	33 1000 AVENUE	COMO	WA 6152
MISEN	MR ET	PERKINWATER TECHNOLOGY P/L	3 TRAFAL RD	OSHWINE PARK	WA 6017
MITO	DR C	ESTRO	PRIVATE BAG PO	MEMLEY	WA 6014

**WESTERN AUSTRALIA**

SURNAME	TITLE	COMPANY	ADDRESS	TOWN/SUBURB	STATE
PANASTENICZ	MR R		94/99 KERDSMAN PARADE	NEWBLEY	WA 6014
PASSMORE	DR JR	ROUFWATER PTY LTD	94 ROUFLEY RD	SUBIACO	WA 6104
PECK	DR A	A PECK AND ASSOCIATES	PO BOX 1213	SUBIACO	WA 6100
PLATISED	MR GR		10 MONTELEY COURT	YARDINIA	WA 6163
FRANSLEY	MR CJA		13/57 MORAN ST	BYACONSFIELD	WA 6162
PTHUR	DR AD	CURTIN UNIVERSITY WA	PO BOX 11987	PERTH	WA 6001
RAYNER	MR JL	CSIRO	PRIVATE BAG	PO NEWBLEY	WA 6014
RICHARDS	MR GN		PO BOX 295	MOBLEY	WA 6067
RINA	MR N	SOLARVAN PTY LTD	25 PURDUM RD	NEWBLEY COMMONS	WA 6017
SALAMA	DR B	CSIRO	PRIVATE BAG	GPO NEWBLEY	WA 6014
SANDERS	MR CC	EPA WA	28 PORTLAND ST	NEWLANDS	WA 6007
SMIRK	MR BD		66 ZENOBIA ST	PALMYRA	WA 6157
SMITH	MR RA	GEOLOGICAL SURVEY OF WA	193 KITCHENER RD	ROORAGOON	WA 6154
STREET	MR GJ	WORLD GEOSCIENCE CORPORATION	17 EMERALD TERRACE	WEST PERTH	WA 6005
THORPE	DR PH	GEOLOGICAL SURVEY OF WA	17 MUMFRESTON RD	KALAMUNDA	WA 6076
THROSBELL	MR JS	GROUNDWATER TECHNOLOGY P/L	3 TEARLE RD	OSBORNE PARK	WA 6017
TOMBLEY	DR LR	CSIRO DIV OF WATER RESOURCES	PRIVATE BAG	PO NEWBLEY	WA 6014
VENTRIS	MR NP	WATER AUTHORITY OF WA	21 LODGRAVE WAY	BUNEBERG	WA 6023
VOGUELL	MR RI	DAMES AND MOORE	85 THE ESPLANADE	SOUTH PERTH	WA 6151
WALLIS	MR DP	ROUFWATER P/L	8796 TYLER ST	JORDANBA	WA 6060
WATERHOUSE	MR J	AGC - WOODWARD ELYDE P/L	300 ALBANY HIGHWAY	VICTORIA PARK	WA 6100
WHEATON	MR PH	ROUFWATER PTY LTD	94 ROUFLEY RD	SUBIACO	WA 6100
WILLIAMSON	MR DR	CSIRO	PRIVATE BAG	PO NEWBLEY	WA 6014
WILSON	MR VC	CURTIN UNIVERSITY	45 PORTCULLIS DR	MILLETON	WA 6155

**OVERSEAS**

SURNAME	TITLE	COMPANY	ADDRESS	TOWN/SUBURB	STATE
BROWN	MR LJ	INST GEOLOGICAL & NUCLEAR SCI	PO BOX 30768	LOWER HUTT	NEW ZEALAND
CORPUS	MRS MA		182-d IRIGA ST	LA LOMA, GUYTON	NEVADA
HELM	DR DC	NEVADA BUR OF MINES & GEOLOGY	ONE NEVADA 4505 MARYLAND	LAS VEGAS NV89154	NEVADA
LEE	MR IR	MINISTRY OF WATER RESOURCES	PO BOX 2575	RUMI 117	OMAN
MIDDLETONS	MR H	WATER MANAGEMENT CONSULT. UN	273 WYLL COP	SHRIMSBURY UK	SVT 101
MANDAN	MR N		27 VUNA RD	SAMAHULA 3 MALLES	SUVA
O'BOY	MR CA	C/- MINISTRY OF WATER RESOURCES	PO BOX 1067	SALALAH 211	OMAN
PAUL	MR RJ	C/- WS ALPINS INTERNATIONAL LTD	PO BOX 5485	RUMI	OMAN
PROMSE	MR G	C/- AUSCON	PO BOX 5977	RUMI	OMAN
READ	MR R	MINISTRY OF WATER RESOURCES	PO BOX 16427	AL MIRAMI	OMAN
ROBERTSON	MR N	MINISTRY OF WATER RESOURCES	PO BOX 19067	SALALAH	OMAN
SALAS	MR B	C/- GEOLOGICAL SURVEY	PRIVATE MAIL BAG 14	HOFAI'S	FIJI
WHINCUP	MR P	DAMES AND MOORE	15 17 CHURCH ST	WELLINGTON UN	NEW ZEALAND

## **IAH Council matters**

I was recently elected to the Council of IAH, and I have a general concern to increase Australian representation in the various international commissions and working groups of the Association which has been very Eurocentric in the past. I believe that we have a lot to offer scientifically, and that more international contact is good for us and will have a spinoff in an increased number of technical co-operation projects and business for Australian firms.

At the recent conference on 'Africa needs Groundwater' in Johannesburg, delegates from about 15 African countries formed an African Association of Hydrogeologists, to be affiliated with the IAH. This will be a very useful network, as there is a large amount of groundwater work going on in Africa, and no existing mechanism for scientific and professional contact. I attended the conference while in South Africa doing a short review job for the Water Research Commission. Other Australians there were Lucy Lytton, who has been working on rural water supplies in the black 'homelands' of South Africa, and Gabriel Salas who is working on an AIDAB project in Botswana.

IAH now has a sponsorship scheme whereby members from wealthy countries (like ours) can pay the membership fees for a sponsored hydrogeologist from a less developed country. Many hydrogeologists in the basket-case countries of Africa cant afford the 40 DM membership subscription yet need the professional contact and literature that IAH provides.

The IAH journal - Applied Hydrogeology - is being reorganised, and there is a need for an Australian to be on the Editorial Board. The duties will include spotting likely papers and encouraging authors. Please let me know if you are interested in this.

I discussed with Andrew Skinner, the Secretary-General of IAH, the possibility of initiating a working group on groundwater-related salinisation. This possibility will be discussed at the Council meeting in November 1994. In the meantime please let me know if you might be interested in participating. One suggestion is for a book comprising comparative international case studies, and in this case participation in the working group would mean a commitment to writing a chapter. However the scope of the proposed working group remains to be determined. *Ideas are welcome!*



**Gerry Jacobson**

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# NEW SOUTH WALES

## DEPARTMENT OF WATER RESOURCES (DWR)

The DWR is reviewing an unusual underground storage system for L.P Gas at Botany. The proposal is to utilise groundwater pressure to contain L.P Gas.

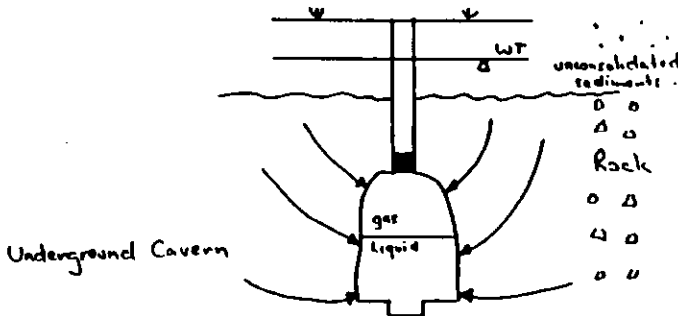
There are approximately 200,000 consumers in NSW who depend on L.P Gas as a reliable fuel source. In 1991 the amount of gas used was 650,000 tonnes and this is projected to rise to 820,000 tonnes by the year 2000.

NSW has no natural supply of L.P Gas and imports the majority of its product from Bass Strait. This source however is in decline and additional bulk storage is required in the Sydney area to handle growing imports.

### Underground Cavern Storage Technology

The proposed Botany facility will utilise unlined purpose built pressurised storage cavern technology. Caverns are constructed in suitable water saturated rock (Triassic Hawkesbury sandstone) between 130 and 150 m below ground surface. The pressure of the water in the surrounding rock is higher than the pressure of the L.P Gas in the cavern due to its depth below the water table. This means that due to the difference in pressure, groundwater will always flow into the caverns, preventing the seepage of gas into the surrounding rock.

Seepage water extracted from the caverns will be treated on the surface and disposed to a firewater pond. Water quality will meet EPA requirements.



The caverns will be located at two sites on Molineux Point, which is reclaimed land on the edge of Botany Bay. The capacity of the Butane and Propane caverns will not exceed 90,000 tonnes.

Each cavern will consist of an operating shaft and a series of parallel galleries that are separated by rock pillars. The shaft will contain venting and seepage water extraction pumps as well as product pumps and filling lines.

## **Construction Method**

Shaft construction is the preferred construction method due to the depth of unconsolidated overburden that overlies bedrock. The shafts will be sunk from the surface using a combination of the slurry trench method in the sediment cover and conventional drill and blast methods in the rock. In the cavern, drill and blast is also seen as the preferred method of construction.

## **CONSULTANTS TALK**

Specialisation in the groundwater industry is starting to occur with firms concentrating on one or more of the following areas;

- Landfill operations
- Petroleum spillages
- Contaminated land studies
- Audit procedures
- Industrial/municipal or mining work

Joint venturing is now common for larger projects and there has been an emergence of 'risk assessment' as a tool for high profile work. Risk assessment can be subdivided into; human health and ecological risk assessment. The assessment given, varies from low budget opinions through to comprehensive risk assessment as defined by the US EPA literature.

There is a general perception that industry is being responsible in their approach to self regulation and cleanup. This is not necessary the case for government enterprises.

More firms are offering groundwater services than ever before. This added competition is having several effects;

- Price is being driven down and there is a reduction in the quality of service.
- Staff with experience are being targeted by head hunters and finding themselves in a very marketable position.
- Several senior people have started up business on there own and contract out their services

## **Groundwater Technology Inc**

Groundwater Technology Inc have been successful in winning the cleanup of the Trial Bay Caltex Terminal site. The work is estimated to cost \$1.8 m and involves two remediation processes.

1. Above ground bioremediation of contaminated soils and

2 Air sparging combined with insitu bioremediation of groundwater, both on site and off site.

### **Mackie Martin - PPK Merger**

PPK Consultants has Strengthened its environmental services group through the recent merger with Mackie Martin and Associates. The merger is a strategic move for PPK to become the premier provider of environmental services in Australia. PPK perceives significant growth through inclusion of MMA capabilities in mining and industrial sectors and specialty areas such as computer modelling for reservoir analyses, contaminant hydrology etc.

Interesting hydrogeological projects currently underway include regional exploration, testing and numerical modelling of the GAB in north western Queensland for potential mine site water supplies. Effort has been directed towards understanding historical pressure changes, development of representative piezometric surfaces and appreciation of the role of regional structure in influencing basinal flows. recharge mechanisms are also being carefully studied.

## IAH NEWSLETTER

### VICTORIAN CONTRIBUTION

#### **1. Victorian Branch Activities**

##### Meetings - 1993

- May 3            State Groundwater Data Base - Rural Water Corporation
- June 1           Current Practices in Contaminated Site Environmental Auditing  
                         - Dr Peter Nadebaum
- June 7           Groundwater Protection Policy in Europe - Dr Guner Schultz-Terfloth
- June 22          Soil and Groundwater Remediation - Joint AWWA and IAH Meeting -  
                         Bronwyn Pagram, John Faulks and Jeff Baselmans
- August 3        Groundwater Contamination by Septic Tanks - Greg Hoxley

#### **2. Committee Activities**

##### **1. Flow Lines**

The Victorian Branch Newsletter - Flow Lines - is already up to Issue No. 5 and is proving to be a great success in keeping Victorian members on top of current activities.

##### **2. IAH National Education Survey**

Fourteen responses to the survey which was sent out in July 93 have been received. These responses are being collated by the National Committee and will be published soon.

##### **3. National Accreditation of Hydrogeologists**

The accreditation paper was sent out in July 93 to National Committee for distribution. No comments have been received yet and it is understood that it has been proposed that this issue be discussed at Water Down Under '94.

### **3. Victorian Water Industry Reforms**

A series of major reforms aimed at improved service and performance of the Victorian water industry have been announced.

Melbourne Water will become a State owned company established under the State Owned Enterprises Act. The Melbourne Water catchment and water collection activities will be separated on an accounting basis through the creation of three regional bodies to establish discrete businesses. Competition by comparison will be generated between the three separate operating supply regions, out of Melbourne Water. They will compete with each other against a cost-based yardstick and a range of performance indicators. Control of Melbourne Water's supply headworks (water storage and harvesting and the associated major infrastructure) will be separated out from the rest of Melbourne Water.

The five regions of the Rural Water Corporation will become separate autonomous authorities which wholesale water in country Victoria and will be required to compete with each other against a series of performance benchmarks. The development of customer groups to take over operations of irrigation districts will be encouraged.

The 120 non-metropolitan water authorities will be encouraged to join together to form authorities with sufficient scale to compete effectively in a less regulated, more effective market.

A priority will be to establish a Special Task force on the finalisation of the Bulk Water entitlement allocation process. This will lead to the establishment of water trading and entitlement holders will have an ability to realise their entitlement either on a temporary or a permanent basis.

Currently, groundwater policy is under the Department of Conservation and National Resources while groundwater management is the responsibility of the Rural Water Corporation. The precise implications for groundwater management of the Water Industry Reform process is unknown at this time.

### **4. New Groundwater Charges in Victoria**

A new tariff and set of charges for licensed groundwater users was recently introduced by the Rural Water Corporation. The increase was the beginning of a five year pricing strategy to recover the cost attributable to licence holders for managing groundwater. The RWC aims to recover \$2 million by the 1997/98 financial year and this means that charges will need to double over that period. The new tariff means that the price paid increases according to the amount of licence entitlement. Under this tariff structure most users will pay significantly more than they currently do, but others will not and some will actually pay less. Although a broad range of fees have changed, the annual fee for most licences is \$45 plus \$1 per ML of allocated groundwater. Domestic and stock users do not pay any annual fee.



## **5. The RWC's Statewide Groundwater Database**

The development of Rural Water Corporation's new Groundwater Database was completed in June 1993.

The Groundwater Database (GDB) stores all of Victoria's hydrogeological data and is used by the RWC in its role of investigating and managing Victoria's groundwater resource. The data is also used by other agencies, consultants and the community. The GDB currently holds details relating to over 121,000 bores within Victoria, including over one and a quarter million water levels and 42,000 laboratory analyses.

The RWC is constantly working to enlarge the database, and improve the accuracy and accessibility of data. To achieve this a 'systems' approach has been used which considers methods of data:

- collection
- entry
- storage
- interrogation, and
- reporting

The amalgamation of pre-existing databases has increased the amount of information stored on the GDB. Data is now available for:

- Bore construction details
- Bore locations and elevations
- Groundwater levels
- Pumping tests
- Laboratory and Field chemistry water analyses
- Isotope and Pollution analyses
- Bore extraction volumes
- Geophysical, lithological and stratigraphic logs

CAD produced Bore Location Maps have been produced for the entire state using GDB data. The maps, available at 1:100,000 to 1:5,000 scale, plot bore numbers and bore uses on detailed base plans.

## **6. Some Projects of Interest**

Groundwater staff at Gutteridge, Haskins and Davey have been involved in several waste water reuse studies involving possible wool scouring plants at Hamilton and Melton. In addition they are assisting Triad Minerals in a mine dewatering project aimed at opening up an old gold mine.

D.J. Douglas & Partners Melbourne office have recently undertaken some interesting projects utilising both the geotechnical and environmental staff. These include a study of the coastal

management issues at Olivers Hill Frankston where geomorphology, hydrogeology, surface water hydrology and geotechnical engineering assessments were required. Land contamination assessments for high density residential developments and other land transfers continue to be the bread & butter work while environmental compliance audits provide some flavour. The design of a corrosion resistant 700m deep bore for the Longford oil & gas plants has also kept the team entertained.

## **7. Victorian Education in Hydrogeology**

In Victoria there has been a marked increase in recent years in the teaching of hydrogeology and related environmental science at the Tertiary level. Already hydrogeology is included in the undergraduate coursework in either the Earth Science or Engineering Departments at Royal Melbourne Institute of Technology (RMIT), University of Melbourne, Latrobe University, Monash University, Ballarat University College and the Footscray Institute of Technology.

As an extension to these undergraduate courses a Masters degree by coursework in hydrogeology and related environmental science commenced in Victoria in 1992. This is a joint program offered by the School of Earth Sciences and the Department of Civil and Environmental Engineering of the University of Melbourne and the School of Mining Geology and Materials of Ballarat University College. It has been designed to meet the needs of professionals working in hydrogeology and related areas of environmental science. At this stage 40 full-time and part-time candidates, drawn mainly from Victoria but also from interstate and overseas, are currently enrolled.

The program is led by Dr Charles Lawrence.

The Master's degree consists of coursework (50-67%) and a research project assessed through a minor thesis (33-50%).

Research projects in the Masters Program have funding or collaboration with the Victorian Education Foundation, Rural Water Corporation, Department of Conservation and Natural Resources, Environment Protection Authority, Melbourne Water, CRA Ltd, Western Mining, Shell Ltd, Woodward Clyde Ltd, Pasminco Ltd, the CRC on Catchment Hydrology, the Australian Geological Survey as well as strong links with a number of universities.

The most popular research category is contamination and remediation of soils and aquifers. Nearly 50% of candidates have their research projects in this area. These studies include phosphate contamination of soils at Werribee Treatment Complex, modelling of nitrate movement in a rural setting and modelling contaminant movement at a variety of waste disposal sites. We are also making detailed studies of the movement and attenuation processes for organic and inorganic pollution in the Newer Volcanic aquifer to the west of Melbourne and the interaction of this aquifer with surface streams and Port Phillip Bay.

Genetic probes are also being developed to facilitate the bioremediation of soil and water contaminated by hydrocarbons.

In addition to the research being undertaken in the Masters Program there are now three PhD candidates.

1 December 1993

## IAH Queensland Branch

At the MAY meeting Lindsay Furness (Douglas and Partners) spoke about "Hydrogeology of Tonga". Lindsay spent three years working in Tonga, under the Australian Staffing Assistance Scheme, which puts Australian technical personnel into government positions to increase the technical capabilities of the country. He gave an interesting overview of the work that he was involved in on the 35 inhabited islands of Tonga, and distributed copies of a report that he produced on this work.

At the JULY meeting Dr Bill Clarke (Woodward-Clyde) spoke about "The Leachate Model for Rundle Oil Shale Waste" at Gladstone. Bill was involved with this project for a considerable time. The chemical modelling, although developed for this project, can be adapted to other similar environments where remediation is necessary.

At the AUGUST meeting James Purtill (Senior Environmental Scientist and Manager of Groundwater Technology Pty. Ltd., Northern Territory and Queensland) spoke about "A Case Study of the Removal of Hydrocarbons from an Aquifer"

Groundwater Technology was engaged to investigate a release of unleaded motor spirit at a service station in New South Wales. During the investigation it became apparent that hydrocarbon vapours were accumulating in a stormwater drain some 150 metres from the site. The presentation described the installation and performance of a multiple phase hydrocarbon recovery system at the site.

While the system was installed to abate the accumulation of vapours it was not a comprehensive site remedial system. However, it provided a suitable case study to exhibit current technologies available for removal of hydrocarbons from a contaminated aquifer in separate, dissolved and adsorbed phases.

At the NOVEMBER meeting, Associate Professor David Gust, Head, School of Geology, Queensland University of Technology, presented "Hydrogeology Education in Queensland - What's Needed for the Future?"

This was to be a forum for discussion for IAH members to help shape the future directions of hydrogeological education in Queensland. Should universities be looking to produce undergraduate hydrogeologists, or is hydrogeology a post-graduate activity? Is there a need for training in the industry? If so, on what topics? University responsiveness to industry requires input from industry and government. David's opinions from the perspective of the head of department were presented. Comments from the group indicated a willingness to cooperate with the structuring of appropriate courses and give peripheral support to students.

The election of office bearers was held at the May meeting. The new executive is:-

Chairman	Locon Wall
Vice Chairman	John Hillier
Secretary	Robert Ellis
Treasurer	Robert Ellis
State Liaison Officer	Bruce Pearce
Committee	Lindsay Furness John Harman Colin Laing Malcolm Cox Magdalena Steffens Paul Smith

Recently, Locon Wall was chosen to work in China for two years, and has resigned from his IAH position. John Hillier, Vice Chairman will step into this position until the next election.

Ian Callow (ex-Coffey Partners International) has gone to Waterloo University in Canada for two years to further his hydrogeological studies.

Mawendra Nandan has completed his geological studies at the Queensland University of Technology, and returned to the Hydrogeology Section of the Geological Survey in Fiji.

## APPLICATION OF SOIL & GROUNDWATER REMEDIAL TECHNOLOGIES IN QUEENSLAND

James Purtil<sup>1</sup>

Groundwater Technology Australia Pty. Ltd. is currently involved in a variety of assessment and remediation programmes for its petrochemical and industrial clients throughout Queensland. The programmes often involve remediation of hydrocarbons in multiple phases; separate-, adsorbed-, dissolved- and vapour-phases. Below is a brief precis of some of these programmes.

**Sandstone aquifer, Sunshine Coast.** Recovery of separate-phase hydrocarbons from a semi-confined sandstone aquifer. Recovery has been achieved through hydraulic manipulation of the aquifer to a central recovery well and dissolved-phase hydrocarbon remediation through air stripping. Treated effluent waters are partially re-injected into the aquifer and also used for irrigation of pastures. The system is remotely monitored by an integrated telemetry and alarm system. Preliminary fate and transport modelling has been employed to assess the plume migration characteristics under pumping and non-pumping conditions.

**Shallow gravel aquifer multiple phase recovery system.** Hydrocarbon vapours resulting from an underground storage tank (UST) loss migrated into a stormwater pipe 100 metres downgradient. A recovery system has been installed removing separate-phase hydrocarbons via a Filter Scavenger™ skimming pump, adsorbed-phase hydrocarbons using a soil vapour extraction system and dissolved-phase hydrocarbons via a low profile air stripping unit. The system has depressed the water table to below the level of the pipe and has removed all available separate-phase hydrocarbons and abated the vapours emanating from the pipe. Remediation options for the site are currently being assessed with a likely *in situ* bioremediation strategy to be adopted using air sparging and bioventing.

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<sup>1</sup> James Purtil is Groundwater Technology Australia Pty. Ltd.'s Senior Environmental Scientist and Manager for Queensland and Northern Territory

Soil and groundwater remediation, bulk terminal central Queensland. An interception trench recovery system has been used in combination with *ex situ* landfarming of diesel impacted soils. A fully pneumatic total fluid recovery system was used due to the hazardous location of the system. A trench design was employed due to the low yielding aquifer present at the site.

Contaminated soil and groundwater, urban service station sites. Several combined technology systems have been deployed depressing water table levels to expose contaminated soil strata at depth. The soil is being remediated by *in situ* soil vapour extraction and effluent waters using air stripping or granular activated carbon filters.

Separate-phase hydrocarbon recovery, bulk fuel terminal, central Queensland. A Filter Scavenger<sup>TM</sup> has been used to recover diesel from a shallow aquifer following a line failure. Diesel had entered the local sewerage system after the failure.

Assessment and remediation feasibility study, landfill far north Queensland. A groundwater monitoring system has been installed and a wide suite of target analytes assessed. The site hydrogeology and remediation options are currently under review.

Assessment and remediation feasibility study, former coal gasification works. A groundwater monitoring system has been installed and the presence of target analytes assessed. The assessment has included monitoring for dense non-aqueous phase liquids (DNAPLs).

Risk assessment and site management plans. Groundwater Technology is involved in a variety of redevelopment site closures based on assessment of risk and the implementation of medium and long term site management plans. These strategies have allowed particular site redevelopment plans to proceed at sites showing reduced hazard exposure to humans or the environment. These techniques have been utilised at former industrial sites, cattle dips and fuel storage terminals.

**Above ground bioremediation of hydrocarbon impacted soils. Engineered AGB treatment cells have been constructed at several sites throughout Queensland to remediate light to heavy hydrocarbons. Feasibility studies are conducted by Groundwater Technology's Remediation Technology Laboratory.**

**Industrial site effluent monitoring program. Groundwater Technology's GTEL laboratory has been involved in effluent analyses to ensure regulatory compliance.**



**QUEENSLAND UNIVERSITY OF TECHNOLOGY  
SCHOOL OF GEOLOGY  
RESEARCH AND TEACHING IN WATER RESOURCES**

**Background**

The School of Geology at QUT in its current form is new, being established in 1991, when the university was created from the previous QIT. Geological science began at QIT in 1971, when it was taught in the Department of Chemistry. Traditionally, geoscience at QUT has been of an applied nature and during the 1970's a Diploma in Groundwater was also offered. The current school approach is that of a sound academic base combined with practical experience and application. A fundamental part of this is regular interaction with relevant state government departments, as well as with the private sector.

The School of Geology awards degrees in four programmes: BAppSc, BAppSc (Hon), MAppSc and PhD). Applied research is becoming increasingly active in the school, especially at honours and masters level. The strongest area of application at the present time is in the general field of environmental geoscience. This broad topic mostly consists of studies in the fields of hydrogeology, surface and groundwater geochemistry, environmental geochemistry, engineering geology, fluvial and coastal sedimentology and coastal zone management.

**Courses**

The BAppSc aims to produce graduates with a well-rounded geoscience background. Students with interests in environmental applications usually follow a course from 2nd year with units such as geomorphology, geochemistry, sedimentology, engineering geology and geophysics with groundwater at 3rd year level. Offered at 3rd year is an individual field investigation project working closely with a supervisor. More advanced units are offered at honours and post-graduate level.

The honours programme is one year fulltime, and the masters two years fulltime. A great deal of interest is now being shown by working geoscientists. The QUT system allows a flexible approach for part-time masters work, and enables a suitable programme to be developed for the individual. This approach is proving useful for people continuing to work and in these cases the thesis research and much of the course work can be directed towards employment projects.

The School of Geology is also expanding its association with neighbouring countries. It is attracting a steady number of students from SW Pacific countries such as Fiji and Kiribati (2-3 per year), and now from SE Asian countries such as Laos (currently 2). For these students appropriate short-term work experience is organised where possible.

**Interaction with Government and Companies**

In Queensland as a whole, but in particular in Brisbane we are receiving a substantial amount of enthusiasm from the various government departments, local authorities and companies, in particular, the private consulting groups. Like everyone at this time, most of these organisations are working on restricted budgets, however, the cooperative approach that has developed has enabled the identification of various non-dollar means of support. Such support is usually in the form of identification of projects, field support, assistance with conducting the study, laboratory work and analyses, data assessment and interpretation, and very importantly access to data bases and discussion with personnel. Most of this translates to real work experience and actual dollar value.

There are various groups that have previously or currently participated in student and other research projects, the main ones are, Water Resources (DPI) both the Groundwater and Hydrology groups, Salinity and Hydrology Group (Natural Resource Management, DPI), Resource Assessment and Planning (DPI), Government Chemical Laboratory (Department of Health), CSIRO, Department of Minerals and Energy, Brisbane Ports Authority, Brisbane City Council, various other local councils such as Logan City, Tweed Shire and Redlands Shire, plus interstate cooperation with NSW Department of Water Resources.

Another aspect of research and applied investigations is the increasing amount of cooperation that is developing within QUT. This is an aim of the Faculty of Science and cooperative efforts are in place

or are being discussed with other Schools such as Physics, Chemistry and Life Science. There are also inter-faculty activities underway, such as with the Schools of Engineering, and Planning and Landscape Architecture. This cooperation is extending to post graduate research and several post-graduate students have joint supervisors from other Schools. This approach is particularly useful in the case of groundwater and other geoenvironment applications.

### **Post-graduate Research**

Current research in the School of Geology in water resources consists of a combination of surface and groundwater studies. Projects are undertaken at various levels extending from senior undergraduate to PhD. The investigations include work within urban/suburban areas and coastal settings as well as rural areas. Most of these projects are only recently finished or are still current and have not yet been fully reported. A new group of projects will also be commencing in 1994.

Current and recent research projects in the School and related to water resources are:

#### *Undergraduate:*

##### **Brishane suburban**

- \*Surface water quality and sediment geochemistry in a small catchment with seepages of acid groundwater from old landfill sites and a quarry in metamorphic rocks.
- \*Groundwater and its chemistry in residual basalt soils of Moreton Bay coastline.
- \*Water quality and sediment chemistry of a tributary of the Brisbane River containing both tidal and channelised sections.

##### **Moreton Bay**

- \*Occurrence and quality of groundwater on a small island in southern Moreton Bay.

#### *Honours*

##### **Brishane hinterland**

- \*Geochemistry of soils in water supply catchment.

##### **Rural east-central Queensland**

- \*Dryland salinity, extent, causes and water chemistry in an area of sedimentary and volcanic rocks.
- \*Dryland salinity, causes and groundwater chemistry in a granite catchment.

##### **Brishane suburban**

- \*Groundwater occurrence, chemistry and status in a small Tertiary basin using irrigation.
- \*Surface and groundwater chemical variation in a water supply catchment which includes a lower tidal zone

##### **Border rivers area NSW-QLD**

- \*Character of material forming shallow and deep alluvial aquifers.

#### *Masters*

##### **Border rivers area NSW-QLD**

- \*Occurrence of groundwater in alluvial aquifers of the Dumaresq River, comparison between shallow and deep, hydraulic continuity and source of recharge.

##### **Rural east-central Queensland**

- \*Encroachment of saline groundwater in the coastal part of the Bundaberg irrigation scheme.

##### **Brishane suburban**

- \*Distribution and chemical character of shallow acid groundwaters in the delta of the lower Brisbane River.
- \*Solid waste sites, their geology, geomorphology and relationship to local water quality.

#### *Doctorate*

##### **Coastal Northern NSW**

- \*Shallow acid groundwaters and their extent and formation in Pleistocene dune systems of the coastal zone.

##### **Brishane-based (School of Physics, joint supervision)**

- \*Development and testing of a probe for direct in situ testing of radium in groundwater.

Further information can be obtained from

Ms Cathy Fielding, Administration Officer, (07) 864 1645

Dr Malcolm Cox, Lecturer, (07) 864 1649

Assoc Prof. David Gust, Head of School, (07) 864 2324

School of Geology, QUT, GPO Box 2434, Brisbane, 4001, Australia. Fax (07) 864 1535

## **WESTERN AUSTRALIAN BRANCH MEETINGS**

**30 June 1993: Annual General Meeting**

**Election of new office bearers:**

<b>Chairman:</b>	<b>Kevin Haselgrove</b>
<b>Vice Chairman:</b>	<b>Ron Colman</b>
<b>Secretary:</b>	<b>Gary Meyer</b>
<b>Meetings Secretary:</b>	<b>Len Baddock</b>

**Bruce Boyes: AGC Woodward Clyde**  
**An Australian abroad - aspects of working on a**  
**superfund site in USA**

**13 September 1993: Joint with Hydrology and Water Resource**  
**Panel, Institution of Engineers Australia**

**Adrian Peck: A J Peck & Associates**  
**Jim Davies: J Davies & Associates**  
**Investigation of the hydrology of the Amarillo**  
**Property between Mandurah and Rockingham**

**6 October 1993**

**Alex Kern: Geological Survey**  
**Impressions from the XXIV Congress of IAH, Norway**

**Alan Brown: Airwell Pumps**  
**Applications of airwell pumps**

**24 November 1993: Student night**

**Ingrid Spencer: Dept of Environmental Engineering,**  
**University of Western Australia**  
**Nutrient input into southern Metropolitan waters**  
**via submarine groundwater discharge**

**Seth Johnson: Dept of Applied Geology,**  
**Curtin University**  
**The hydrogeological implications and economic**  
**potential of salt lake inundation in the Eastern**  
**Goldfields**

**Charles Poynton: Dept of Applied Geology,**  
**Curtin University**  
**Drainage of Bibra Lake and nearby groundwater**  
**recharge**

**The meeting was attended by 33 members and guests, and**  
**was followed by an enjoyable end of year dinner.**

**10th Anniversary**

**December 16th marks the 10th anniversary of the WA Branch.**  
**During the period, membership has risen from about 15 to 69,**  
**and regular technical meetings have been held.**

## **WESTERN AUSTRALIA**

### **Geological Survey**

The State Government has allocated \$500 000 for groundwater assessment as part of the government's stated objective to step up the hydrogeological surveying of the State. Mines Minister George Cash said in a media statement that funding by previous governments had been inadequate. The government recognised the importance of groundwater for public, industrial, mining, agricultural and domestic water supplies, and recognised the strategic importance of knowledge about the extent and quality of underground water supplies for planning and development throughout WA. The allocation will be spent on about eight projects spread around the State.

Computerisation of the Geological Survey's waterbore database commenced in September. The AQWABASE database is being transferred from a card system into Microsoft Access. Two contract keyboard operators and a contract geologist are employed.

A vulnerability map of the Perth Basin has just been released. The two maps at a scale of 1:500 000 use the red-green system to highlight areas of high and low vulnerability. The map is aimed at state and local government authorities responsible for groundwater management and regional development, and was released in the week that CSIRO released details of contamination in the Gwelup borefield, highlighting the need for groundwater protection.

### **Large projects**

Two large water supply projects for Western Mining Corporation nickel projects are currently underway in the Goldfields. An 8-11 GL/a borefield is being installed at Mt Keith south of Wiluna by Woodward Clyde. A 10 GL/a water supply for the proposed Bulong nickel project, just east of Kalgoorlie, has just been proved. This will involve desalination of 150 000 mg/L groundwater to yield 3 GL/a of low salinity water.

### **Employment**

Demand for hydrogeologists is very strong in Western Australia, with the major consulting groups and the Geological Survey taking on staff.