



THE HYDROLOGICAL SOCIETY OF S.A.

% Water Resources Branch

Box 1751, Adelaide, S.A. 5001

NEWSLETTER NO. 49

OCTOBER 1985

GUEST EDITORIAL

MISINFORMATION IN THE FIELD OF GROUND WATER RESOURCES

The current trend towards more public participation in government decision-making processes related to new developments is to be applauded since, through such mechanisms as the Environmental Impact Statement, the public is provided with technical information which was previously only available to the developer and the relevant government authorities.

The public is invited to submit comments on the proposal, and these comments, together with the technical input from the developer, are evaluated by qualified professionals in various government departments who provide the government of the day with advice regarding the feasibility and environmental acceptability of the proposal together with recommendations for controls and monitoring before final approval is given for a development to proceed.

One of the reasons for such public information exercises is to reassure the public that developers are not being permitted to exploit or damage our valuable groundwater resources and to show that government is concerned about, and anxious to maintain the integrity of such resources or at least to ensure that where exploitation is a necessary part of a project, water is not wasted and every endeavour is made to protect the resources from pollution and the environment from unnecessary degradation.

It is unfortunate that the level of understanding of the technical aspects of groundwater among the general public is rather low and folkloric in nature. The same may be said of the media and the various lobby groups devoted to opposing projects either on genuine environmental or purely emotional or philosophical grounds.

Technical information which is freely given is often grossly misinterpreted by the "gurus" of the lobby groups who predict disaster at every turn and freely give their biased interpretations to an unsuspecting public via the media who appear to be only interested in the controversial aspects of new projects.

The 'letters to the Editor' columns of the newspapers frequently carry the views of the lobby groups via an apparently carefully orchestrated series of letters from concerned individuals, many of whom are members of the lobby groups but who neglect to indicate their affinities in their letters.

Government Ministers are also peppered with letters from concerned citizens, all bearing the same misinformation which can occasionally be traced back to circular letters provided by lobby groups.

Government Departments are reluctant to enter into arguments with the general public, especially when the Government Department is arguing on technical grounds and the public on an emotional basis.

Misinformation is becoming a growth industry and is being employed to attempt to discredit professionals who are in no position to defend their work.

Perhaps the Hydrological Society of S.A. may be able to offer a balanced overview of some projects through the medium of Position Papers prepared by professionals who have no direct interest in a particular project. These papers should be able to be provided to the media.

DON ARMSTRONG

LETTER TO THE EDITOR

Dear Sir,

I should like to express my strong support for the decision of the Executive Committee of the Hydrological Society of South Australia to seek the Society's approval for the assumption of a higher profile in matters of hydrological importance.

During the course of the debate in the South-East over the hydrological implications of the Kingston Lignite Project, I attended numerous public meetings where local 'experts' explained to audiences (determined to believe) what dire hydrological consequences would result from the project. Much of this information was unsubstantiated clap-trap and pseudo-science, and ill-informed misquotations from authoritative sources which no amount of correction could erase. It was also, as the note in Newsletter No. 48 points out, '... distinguished in the media by inaccurate, sometimes technically incorrect, reporting ...'.

What was more distressing was to see, on more than one occasion, the sincere, well presented and technically sound statements of a government hydrologist greeted by boos and jeers.

In such circumstances, an authoritative and independent position paper prepared by the Society would have been of inestimable value. In debates such as those orchestrated in the South-East during the Kingston assessment, truth was the first casualty and the local gurus grew in stature with each public presentation of the folk-lore that passed for hydrology.

When such opinions are cast in tablets of stone, it is perhaps doubtful if much can be done to change public attitudes; however, at least the misquoted, misunderstood hydrologist will gain some solace from the support of his peers.

R.E. BLACK, Kinhill Stearns

POSITION PAPERS

At a general meeting of the Hydrological Society of South Australia on 27 June 1985 it was decided that the Society should prepare Position Papers on topics related to water that are of concern to the community.

It is intended that these Position Papers should provide a balanced, technically accurate assessment of a particular issue unconstrained by the political restrictions of a Government authority and not coloured by the vested interests of environmental groups or industrial enterprise.

It is hoped that through the wide distribution of these statements the Hydrological Society will gain a reputation for accurate and responsible comment on these sometimes contentious issues and will eventually be sought out by the media to provide unbiased technical comment on new issues.

The suggested procedure for preparing these Position Papers once a topic has been selected is for the Executive Committee to form a working group and set a target date for the production of the final draft paper. This working group would probably consist of three members, of whom at least one would be from the Executive Committee. Members of the working group would be selected for their expertise in the topic being addressed. While the spokesperson would have to be chosen carefully to avoid any conflict of interest this would not preclude any person directly involved in the issue being addressed from becoming a member of the working group.

It is envisaged that the working group would prepare a statement of factors which should be considered in detail and then convene a policy forum open to all members. This would probably take the form of an evening or Saturday afternoon meeting specifically to discuss the topic. Time would also be allowed for written submissions to the policy forum by members unable to attend. The working group would then prepare the Position Paper draft for circulation. The draft would then be ratified by a general meeting of the Society before printing.

This procedure will allow all interested members adequate opportunity to have an input to the paper and should ensure that a balanced and technically accurate paper is produced.

There is obviously a considerable amount of work involved in the preparation of a Position Paper and the Executive Committee considers that the resources are not available to prepare more than one at a time. The Committee has identified a list (over) of the highest priority issues for which it believes a clear statement of the scientific/engineering facts would benefit public debate on the issue.

The Executive Committee now seeks a response in writing from members with the tasks of, firstly, fixing a priority for topics on the list and, secondly, forming groups of Society members (and others) willing to assist in the preparation of particular papers. The Committee would also welcome suggestions for additional Position Paper topics and any other relevant comments.

This is your opportunity to ensure that the Hydrological Society fulfils a key element of our objectives "to provide a forum for the interchange of ideas and knowledge in water resources and their utilisation".

EXECUTIVE COMMITTEE

It is suggested that the following list etc. may be copied by interested members and returned to Mr. P.D. Harvey, Secretary, H.S.S.A.

SUGGESTED POSITION PAPER TOPICS

	Your priority
<p>A. <u>General Issues</u></p> <ul style="list-style-type: none">◦ Flood mitigation/flood warning/flood plain planning/flood insurance◦ Sewage treatment works and common effluent disposal in inland areas◦ Policies on mining of groundwater reserves◦ Water allocation policies in irrigation areas; water allocation between conflicting uses, e.g. irrigation versus wetlands◦ Wetland protection and enhancement◦ Re-use of sewage effluent◦ Water quality standards	
<p>B. <u>Specific Issues</u></p> <ul style="list-style-type: none">◦ Prevention of uncontrolled artesian discharge in the G.A.B.◦ Protection of mound springs◦ Salinity and land clearing on Kangaroo Island◦ River Murray salinity control programme◦ Land use planning and water quality in the Mt. Lofty Ranges◦ Operation of the River Murray mouth◦ Impact of drainage in the South East of S.A. and the issue of over-drainage	

GENERAL OR SPECIFIC COMMENTS

STREAKY BAY WATER CONSERVATION PROGRAMME

A water conservation programme for Streaky Bay on Eyre Peninsula was launched by the Engineering and Water Supply Department in October 1983.

The programme, which is unique to South Australia, was initiated not only to solve the water supply problems encountered at Streaky Bay, but also to establish a pilot water conservation strategy applicable to other areas of the State. The initiatives and progress of the programme are being closely monitored by the Engineering and Water Supply Department, Eyre Region, documenting the results over the planned 10 year programme life.

Streaky Bay's sole source of water supply is from the Robinson groundwater basin approximately 8 km from the town. The basin currently provides only limited good quality water from two covered trenches and a bore commissioned in 1980. The volume of water that can safely be supplied from the basin varies from year to year depending mainly on rainfall in the previous few years. Under normal conditions the extraction points draw from an aeolianite layer containing good quality water (800 mg/l) which is separated from a lower sandy aquifer containing up to 80,000 mg/l water by a sandy clay horizon. During periods of high demand and/or low recharge, the good quality water is drawn off more rapidly than it can be replaced causing up-coning of the deeper saline water resulting in mixing and a sharp increase in town supply salinity.

Initially, safe yield from the basin was not known with any degree of confidence, thus additional bores in the same aquifer were considered undesirable. Alternative supply augmentation options were either too low yielding (in the case of adjacent groundwater basins), or too expensive (in the case of a branch main from the Tod pipeline system). It was finally concluded that reducing the town's water demand via a water conservation programme would ease the load on the basin sufficiently to overcome the salinity problem whilst investigations by the Department of Mines and Energy continued into establishing a confident safe yield figure.

Most water conservation campaigns in the past have aimed at large reductions in consumption for particularly dry years. Although these reductions are usually achieved, consumers have generally reverted back to their original higher consumptions. The Streaky Bay programme aims to reduce the town's water consumption by 15% over a 10 year period. By educating the public about water supply problems and encouraging the installation of water saving devices such as aerated shower roses, dual flush toilets, timer taps, etc., which, once installed, do not require any conscious effort to conserve water, it is expected that a long term sustainable water reduction can be achieved.

The first two years of the programme's operation have been outstandingly successful with the final 10 year reduction goal of 15% being easily surpassed. The ongoing monitoring of the results of the programme will determine what percentage of this initial reduction is long term. Also the effectiveness of various initiatives and water saving devices will be assessed from season to season for the possible inclusion in further conservation campaigns elsewhere in the State.

(M.R.L. Smith, E & W S Department)

+++++

SALINISATION OF AUSTRALIA'S INLAND WATERS

Professor W.D. Williams, University of Adelaide

Salinisation, or secondary salinisation, is the term generally used to refer to the process of salinity increase in inland waters. It is of particular significance in semi-arid regions, or in regions of reduced rainfall, where it poses a significant hazard to water quality, as well as an important potential threat to the structure and function of natural aquatic ecosystems. The extent of the ecological threat remains largely unresolved, and, indeed, is often ignored (see, for example, the account by Peck, Thomas and Williamson (1983) of salinity issues in Australia). Economically, the process is important because it often renders waters and soils less useful to man; water supplies may be degraded in quality, and agricultural production severely curtailed.

Salinisation is caused by both natural events and man-made changes to the environment. Of most concern, is the latter, so that essentially it is man's disturbance of the natural environment which is the focus of the problem.

Whilst both natural and man-made salinisation may cause highly saline waters to develop, economically and ecologically the most significant part of the process relates to relatively small increases in the salinity of nominally fresh waters. Salinisation is of most concern where it converts waters of salinity 500 milligrams per litre to waters with salinities of 500-5000 milligrams per litre. In this regard, it should be stressed that considerable differences exist between water managers and limnologists in their perceptions of what are "fresh", "slightly saline", "saline" and "highly saline" waters. Thus "fresh water" is often taken by the water manager to mean a water containing less than 300 milligrams per litre dissolved salts; many limnologists regard all waters containing less than 3000 milligrams per litre as "fresh". Whatever the perception, in Australia almost all of the ions involved are sodium and chloride.

To a very large degree, water managers have tended to disregard possible adverse effects on aquatic ecosystems resulting from the salinisation of inland waters. Many view the matter as of no consequence. It is important to stress, therefore, that many of the natural properties of water bodies determine water quality *sensu lato*, as well as their capacity to satisfy various beneficial uses. The "assimilative capacity" of rivers, for example, is a function of their ecological balance. Thus, there is good reason why water managers should be concerned about environmental effects. Part of the reason why this article was written is that it provides an opportunity to alert those in the "water business" to this matter.

A major problem in this area is our lack of knowledge concerning the extent to which aquatic ecosystems can absorb increased salt loads without damage or change to their structure, or gross alteration to the processes of decomposition, production, and mineral recycling. Nevertheless, although undeniable examples of salt-induced environmental damage are not plentiful, they do exist and span several continents and cover a range of plants and animals. There is a clear need for additional research on this matter.

Associated problems are the difficulties of dissociating ecological damage caused by salt from damage resulting from other causes, the long timespan that may be needed to monitor damage, and the lack of data on conditions before salination occurred.

(Reprinted from "Water News" No. 3, 1985)

(i) Metropolitan Area

As part of a major investigation into the groundwater resources of the area sampling for C14 analyses has been completed for the Tertiary aquifers. In addition, Quaternary sediments in the Northern Adelaide Plains were auger sampled for C1 analysis by CSIRO.

Partially as a result of this work a revised recharge mechanism has been proposed for the Adelaide Plains Basin aquifers.

(ii) Murray Basin

A number of holes were drilled to the Renmark Beds confined aquifer on the western margin and EM traverses were undertaken to confirm stratigraphy and depth to basement as part of the joint BMR and tri-State study.

A management plan for the Mallee Proclaimed Region is being formulated. Water uses currently approximates groundwater inflow with rainfall recharge negligible.

(iii) Dalhousie Springs

All springs of the Dalhousie group were sampled and major flows gauged as part of DM&E's contribution to a multi-disciplinary study of the area's environmental resources. The study was organised by the Australian and South Australian Museums.

(iv) Great Artesian Basin

A well inventory obtaining information on condition of headworks, electrical conductivity and temperature was completed. An investigation programme involving extensive use of geophysics (seismic, EM, etc.) has commenced.

(v) Future Energy Action Committee (FEAC)

The FEAC review of the State's coal mining options was completed and forwarded to the Minister for implementation. The Branch's role was to review all geotechnical (including groundwater) reports from the companies and consultants involved.

WATER SUPPLY PROJECTS IN EAST MALAYSIA

(Reporter : Ross Stevens)

The Adelaide-based consulting practice, Montgomery Hosking Stone Pty. Ltd., has undertaken three water supply planning studies for the cities of Kuching, Sibul and Miri in Sarawak, East Malaysia. The project has been undertaken in association with Snowy Mountains Engineering Corp. Each study includes approximately one man-year of input from Australian and US engineers. The hydrologic work includes a study of the most available and appropriate water source for each city. In each case this involves direct pumping from a nearby river system, sufficiently upstream from the coastal estuary, to avoid problems of salinity intrusion. The project has involved review and analysis of stream gauging records and daily water level data to establish daily discharge files which have been analysed to produce low flow frequency curves.

FROM THE HYDROLOGICAL TRAPS

GAWLER RIVER DISTRICT FLOOD AND DRAINAGE STUDY (Reporter : Ken Potter)

Lange, Dames & Campbell Australia Pty. Ltd. is carrying out a flood and drainage study for the District Council of Mallala. Flood Plain maps for 20 and 100 years average recurrence interval flood events and a drainage and flood management strategy are being developed for a 55 sq km area lying to the north of the Gawler River. The study addresses flooding from both local catchments and Gawler River runoff. It is expected that the job will be completed in October 1985.

WATER RESOURCES STUDIES AT U OF A (Reporter : Graeme Dandy)

- (i) A study of residential water consumption in Adelaide is being carried out by the Civil Engineering Department of the University of Adelaide. This study is aimed at finding out how reduced water allowances and an increased price for excess water has affected the consumption of individual households over the last seven years. Interviews are being carried out at 500 households randomly selected throughout the metropolitan area. The intention is to develop a statistical relationship between annual household consumption and the variables of water allowance, water price, household characteristics and weather.
- (ii) The Department of Water Resources in Victoria is currently undertaking ten major projects in relation to state-wide water planning. Dr. G. Dandy of the University of Adelaide is serving on a review panel which oversees three of these projects. These are :
 - (a) A study aimed at identifying the incremental costs of the development of new water resources (both surface and groundwater) in various regions throughout the State.
 - (b) A study of the application of the MMBW network simulation model, WASP, as a basic tool for evaluating alternative proposals for water resources development at a regional level.
 - (c) The development of a computer model which can be used to evaluate water pricing, allocation and investment decisions in the short and long term.

The town of Greenock in the Barossa Valley has been the subject of some flooding from both the Greenock Creek and its tributaries. B.C. Tonkin and Associates have been engaged by the District Council of Light to prepare flood plain maps for the township.

The total catchment is approximately 27 km² and the runoff routing models GENDRAIN and RORB have been used to produce flow-frequency relationships. A regional flood frequency approach has been used to check the model predicted flows. The flows generated are then used as input to a one-dimensional water surface profile model to predict the level and extent of inundation.

The results will be used to advise the Council on flood mitigation strategies.

UNITGRAPH STUDIES - ADELAIDE HILLS CATCHMENTS

(Reporter : Kim Read)

The Engineering and Water Supply Department has commissioned B.C. Tonkin and Associates to derive unit hydrographs for ten Adelaide Hills catchments. Different derivation methods will be evaluated including single period method, multiperiod (Collins) method, multiperiod - least square method.

Different loss models will be tested for each of the above derivation methods. These are : initial loss - runoff coefficient, United Kingdom Flood studies report model, Time Comparison Approximation model and Richard Clark model.

The project aims to establish which derivation method/loss model combination yields to most consistent results for typical Adelaide Hills catchments.

FOR YOUR DIARY

1. Next meeting of H.S.S.A.

- "The 1986 Edition of Australian Rainfall and Runoff"
Speaker : Assoc. Prof. David H. Pilgrim (U.N.S.W.)
6.30 pm Thursday 7 November 1985
Charles Hawker Centre, Waite Road, Urrbrae

More details later.

2. Prof. Dr. Reimer Herrmann

Reimer Herrmann is Professor of Hydrology, University of Bayreuth, West Germany and a recognised authority on the behaviour of various industrial and domestic pollutants in streams, lakes and estuaries. He will be visiting Adelaide 15-22 March 1986. His work has included studies of polycyclic aromatic-hydrocarbons, organochlorine pesticides, polychlorinated biphenyls, volatile trace organics, trace metals, coprostanol and faecal bacteria. He will be addressing a combined meeting of R.A.C.I. and H.S.S.A. tentatively set for Tuesday 18 March, Hawker Centre and will be presenting a seminar at the Levels Campus of S.A. Institute of Technology. More details later.

2. H.S.S.A. Seminar - "Water and Soil - Our Basic Resources in Conflict"

Planning of a seminar on the problems of water erosion in zones of high and low rainfall - causes, consequences and cures - has commenced. No further details are available at present other than the tentative date - October 1986. Watch this space !

FROM THE SECRETARY

NEW COMMITTEE

There was only one change in the committee elected at the Annual General Meeting of the Society on 22 August. John Botting, who in the last year has made the move from B.C. Tonkin and Assoc. to the Civil Engineering Department, University of Adelaide, did not seek re-election. In his place we welcome Chris McQuade from the Department of Agriculture. Our thanks go to John for his work on the committee over the past two years.

The new committee and their work contact telephone numbers are :

<u>Chairman</u>	John Waterhouse, Australian Groundwater Consultants Ltd.	272 5336
<u>Vice Chairman</u>	Ian Laing, Water Resources Branch, E&WS	227 2577
<u>Treasurer</u>	Jerome Maguire, Water Resources Branch, E&WS	227 3352
<u>Secretary</u>	Paul Harvey, Water Resources Branch, E&WS	227 1350
<u>Committee</u>	Chris Wright, Kinhill Stearns	223 7011
	Graeme Dandy, Univ. Adelaide, Civil Eng.	228 5471
	Steve Moore, Department of Agriculture	227 3075
	Don Armstrong, Department Mines and Energy	274 7572
	Charles Duncan, Kinhill Stearns	223 7011
	Chris McQuade, Department of Agriculture	227 0652
<u>Newsletter Editor</u>	John Argue, S.A.I.T., Civil Engineering	260 2055

1985 H.S.S.A. PRIZE - MR. CHRIS BURTON

The 1985 Hydrological Society Prize was presented at the AGM on 22 August. The winner was Chris Burton, a final year honours student in Civil Engineering at the University of Adelaide. Chris's honours project is a study of the application of optimisation techniques to the operation of the Adelaide water supply headworks. He has an excellent academic record having achieved 4 distinctions and 3 credits in the first three years of the course.

+++++++

John R. Argue
Editor of the Newsletter
C/- S.A. Institute of Technology
PO Box 1
INGLE FARM. S.A. 5098