SA waterbulletin

VOL 12 No 1 FEBRUARIE 1986

HIDROLOGIE

DATABANKE ONTWIKKEL SNEL

IRRIGATION

NEW PROJECT IN BREEDE RIVER

SLUDGE BULKING

PORT ELIZABETH TAKES THE LEAD

22–24 September 1986

simposium

anaërobe vertering

PROGRAMOORSIG

Die simposium sal uit lesing-, plakkaat- en besprekingsessies bestaan. Moontlike besprekingsonderwerpe sal insluit:

- Oorsig oor anaërobe vertering
- Ingenieursaspekte van die proses
- Prosesbeheer
- Rioolbehandeling
- Die behandeling van industriële uitvloeisels
- Ekonomiese aspekte van die proses
- Die vertering van landbou-afval
- Mikrobiologie van die verteringsproses
- Biochemiese aspekte
- Opberg en gebruik van biogas

Die reëlingskomitee onderhandel ook om enkele vooraanstaande nasionale en internasionale navorsers te betrek by die simposium.

KORRESPONDENSIE:

Alle korrespondensie en vorms met betrekking tot die simposium moet gerig word aan:

Mnr Francois Marais
Afdeling Nie-formele Onderwys
Posbus 4345
BLOEMFONTEIN 9300
SUID-AFRIKA
Tel: 051-70661 X 425
Teleks: 267666

Voltooi ook die antwoordkaart in die Bulletin.

LOKAAL EN DATUM VAN SIMPOSIUM

Die Anaërobe Verteringsimposium sal gehou word by die Universiteit van die Oranje-Vrystaat, Bloemfontein, Suid-Afrika.

VOORLOPIGE KOSTES:

Voorlopige kostes beloop ongeveer R80–R100 maar sluit nie verblyfkostes in nie.

Departement Mikrobiologie
Universiteit van Oranje Vrystaat
Bloemfontein

Nasionale Instituut
vir Waternavorsing
WNNR

CCWR NEWSLETTER

COMPUTING CENTRE FOR WATER RESEARCH, c/o University of Natal, PO Box 375, PIETERMARITZBURG 3200. Tel. (0331) 63320 ext. 177/178

ESTABLISHMENT OF THE CCWR

The Computing Centre for Water Research (CCWR) has been established jointly by IBM SA (Pty) Ltd, the Water Research Commission and the University of Natal. The CCWR was opened officially by Dr JP Kriel, the Chairman of the Water Research Commission on 6 May 1986.

BACKGROUND AND PURPOSE OF THE CCWR

The provision of adequate supplies of water with a high degree of assurance in terms of both quantity and quality for agricultural, industrial and domestic, both urban and rural purposes, is a high priority national objective. Since the planning and development of such supplies can be greatly improved by research it is imperative that water research receive increasing attention in the immediate future.

Universities are accepting the challenge increasingly, of involving themselves in this type of research and thereby engaging problems of a nature outside of the university or of the region in which the university is situated.

There is, at the same time, the rapid expansion and growing importance of information systems and graphics capabilities in the operation and management of water research. The computing Centre for Water Research (CCWR) has therefore been established to meet these two needs of the water research community. The CCWR, which is hosted by the University of Natal in Pietermaritzburg, consists of computer hardware and software donated by IBM and financial and other support provided jointly by the Water Research Commission, University of Natal and IBM. The responsibility for the overall management of the Centre lies with the Water Research Commission. For this purpose a management board has been instituted to ensure that the needs of all water researchers are attended to.

The CCWR is intended to provide emphasis, encouragement and aid to researchers throughout South Africa, in the field of water. It is intended that the CCWR will be accessible to all *bona fide* water researchers throughout South Africa, by direct personal access and via the major national computer networks. Users have to be approved by the management of the CCWR.

PRESENT CAPABILITIES AND PROGRESS OF THE CCWR

The CCWR project has been structured in two phases. Phase 1 is a pilot or feasibility phase, which is designed to test the concept and capabilities of such a centre. Should Phase 1 prove successful, Phase 2 will commence in January 1987 and continue for a further five years. Thereafter the role and funding of the CCWR will be reviewed.

A main frame computer, an IBM 4341 has been operational since mid April 1986. At present there is no networking or remote station capability in the system. However, the hardware and software necessary to achieve access to the CCWR via the national networks is to be installed later this year. It is the express intention of the CCWR to make itself accessible via the synchronous and asynchronous national networks before the end of the year to *at least* one other research organisation apart from the University of Natal itself.

MANAGEMENT OBJECTIVES OF THE CCWR

The CCWR must contribute to the overall water research goal by providing a national facility for

(i) enhanced data and information transfer between data supply organisations, software supply organisations and researchers and enchanced transfer of research results between researchers, end-user organisations and other researchers, (the *"market"* concept);

(ii) multidisciplinary, multiorganisational research to be undertaken by people in different organisations throughout the country, (the *"invisible college"* concept); and

(iii) enhanced and/or alternative computing and computer graphics capabilities for water researchers throughout South Africa.

(The CCWR is mindful of its responsibilities to the following parties:

- The financing bodies (at present IBM/WRC/UN) and through them to the South African society as a whole. This responsiblity is to fulfil its objectives cost effectively thereby aiding economic development and productivity.
- Water researchers — without whom the CCWR would have no reason to exist. Users needs will be monitored continuously to enable the CCWR to be "customer" orientated.
- End-user organisations who need and utilise the results of water research.
- Data/Information supply organisations by helping them fulfil their task more effectively and efficiently.
- CCWR employees — without whom its objectives cannot be achieved — by creating and maintaining an environment where every employee is provided with the opportunity to develop and progress.

MEET THE PERSONNEL OF THE CCWR

The Management Board

Mr D Cousens of the Water Research Commission has been appointed as Chairman of the Management Board and as such is a member of the Executive Committee. He is also acting as a part-time joint manager of the Centre for 1986.

Mr N Davies of IBM SA (Pty) Ltd who is also a member of the Executive Committee. His alternate is Mr P Riches.

Prof P Meiring of the University of Natal who makes up the final member of the Executive Committee. His alternate is Prof R Schulze.

Mr D vd Merwe of the Water Research Commission. (Alternate: Dr P Roberts).

Dr C Roberts of the Department of Water Affairs.

Dr L du Pisani of the Department of Agriculture and Water Supply.

Mr V Shaw of the CSIR.

Prof J Botha of the University of the Orange Free State who represents the Committee of University Principals. (Alternate: Prof B Verhagen of the University of the Witwatersrand).

Mr J van Rhyn of the Weather Bureau.

Mr D Owen of the Department of Environment Affairs.

The CCWR team. From left: Keith Fismer, Jane Conning, Arne Kure, Melanie Gorven and Mark Dent.

Employees

Mark Dent — Part time joint manager for 1986.
Mark is a Senior Research Fellow in the Department of Agricultural Engineering, University of Natal, Pietermaritzburg. A graduate of Natal University and the holder of a Masters degree in Agricultural Engineering, Mark has been involved actively in water research since 1979.

Arne Kure — Senior Systems Programmer.
Arne, until recently Senior Systems Engineer with IBM for 25 years, is the holder of an honours degree in Mathematics and a U.E.D. from the University of Natal, as well as of numerous awards from IBM. The CCWR is indeed fortunate to have such an experienced, capable and amicable person on its staff.

Melanie Gorven — User/Applications Support.
Melanie is a B.Sc. Hons Computer Science, graduate from UCT. She has recent experience as a user consultant. The users of the CCWR will ''interface'' with a most pleasant and capable person in Melanie.

Keith Fismer — Operator.

Keith comes to us with six years of operating experience on IBM systems. We are confident that in Keith you will have all your operational requirements attended to in a professional and efficient manner.

Jane Conning — Secretary/PRO

Last but not least! Jane has only recently joined the CCWR. However, as soon as she has found her feet she is to become Editor of this quarterly newsletter. Jane has a wide secretarial experience in Cape Town and Johannesburg and is also a qualified nurse. We are sure that you will find your dealings with Jane, most pleasant and efficient.

ACCESS TO THE CCWR COMPUTER

As mentioned earlier, access is available to all *bona fide* water researchers in South Africa, provided that they are approved by the management of the CCWR. Since the CCWR is specifically for *water research* computing, it will be necessary for all users to sign a DOCUMENT OF UNDERSTANDING with the CCWR, in which the terms and conditions of use of the computing facilities are specified. It should be noted that *all* water research is to be supported and not any one aspect of it. At this stage users cannot acccess the centre by computer network — this will come later. In the meantime **please register your interest by completing the reply form or contacting the centre direct by telephone for further information.**

REPLY FORM

Computing Centre for Water Research
c/o University of Natal, PO Box 375,
Pietermaritzburg 3200

To receive further information please complete and return to the CCWR.

NAME (Prof/Dr/Mr/Mrs/Miss) _____

ORGANISATION _____

ADDRESS _____

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Telephone _____ Postal Code _____

Telex _____

REMARKS _____

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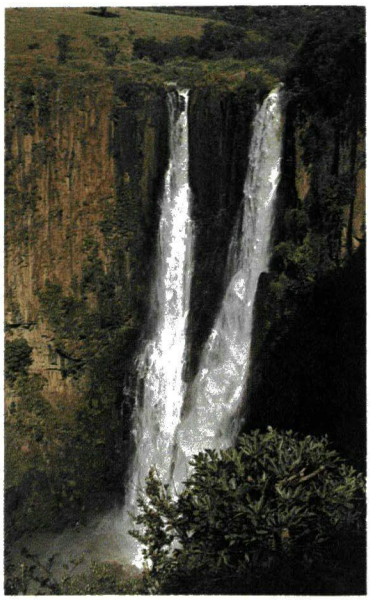
SA waterbulletin

VOL 12 No 1 FEBRUARIE 1986



WNK

Die Howick-waterval in Natal.

SA Waterbulletin **is a quarterly magazine on water and water research published by the South African Water Research Commission (WRC), a statutory organization established in 1971 by Act of Parliament.**

Subscription is free. Material in this publication does not necessarily reflect the considered opinions of the members of the WRC, and may be copied with acknowledgement of source.

Editorial offices: WRC, PO Box 824, Pretoria 0001, Republic of South Africa. Tel (012) 28-5461.

Editor: Jan du Plessis
Asst editor: Marietta Theron
Ed. Secretary: Rina Human

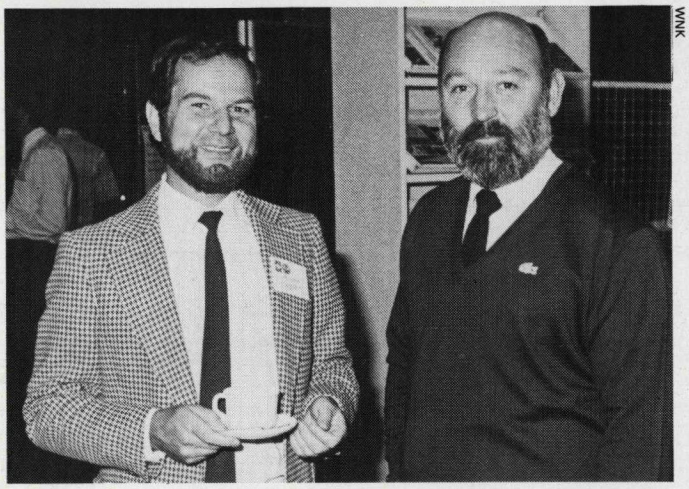
SA Waterbulletin **is 'n kwartaallikse tydskrif oor water en waternavorsing wat uitgegee word deur die Suid-Afrikaanse Waternavorsingskommissie (WNK), 'n statutêre organisasie wat in 1971 by Wet gestig is.**

Intekening is gratis. Stof in dié publikasie weerspieël nie noodwendig die oorwoë menings van lede van die WNK nie, en mag hergebruik word met erkenning van die bron.

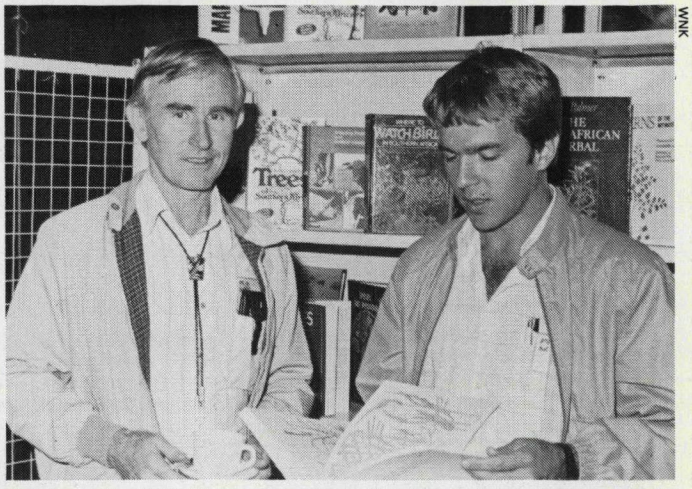
Redaksie: WNK, Posbus 824, Pretoria 0001, Republiek van Suid-Afrika. Tel (012) 28-5461.

Redakteur: Jan du Plessis
Asst-redaktrise: Marietta Theron
Red. sekretaresse: Rina Human

INHOUD



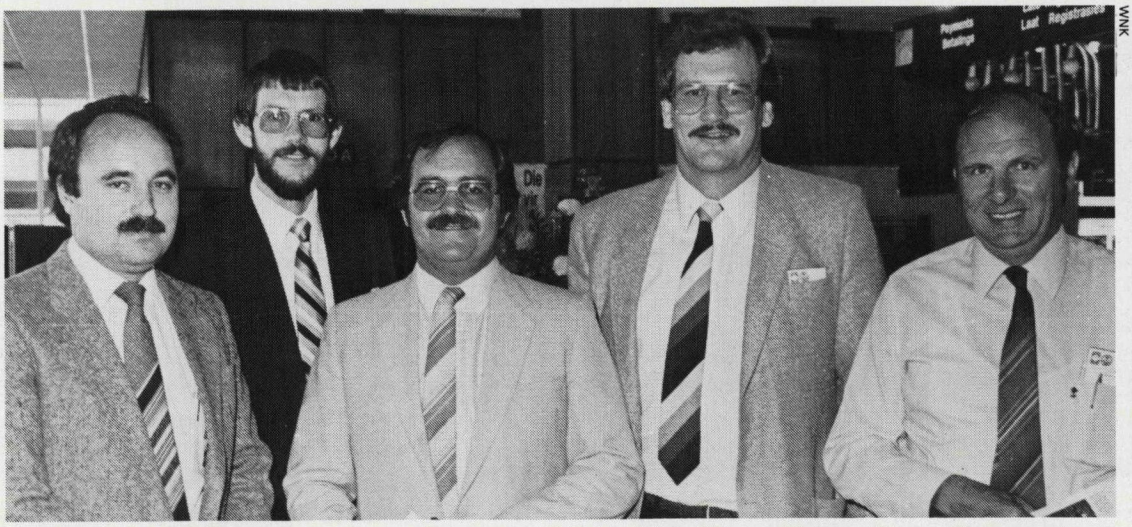
Dr Carl-Josef Weiers (Duitsland) (links) en mnr JC Legoupil (IRAT, Frankryk).



Links: dr JEP Green en mnr EJ Schmidt albei van die Universiteit van Natal.

Van links: dr BL Barge (Kanada), dr P Roberts (WNK), dr I-P Wu (Hawaii) en mnr D van der Merwe (WNK).

'n Internasionale simposium oor landbou-ingenieurswese is vroeg vanjaar in Pretoria gehou. Die simposium wat deur die Suid-Afrikaanse Instituut vir Landbou-ingenieurs gereël is, het uit drie afdelings bestaan: Grond en Water, Plaasgeboue, en Plaasmasjinerie waar die tema van bespreking meganisasie en energie in ontwikkelende lande was. Altesaam sewe en twintig referate het oor water gehandel en afgevaardigdes het oa 'n besproeiingskema in Lebowa besoek.



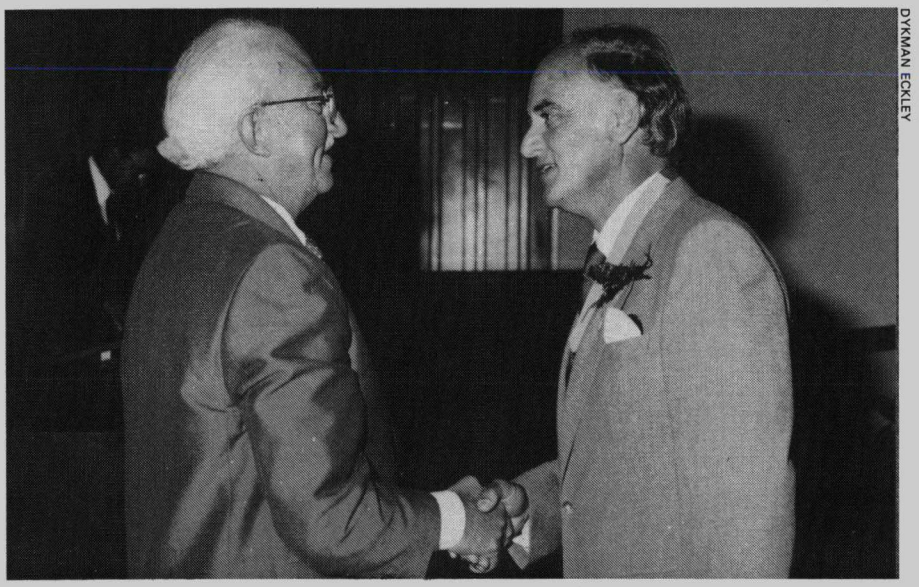
Van links: mnre CJ Coetzer, J van Aswegen, WD Enright, FC van Zyl en JS van Rooyen almal van die Departement van Waterwese.

Van links: mnre C van der Joubert (Direktoraat Land NJ Rabie (Departement

WNK

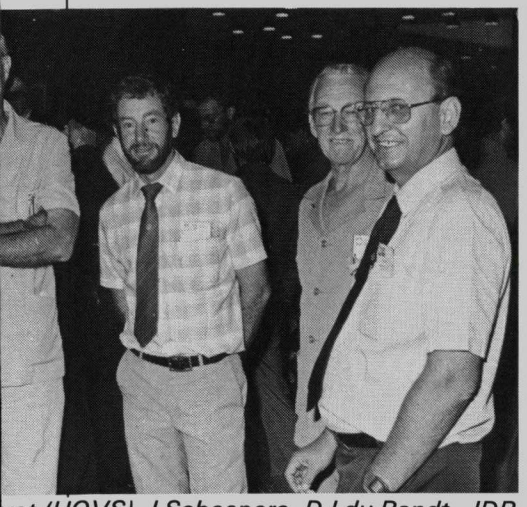
WNK

(Links) By die algemene jaarvergadering van die Instituut vir die Bestryding van Waterbesoedeling (IBWB) (SA Tak) is mnr John Slim van Port Elizabeth ingehuldig as voorsitter vir 1986. Links staan die pasafgetrede voorsitter mnr PE Odendaal, uitvoerende direkteur van die WNK. (Bo) Tydens die vergadering het dr Lukas van Vuuren (regs) van die NIWN die Genootskap van die Instituut ontvang.



DYKMAN ECKLEY

(Links) 'n Bekende in waterkringe, professor LS Smith (regs), het verlede jaar die Salus goue medalje van die Departement van gesondheid en Welsyn ontvang. By hom is dr LAPA Munnik, destryds waarnemende Minister van dié Departement. Prof Smith se kennis van watersuiwering, rioolwater- en slykdisponering asook sy werk op die gebied van bakteriologie en forensiese medisyne het aan hom internasionale bekendheid besorg.



yst (UOVS), I Scheepers, DJ du Randt, JDR ou-Ingenieurswese en watervoorsiening) en Waterwese).

WNK

Mnre FB Reinders (links) en LB Terblanché albei van die Direktoraat Landbou-Ingenieurswese en Watervoorsiening.

Milnerton's Potsdam Wastewater Treatment Works with the sludge holding tank and reactor.

MILNERTON STARTS DUAL DIGESTION PROJECT

The Water Research Commission has entered into an agreement with the Milnerton Municipality and the National Institute for Water Research to undertake research into a recently developed and patented sludge treatment process known as *Dual Digestion* to assess and demonstrate its applicability in south Africa.

Because of the many problems associated with the treatment and disposal of sewage sludge the WRC supports research aimed at scientifically evaluating new and existing treatment processes and disposal techniques in order to provide local authorities with suitable avenues for disposal of the sludge.

Dual Digestion combines thermophilic aerobic digestion and anaerobic digestion in a two-step system. The process combines the advantages of a certain degree of pasteurisation and low energy requirements with additional unique advantages of process stability and reduced capital costs. The advantages of the process are that:

ADVANTAGES

(i) Partial pasteurisation can be achieved *during* the process of stabilisation (digestion) of the sludge.

(ii) The use of energy for the supply and dissolution of oxygen in the aerobic step is small since the degree of oxidation of the sludge is limited.

(iii) No external heating of the anaerobic digester is required as the heat is provided in the hot sludge feed from the first step. (Heating to mesophilic temperatures is a standard requirement for anaerobic digestion unless long retention period cold digestion is used).

(iv) The two-step system is an overall net producer of energy since all the methane gas produced by the anaerobic step is available for use external to the digestion plant. By comparison, a conventional anaerobic digestion system consumes 40 to 100 per cent of the methane produced to maintain the optimum operating temperature.

(v) The aerobic first step provides a conditioning effect on the sludge resulting in more stable operation of the anaerobic step. This is by:

  (a) reducing the effect of organic toxic contaminants of the feed sludge;

  (b) oxidising the most rapidly degradable components of the sludge which helps to maintain the balance of the growth rates of the acid forming and methane forming bacteria in the anaerobic step.

(c) solubilising some of the solid organic material at the thermophilic temperature of the first step.

(d) minimising temperature changes by maintaining a consistent feed sludge temperature to the anaerobic step.

(vi) Although the system involves two separate digestion tanks, the overall capital cost of the digestion system is reduced compared to conventional anaerobic digestion. This is because the anaerobic digestion tank volume is reduced by 60 per cent to 65 per cent and the need for heat generation and transfer system avoided.

(vii) The process may be started up much more rapidly than for a conventional anaerobic digester.

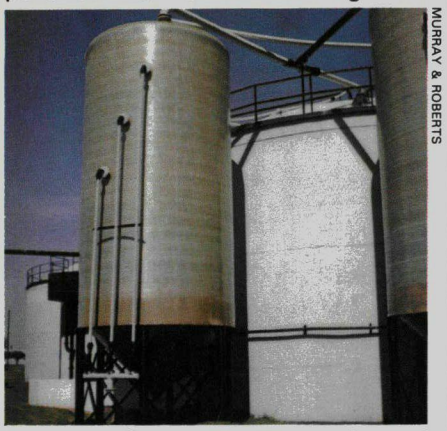
(viii) The system is particularly appropriate where an existing anaerobic digestion plant is required to treat increased sludge flows. Throughputs may be increased using this method by a factor of 2 to 3 and the need to renovate or replace ageing heat transfer equipment eliminated.

APPLICATION OF DUAL DIGESTION IN SOUTH AFRICA

A short retention period version of autothermal aerobic digestion is used as the first step of the *Dual Digestion* process and the Johannesburg City Council, under contract to the WRC, completed a programme of research into autothermal aerobic digestion in 1984. The objectives of the study were inter alia, to investigate the effectiveness of the process of autothermal aerobic digestion in terms of the inactivation/destruction of selected pathogens; to assess the effect of varying such parameters as solids loading and retention period; to assess the economic implications of operating at thermophilic termperatures utilising pure oxygen and to assess the potential, in the light of the results of the study, of the combination of autothermal aerobic digestion and anaerobic digestion (i.e. dual digestion) particularly from a point of view of cost effective stabilisation combined with pathogen inactivation. The Johannesburg Study used the Vitox oxygenation system in the Autothermal reactor.

The conclusions of the study were most encouraging. The process was found to operate successfully, was self-sustaining, very resistant to change, could achieve disinfection of the sludge if operated at the correct temperature and achieved high solids loading rates and efficient oxygen utilisation.

The work undertaken by the Johannesburg City Council has shown that a combined aerobic/anaerobic process does have potential in South Africa and that the final product from the process could well be beneficially utilised in agriculture under controlled conditions without the threat of pollution of surface and underground water and without endangering the health of man and animals through exposure to pathogenic viruses, bacteria and parasites.



MURRAY & ROBERTS

The 50 m^3 fibre glass autothermal reactor.

Before this process can be adopted, however, a number of aspects need careful study in order to ensure successful application to meet very specific needs in South Africa. The process for example, needs to be investigated on a large enough plant for process economics to be established with a high degree of accuracy.

Other factors to be investigated are the minimum retention period for the autothermal aerobic stage, minimum energy input, temperature control of the anaerobic stage of the process, mode of operation to prevent recontamination and dewaterability of the sludge.

The proposed research and development programme at Milnerton's Potsdam Wastewater Treatment Works will involve the establishment of a relatively large scale dual digestion facility which will treat about one half of the daily sludge production at the works and will be run in parallel with the existing Zimpro heat-treatment plant.

The dual digestion facility will consist of an existing 50 m^3 fibre glass autothermal reactor, an existing 1 000 m^3 concrete anaerobic digester, oxygen and air injection facilities, pumps, pipework, monitoring and control equipment and liquid oxygen storage.

Feed sludge to the facility will be mixed primary and humus sludge thickened by gravity to at least 3,5 per cent solids.

Establishment of the facility will involve modification to the existing reactors (one of which will be used as the autothermal aerobic digester and the other as anaerobic digester), interconnection of the reactors by means of pumps and pipework, recirculation pipework and the provision of oxygenation equipment, controls and monitors.

Once the facility has been established sludge will be fed to the autothermal reactor and oxygenation commenced. The reactor will be fed on a regular basis every two hours and an equal amount of sludge wasted from the system until an operating temperature of about 60°C has been achieved. This reactor will then feed the anaerobic digester with hot disinfected sludge and the process of anaerobic digestion will be gradually established. Prior to commencement of the start-up procedure the anaerobic digester will be sand blasted and epoxy lined.

Once the process has established itself and stable operating conditions have been achieved in both the autothermal aerobic stage and the anaerobic digestion stage, then optimisation of the process with respect to minimum retention periods, oxygen requirement, management of the possible foaming problems; energy input, temperature control, disinfection and sludge stabilisation can be commenced.

WATER AND SALT BA
EXAMINED IN BREEDE RIV

In the November 1985 issue of the *SA Waterbulletin* one aspect of salinity in agriculture was highlighted by an article describing the control of saline seepage into farms dams.

To further study the problem of salinisation of water in a rural agricultural environment, the Water Research Commission with strong support from the Department of water Affairs, has recently entered into an agreement with Murray, Biesenbach and Badenhorst, a firm of consulting engineers, to investigate the most effective means of establishing, the water and salt balances of an area of land under irrigation.

For several years high priority has been given to developing a mathematical mineralization model for a large part of the Breede River System, especially after a similar model called FLOSAL, had proved to be useful for planning and salinity management in the Fish-Sundays River system. According to Dr George Green, senior adviser of the Water Research Commission, a comprehensive programme aimed at adapting FLOSAL (which was developed specifically for the Fish River) to the Breede River was jointly undertaken by the Hydrological Research Institute (HRI) of the Department of Water Affairs and the Soils and Irrigation Research Institute (SIRI) of the Department of Agriculture and Water Supply.

In this endeavour, the HRI assumed responsibility for the hydrological component of the model and for compilation of the system model as a whole. The SIRI's function was to develop the irrigation return flow sub-model. A large amount of work has been done by both organisations. For instance, all available flow and salinity data have been assembled in a comprehensive data base, gauging station and sampling networks have been upgraded where possible, and the reprogramming of FLOSAL for the Breede System has largely been attended to. Soil surveys have been undertaken and soil modelling units delineated. Additional weather stations have been installed. Research backup has been provided by studies in the Poesjenels River Valley, where the Department of Agriculture has undertaken the testing of a detailed mechanistic model for assessing salt and water transport to below the root zone under conditons of irrigation, and the Water Research commission in turn has financed a project with the University of Stellenbosch to find out more about pathways of saline water movement to the river and contributions of saline groundwater to river salinity.

All this work represents a considerable investment of time, manpower and funds which should logically make for successful model development when it is all ultimately put together. Unfortunately, progress has been held up because of a lack of essential input data, mainly relating to distribution of water and irrigation water usage.

Yet the need for a comprehensive hydrosalinity model for the Breede River System in the medium term is as strong as ever. Even now difficulty is being experienced in predicting the relatively large quantitites of water which have to be released from storage purely for refreshening purposes, to ensure acceptable water quality for irrigators along the lower reaches of the Breede River. In the long run, as water quality deteriorates with more intensive use, it is feared that even larger quantities of water required for refreshing may no longer be affordable. Other options such as the provision of a canal to replace the various pumping stations serving irrigation areas along the lower reaches of the river will have to be investigated. The timing and optimisation of such a development will depend on sound model predictions.

The pilot study by Murray, Biesenbach and Badenhorst is being undertaken in order to bridge many of the important difficulties which

POSKAART

Posseël
Nodig

Mnr Francois Marais
Afdeling Nie-formele Onderwys
Posbus 4345
Bloemfontein
9300

Byvoegsel tot 'SA Waterbulletin' Feb. 1986

ANAËROBE VERTERINGSIMPOSIUM
22—24 SEPTEMBER 1986

Voltooi asseblief en stuur so gou moontlik terug

	JA	NEE
1. Ek stel belang om die simposium by te woon en sal graag verdere besonderhede ontvang	☐	☐
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plakkaat	☐	
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SYMPOSIUM ON DAM SAFETY

23–35 September 1986

University of Pretoria

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ORGANISATION: .....

ADDRESS: .....

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Please indicate the probability of your attending the symposium and participating in the study tour (mark appropriate block with X)

	Certain	Fairly certain	Uncertain	Not participating
Symposium	☐	☐	☐	☐
Study Tour	☐	☐	☐	☐

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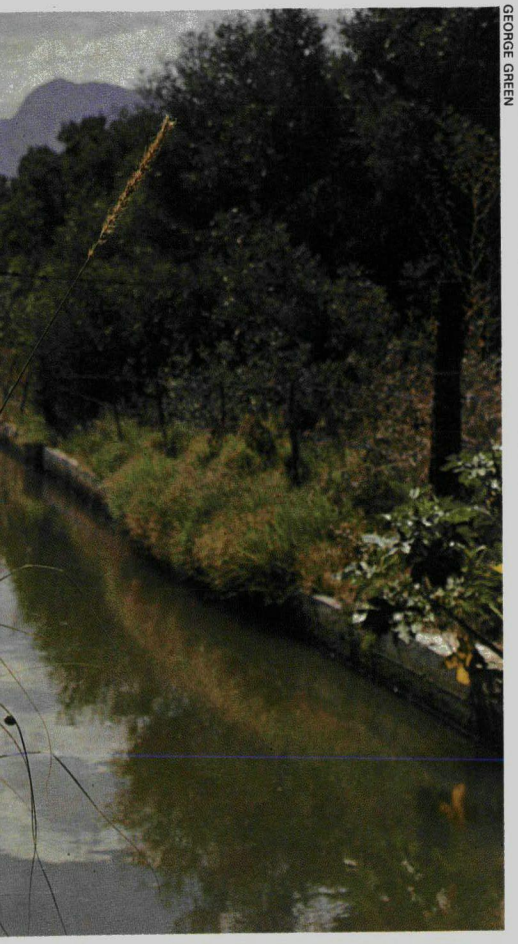


GEORGE GREEN

LANCES
ER SYSTEM

have slowed down efforts to model the mineralization (salinisation) of the Breede River.

The study address the question of how best to obtain input data necessary for establishing a salt and water balance of the study area. Furthermore, it is important to find out which of these input data are most meaningful and essential in terms of output sensitivity and to what accuracy they can and should be measured in future. Finally, the study must provide guidelines concerning a methodology for obtaining the necessary information at minimum cost for the complete Breede River System and for other systems where similar problems are being encountered.

Mr Charles Chapman, senior adviser of the water Research Commission says the approach used will be to intensively study the salt and water balance of approximately 1 000 ha of irrigated land served by the Robertson canal. Initially emphasis will be on direct measurement of all measurable quantities. A prescribed mathematical approach will be used to guide and evaluate acquisition of data relating to the measurable quantities and to provide good estimates of the non-measurable quantities. The project should not only make a most significant contribution to the ultimate goal of providing a comprehensive planning and management model for the Breede River system but should also indicate the most efficient and economical approach to acquiring information needed for hydrosalinity modelling in general.

Voorlegging van navorsingsvoorstelle aan die WNK

Weens die wydverspreide en volgehoue waterbeperkings wat deur die droogte veroorsaak is, het die WNK se inkomste wat verkry word uit belasting en vorderings op watergebruik en op ingelyste besproeiingsgrond, skerp gedaal. Gevolglik moet die WNK nou langer vooruit beplan vir die finansiering van nuwe navorsing en moet hy nog meer krities kyk na prioriteite.

Behalwe vir moontlike nuwe projekte wat in die vooruitsig gestel is en waarvoor begroot is, sal geen ander nuwe navorsingskontrakte tydens 1986 aangegaan kan word nie.

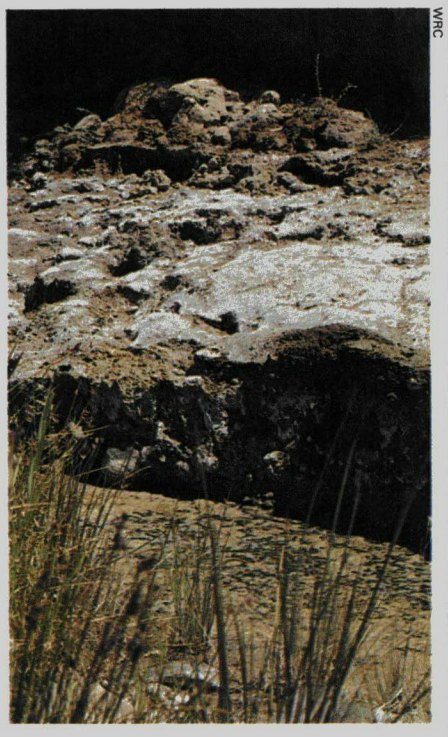
Om die WNK in staat te stel om vroegtydig te kan beplan vir sy 1987-begroting word organisasies wat navorsingsvoorstelle aan die WNK in gedagte mag hê, versoek om dit *vóór 31 Julie 1986* aan die Uitvoerende Direkteur te besorg vir voorlopige oorweging.

Ten einde onnodige moeite te bespaar moet voorstelle slegs kerninligting bevat, nl:

- Titel
- Kort samevatting van motivering en *modus operandi* (maksimum 2 bladsye)
- Voorgestelde termyn
- Beraamde begroting (salarisse, ander lopende uitgawes, en kapitaal vir elke jaar)

Die WNK sal al die voorleggings gesamentlik op prioriteitsgrondslag oorweeg en die voorlegger so gou doenlik in kennis stel of verdere onderhandelings m.b.t. elke spesifieke voorlegging geregverdig is.

Vir spesifieke voorleggings waaroor verdere onderhandelings gevoer word, sal volledige voorleggings vereis word. Die WNK se verantwoordelike adviseurs sal persoonlik met die betrokke personeel van die verskillende organisasies in verbinding tree ten einde te beraadslaag oor die formaat en inhoud van die volledige voorleggings en oor moontlike verdere uitklaringsprosedures voordat die voorlegging finaal en formeel by 'n vergadering van die Waternavorsingskommissie oorweeg word.



WRC

Efflorescence — the white deposits indicate the high salt content of the Breede River water.

Does the moon affect the weather?

From earliest times it has been believed that the Moon exerted a control over the behaviour of the atmosphere, and many systems for predicting the weather have been based on this idea*. In France, Jean Baptiste Lamarck issued long-range weather predictions based on lunar data in his *Annuaire Météorologique* from 1800 to 1811, and in Germany Rudolf Falb, who lived between 1838 and 1903, became known as a "lunar prophet". Falb coined the expression "critical days" for dates when the Earth, Moon and Sun occupied certain relative positions, which were supposed, according to his views, to be associated with various types of weather anomalies. Similarly, in Russia, Demchinskii issued long-range weather forecasts, from 1901 to 1903, based on supposed lunar effects for a number of places in Russia and Europe, and later published information even for locations as far afield as the United States, Japan and India. Although his forecasts were severly criticized by contemporary official meteorologists, they were eagerly received by the general public and published in the British newspaper the *Daily Mail.* Like all other past and present amateur weather prophets, Demchinskii presented a challenge to the professional meteorological establishment to provide a service of long-range weather forecasting, which was very much in demand at the time (and still is!), especially by workers in agriculture, industry and commerce, whose livelihoods depended on the weather.

Even in the RSA to-day, many a farmer bases his sowing programme on the phases of the Moon in the

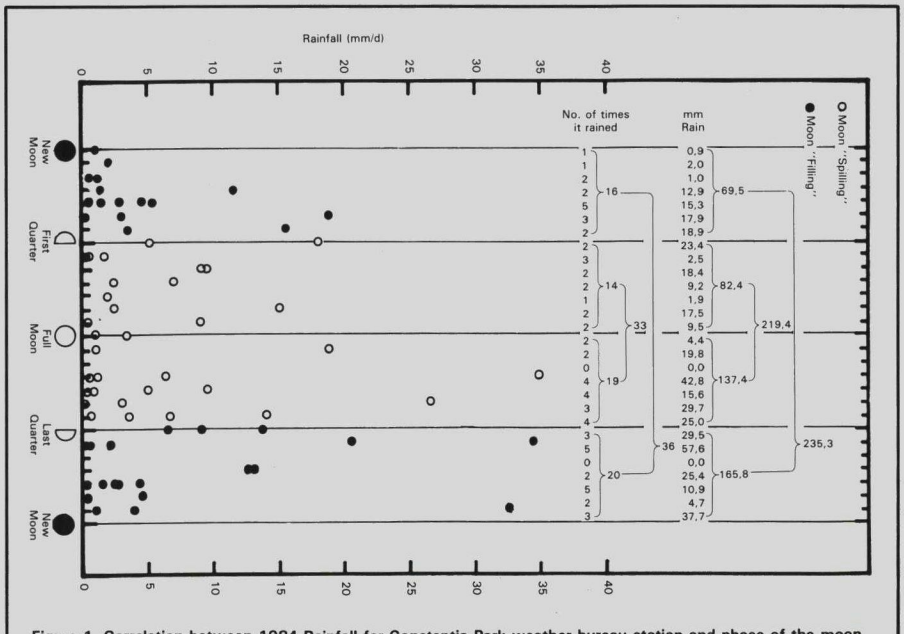


Figure 1. Correlation between 1984 Rainfall for Constantia Park weather bureau station and phase of the moon

**The Weather Book* by R. Hardy, P. Wright, J. Gribbin and J. Kingston. Michael Joseph Ltd., London, 1982.

belief that rainfall is somehow correlated with a particular phase; Many city dwellers also hold this belief. Adherents state that when the Moon "spills", i.e. when the phase of the Moon is between first quarter (◐), full Moon (○) and last quarter (◑), it rains significantly more than when the Moon is "filling", i.e. when its phase is between last quarter (◑), new moon (●) and first quarter (◐).

EVIDENCE

Discussions with those knowledgeable in the field of meteorology as well as a brief survey of the literature revealed no scientific evidence of any correlation between the phase of the Moon and quantity of rain (or for that matter number of rainfall events). Analysis of rainfall data for a Weather Bureau station in Constantia Park, Pretoria, RSA for two randomly chosen years, viz. 1985 and 1984, indicates that there is probably no substance in the above-mentioned popular belief (see Figures 1 and 2). The data shows that during 1984 it rained on 36 days (235 mm) while the Moon was "filling" and on 33 days (219 mm) while it was "spilling". Conversely, during 1985 it rained on 32 days (244 mm) while the Moon was "filling" and on 36 days (431 mm) while it was "spilling". Although this is by no means a statistically significant or representative data set, it demonstrates the point.

Does the Moon affect the weather? Probably not to any significant degree. Of course, the Moon's phases do affect ocean tides and if high tide coincides with strong winds the combination can be disastrous; but the Moon does not cause the winds.

Possibly the safest statement about the Moon's affect on the weather is set out in a rhyme given in the "Guinness Book of Weather: Facts and Feats"**

The Moon and the weather
May change together,
But a change of the Moon
Does not change the weather.

**Book written by Ingrid Holfond, Guinness Superlatives Ltd., Middlesex, UK, 2nd Ed., 1982

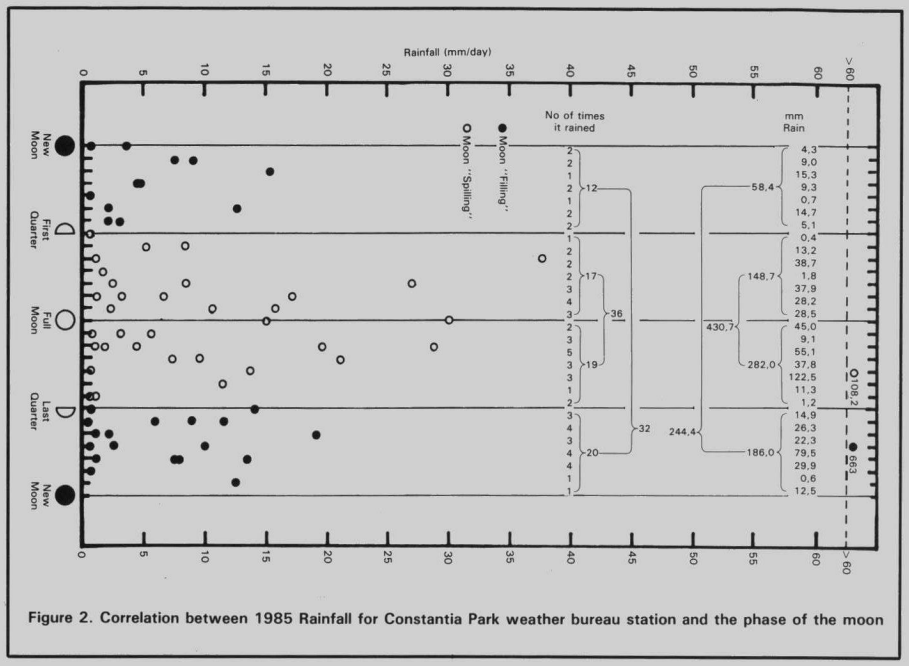


Figure 2. Correlation between 1985 Rainfall for Constantia Park weather bureau station and the phase of the moon

An Open Day Demonstration of the planning, operation and results of water loss analysis being undertaken jointly by Johannesburg Municipality and Castle Brass Holdings (Pty) Ltd on behalf of the Water Research Commission, will be held during May 1986 to coincide with the Municipal Engineers Conference to be held in Randburg from 12 — 15 May.

During the Conference a paper on Water Loss Analysis will be read but the 'open day' which has been arranged for the morning of 16 May immediately following the conference, will not be a formal part of the proceedings.

Representatives from far afield seldom see their way clear to travel long distances to attend functions such as this, so the rationale behind the arrangement is to enable as many conference delegates as possible to avail themselves of the opportunity of gaining first hand insight into the implementation of a Water Loss Analysis programme by staying on an extra morning after the conference.

A promotional and RSVP notice will be sent to all local authorities during March/April to advertise the demonstration, but those interested are asked to reserve this date now and to make an effort to attend.

Aspects included will be the preparation of water reticulation drawings, procedure for water loss control using largely daytime work, results achieve, remote recording of flow data using sophisticated electronic instrumentation, cost/benefit relationships and other peripheral benefits. Samples of interesting pipe defects will be displayed.

WNK help Hidrologiese

Die doeltreffende beplanning en bestuur van Suid-Afrika se waterbronne raak al hoe meer afhanklik van betroubare hidrologiese data in gerekenariseerde vorm.

Veral in hidrologies verwante projekte waar navorsers wiskundige modelle gebruik en met kragtige syferrekenaars werk, is inligting soos reënval, riviervloei, verdamping, ens. in 'n rekenaartoeganklike vorm deesdae onontbeerlik.

Die Departement van Waterwese wat die grootste gebruiker van hidrologiese inligting is, samel sedert die begin van hierdie eeu hidrologiese data vanoor die hele Suid-Afrika in. Al hierdie massas data is in die Departement se direktoraat Hidrologie byeengebring. Ongelukkig is baie daarvan nog nie gerekenariseer nie maar slegs in die vorm van papierdrukstukke aan navorsers en ander gebruikers beskikbaar. Dit beperk die bruikbaarheid van data baie en beteken dat duplikasie plaasvind elke keer as die verskillende gebruikers die inligting moet verwerk om dit rekenaartoeganklik te maak.

Ten einde gedeeltes van die Departement se rekenariseringsprogram vir hidrologiese inligting te help bespoedig, het die Waternavorsingskommissie aan die einde van 1984 'n bedrag van meer as R7 miljoen aan die Departement beskikbaar gestel.

WNK

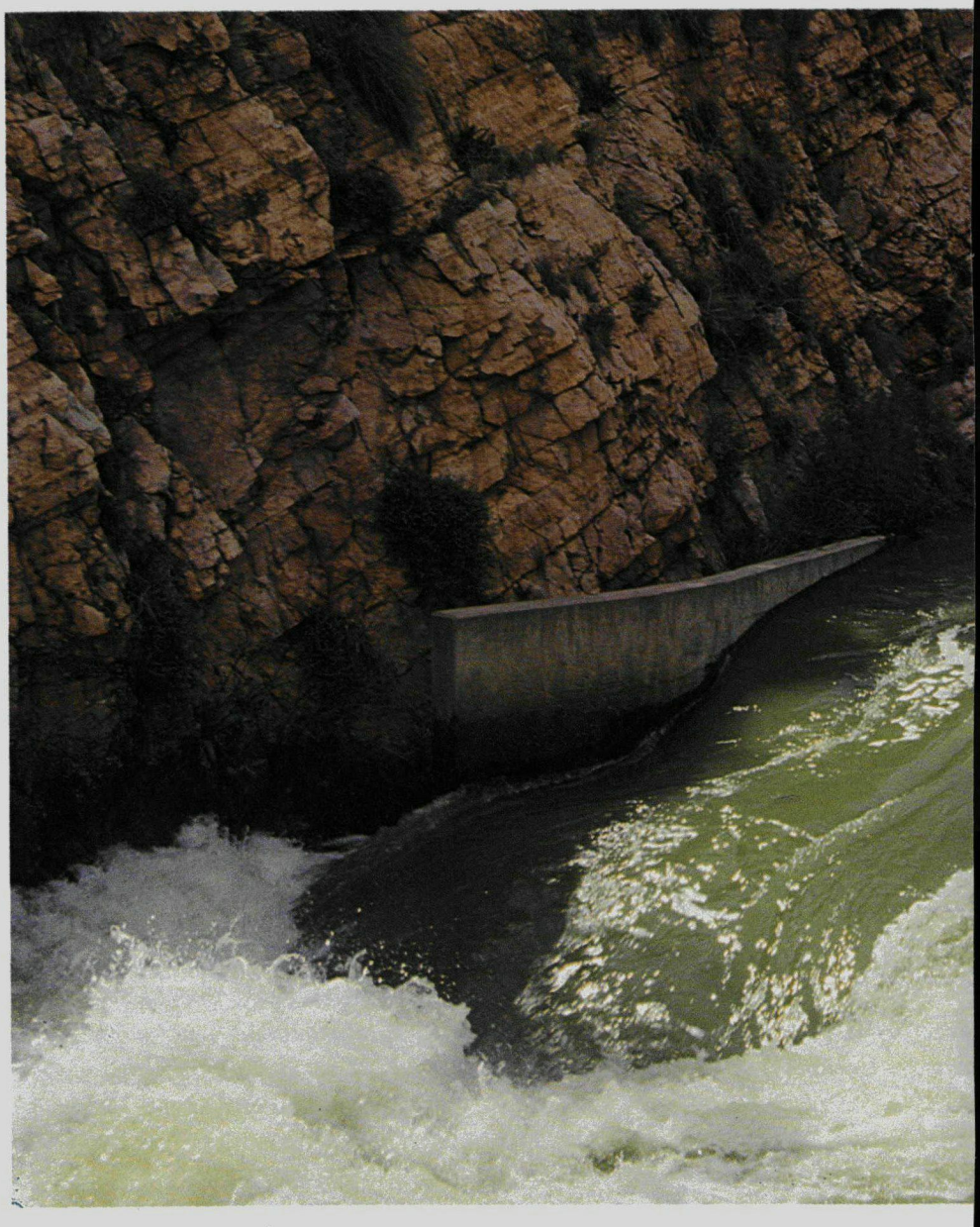
Mnr Dave Cousens, WNK.

Volgens mnr Dave Cousens, senior adviseur van die Waternavorsingskommissie, sal dié geld oor 'n periode van ses jaar gebruik word en deel uitmaak van die Waternavorsingskommissie se projek om uiteindelik 'n nasionale hidrologiese inligtingstelsel in Suid-Afrika tot stand te bring.

Mnr Cousens sê die hidrologiese inligtingstelsel sal uit altesaam agt verskillende databanke bestaan, naamlik banke vir reënval, vloei, reservoirs, verdamping, sediment, vloede, chemiese kwaliteit en grondwaterdata.

Die reënvaldatabank is reeds in 'n gesamentlike projek tussen die Waternavorsingskommissie en die Weerburo geskep terwyl die Universiteit van die Oranje-Vrystaat, met finansiële steun van die WNK, die grondwaterdatabank ontwikkel. Al die ander databanke sal mettertyd deur die Departement van Waterwese in bedryf gestel word, namate hulle data-ontwikkelings- en rekenariseringsprogram vorder.

Geskikte onttrekingsprogramme sal vir die hidrologiese inligtingstelsel geskryf word sodat data op papierdrukke magneetband, en moontlik ook via GOVNET beskikbaar sal wees, afhangende van die gebruiker se behoeftes. Die banke sal waar nodig ook aan mekaar gekoppel kan word. Sodoende sal 'n gebruiker wat byvoorbeeld die soutvrag in 'n rivier wil bereken, die chemiese kwaliteitsdata sowel as vloeidata uit die databanke kan verkry om sodanige berekenings uit te voer.



Mnr Cousens sê dat hoewel dit ideaal sou wees om al die hidrologiese inligting onder een dak beskikbaar te hê dit nie prakties moontlik is nie. Waar data deur verskillende instansies soos byvoorbeeld die Weerburo en die Departement van Waterwese geberg en hanteer word, sal 'n rekenaarnetwerk soos GOVNET die onderskeie banke met mekaar kan koppel.

Hy sê die hidrologiese inligtingstelsel moet as 'n nasionale netwerk beskou word wat in die toekoms ook data vanuit ander Suider-Afrikaanse state sal kan insluit, tesame met die hidrologiese inligting wat ander staatsdepartemente (buiten Waterwese), plaaslike owerhede, universiteite, raadgewende ingenieurs, waterrade en organisasies soos byvoorbeeld die SA Suikervereniging se navorsingstasie op Mount Edgecombe tans insamel.

Die insameling en berging van hidrologiese inligting word by die Departement van Waterwese deur die direktoraat Hidrologie behartig.

Databanke wat in die direktoraat geskep en reeds in 'n gevorderde stadium van rekenarisering is, is die vloeidatabank, die chemiese kwaliteitsdatabank, die verdampingsdatabank en die reservoirdatabank.

Databanke ontwikkel

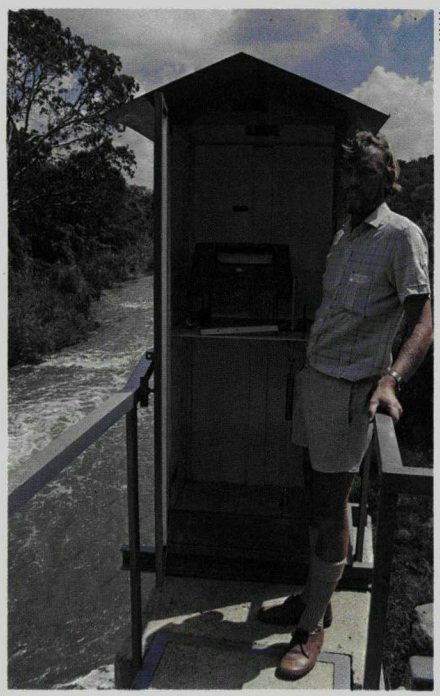
WNK

VLOEIDATABANK

Die Departement van Waterwese bepaal met vloeimetings hoeveel water daar bogronds in Suid-Afrika beskikbaar is. Dié vloeimetings vind tans by nagenoeg 1600 vloeimeetstasies landwyd plaas.

'n Vloeimeetstasie in 'n rivier bestaan gewoonlik uit 'n meetwal, meetplate, 'n inlaatpyp, verbind aan 'n put, en 'n registreerder waaraan daar 'n dobber vasgemaak is wat boop die water in die put dryf. Die dobber is ook aan 'n pen gekoppel wat die op-en-af beweging van die dobber op 'n grafiekkaart aanteken, namate die water in die put styg of sak. Die grafiekkaart vou om 'n silinder wat een keer 'n week deur 'n horlosie in die rondte gedraai, word. Aan die einde van elke week kry die data-insamelaar van die Departement dus 'n grafiek van hoe die watervlak gedurende die week by dié meetstasie geskommel het.

Mnr Daan Zietsman, assistent-direkteur by die Departement, sê die Departement se eerste riviervloeimeetstasies is reeds teen die einde van die vorige eeu gebou. Aanvank-



WNK

(Bo) Mnr PAL Wessels van die Departement van Waterwese by 'n vloeimeetstasie.

(Links): 'n Parshall-meetgeut onderkant die Hartbeespoortdam.

lik, vanaf 1900, is die stroomvloeidata op masjiene bewerk wat met die hand gedraai moes word. Later is na elektriese masjiene oorgeskakel en in 1964 het die Departement 'n DEMAC-aftasser aangeskaf.

Die aftasser is 'n elektroniese apparaat waarmee die koördinate van die penlyn in 'n rekenaar ingevoer kan word. Die riviervloeimeetstasie se grafiekkaart word op 'n tafel neergesit en die grafieklyn met 'n loper nagetrek. Op sekere plekke op die grafieklyn word die loper geaktiveer en sodoende word die hoogte-tydkoördinate van hierdie spesifieke punt in die rekenaar ingesleutel.

Mnr Zietsman sê vir elkeen van die vloeimeetstasies is daar ook 'n unieke vloeitabel opgestel.

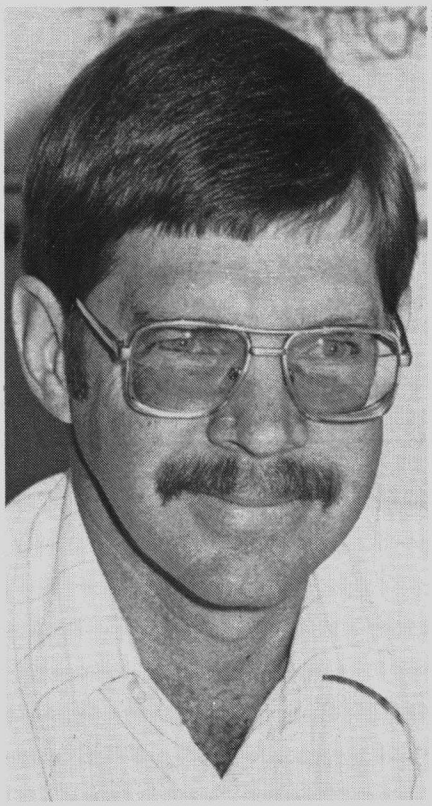
'n Vloeitabel verskaf die hoeveelheid vloei oor die meetwal in kubieke meter per sekonde teenoor hoogte in meter op die meetplaat. Dit staan ook bekend as die kalibrasie gegewens vir die betrokke meetwal.

Hierdie inligting is van 1900 tot 1976 alles met die hand bereken en in boekvorm gepubliseer vir gebruik. Gedurende 1976 het die Departement 'n vloeidatabank op 'n hoofraam-rekenaar geskep waarin al hierdie vloeitabelle tesame met die afgetaste koördinate gelaai is. 'n Rekenaarprogram het dan die twee stelle data bymekaargebring en die daaglikse gemiddelde vloei by elke meetstasie bereken. Die volgende stap was om uit hierdie daaglikse vloei 'n maandelikse opsomming te maak. Hierdie maandelikse opsomming verskaf van elke meetstasie die volgende data: die totale volume gemeet by die spesifieke stasie, die maksimum daaglikse gemiddelde vloei, die minimum daaglikse gemiddelde vloei, die piek van die maand, met ander woorde, die hoogste vloei wat gedurende die maand geregistreer is, die datum waarop dit plaasgevind het, die laagste vloei gedurende die maand, die datum waarop dit voorgekom het, asook die aantal dae waartydens vloei gedurende die maand by die stasie gemeet is. Hierdie maandelikse inligting word uiteindelik gesommeer na jaarlikse syfers vir die meetstasie.

Volgens mnr Zietsman is die maandelikse vloeidata die mees populêre data onder gebruikers. Dit kan gebruik word om waterbronne te bepaal en om byvoorbeeld, waar

WNK

Mnr Daan Zietsman.



WNK

Mnr Jan Schutte.

damme gebou is, die water te beheer.

Mnr Zietsman sê dat toe daar in 1976 met die ontwikkeling van 'n vloeidatabank begin is, was die inligting oor hidrologiese databasisstelsels nog baie beperk en die basiese ontwerp van die bank was nie na wense nie. Ingewikkelde datastrukture is gebruik wat gelei het tot die onekonomiese benutting van skyfruimte. Mettertyd het dit ook geblyk dat daar 'n behoefte bestaan het aan meer inligting as wat in die bank gelaai kon word.

Gevolglik is daar gedurende 1983 begin met die skep van 'n ''nuwe'' vloeidatabank. Die struktuur van die nuwe bank was eenvoudiger en daar is voorsiening gemaak vir die hantering van addisionele inligting.

Mnr Zietsman sê toe die ou stelsel geskep is, was gestruktureerde programmeringstegnieke nog feitlik onbekend. Die struktuur van die ou databasis het tot gevolg gehad dat ingewikkelde ongestruktureerde programme geskryf is wat feitlik nie deur 'n volgende programmeerder onderhou kon word nie. Die programme vir die nuwe stelsel was daarenteen eenvormig en gestruktureerd en dus heelwat makliker toetsbaar en onderhoubaar.

''Meer fasiliteite, in die vorm van onttrekingsprogramme, is ook beskikbaar vir die nuwe stelsel. Baie van die programme in dié nuwe stelsel maak van die sogenaamde ''user friendly''-benadering gebruik wat die gebruiker se taak heelwat vereenvoudig.''

Volgens mnr Zietsman staan die afgetaste hoogte-tyd-koördinate as primêre data bekend en data wat met behulp van vloeitabelle na daaglikse en maandelikse vloeiwaardes omgeskakel is as sekondêre data.

Op die oomblik is die Departement so te sê klaar met die laai van die sekondêre data in die nuwe bank, terwyl die primêre data wat vanaf 1900 ingesamel is tans deur mense vasgelê word wat kragtens die ooreenkoms tusen die Waternavorsingskommissie en die Departement gewerf is.

Hierdie historiese data word in 'n primêre bank gestoor. Daarna word dit verwerk tot sekondêre data en vergelyk met die sekondêre data wat reeds in die bank is. Teoreties behoort dit dieselfde te wees, maar, sê mnr Zietsman, weens meer gesofistikeerde berekeningsmetodes is daar tog verskille.

''Elke stasie waar verskille voorkom moet dan geëvalueer word om te kyk of die data reg is en indien dit nie reg is nie moet die foute gesoek en reggestel word.''

Een van die grootste probleme waarmee die data-personeel sukkel, is gebrekkige veldinligting en baie

van die grafiekkaarte wat die Departement ontvang, het foute op.

Volgens mnr Zietsman is daar nagenoeg 54 moontlike foute of kombinasies van die foute wat op 'n grafiekkaart kan voorkom. Byvoorbeeld: die meetstasie se inlaatpyp raak verstop, die pen skryf nie meer nie, die data-insamelaar vergeet om die horlosie op te wen, ens. Dit is moeilik om hierdie probleme uit te skakel, maar dit moet gedoen word sodat daar nie gapings in die rekords moet wees nie.

Hy sê die Departement is tans besig om ondersoek in te stel na die moontlikheid om weg te beweeg van die registreerderstelsel soos wat dit tans gebruik word. Hulle ontwikkel elektroniese registreerders wat die data elektronies in geheueblokkies vaslê. Dié data sal direk in die databank ingelees kan word sonder om dit eers af te tas.

CHEMIESE KWALITEITSDATABANK

Die Departement van Waterwese het gedurende 1973 begin om 'n chemiese kwaliteitsdatabank te skep en om al die ontledingsresultate wat destyds bestaan het daarin te laai.

Mnr Jan Schutte, assistent-direkteur by die Departement, wat vir die chemiese kwaliteitsdatabank verantwoordelik is, sê die bank was aanvanklik in die vorm van 'n gerekenariseerde ''lêerstelsel''.

''Hierdie stelsel het gaandeweg al swakker gefunksioneer namate die data daarin toegeneem het en in 1980 is dit met 'n nuwe databasis vervang wat van die hoofraambestuurstelsel gebruik gemaak het.''

Die Departement se uitgebreide bemonsteringsnetwerk is in die begin van die sewentigerjare tot stand gebring en die laboratorium by die Hidrologiese Navorsingsinstituut op Roodeplaat, buite Pretoria, het in 1974 begin om op 'n gereelde grondslag monsters te ontleed. Die direktoraat Hidrologie bemonster tans ongeveer 800 punte vir watergehalte.

Die monsters word met die hand geneem uit riviere, damme, mere, panne en kanale.

Sekere monsters word volgens mnr Schutte net vir elektrisiteitsgeleidingsvermoë (EG) by die Departement se hoofkantoor en

WNK

Die oue en die nuwe. Die operatrise is besig om stroomvloeidata met 'n moderne D-MAC aftasser te versyfer. Op die tafel staan die ou handmasjien (met die slinger), die aftasser se skerm en die elektriese apparaat waarmee die data vroeërjare verwerk is.

Hidrologie se streekkantore ontleed, veral dié wat afkomstig is uit gebiede waar daar nie watergehalteprobleme is nie. Die res word na die Hidrologiese Navorsingsinstituut gestuur vir 'n standaard reeks ontledings wat normaalweg 14 determinante insluit. Die monsterdata word in die rekenaar ingesleutel

WNK

Mnr Al Rabie, direkteur Hidrologie, by een van die eerste watervlakregistreerders wat in Suid-Afrika gebruik is. Dit dateer uit die jare 1900 – 1901.

om met die laboratoriumdata, wat per magneetband ontvang word, te koppel en gestoor te word.

Gebruikers kan die data op papierdrukke of op magneetband bekom.

Mnr Schutte sê die chemiese kwaliteitsdatabank word op grootskaal gebruik en daar is tans 200 000 monsters se gegewens op die rekenaar beskikbaar.

Die huidige databank voldoen ook nie meer aan die vereistes nie en 'n nuwe stelsel word tans geskap met behulp van die finansiële ondersteuning van die WNK.

''Die grootste leemte in hierdie stadium is egter dat die bank nog nie aan die vloeidatabank gekopel kan word om byvoorbeeld berekenings vir soutvrag te doen nie.''

Daar word ook beplan om die bank met die sedimentdatabank te koppel sodra laasgenoemde ten volle operasioneel is.

Ander databanke waaraan die Departement aandag skenk, is die verdampingsdatabank, reservoirdatabank en sedimentdatabank.

VERDAMPINGSDATABANK

Daaglikse verdamplesings en reënvalwaardes word as maandelikse opgawes vanaf nagenoeg 350 verdampstasies in Suid-Afrika na die

Departement gestuur en is veral noodsaaklik vir die berekening van daminvloeie.

Spesifikasies vir die daarstelling van 'n databank vir verdampingsdata is in 1982 opgestel. Die bank is intussen geprogrammeer en met data gelaai, maar dit verkeer nog in 'n toetsfase 'n Rekenaarprogram moet onder andere nog ontwikkel word sodat die bank met die reservoirdatabank gekoppel kan word vir die berekening van waterbalanse.

RESERVOIRDATABANK

Daar word tans hidrologiese data versamel by meer as 180 damme in Suid-Afrika terwyl 26 watervlakmeetstasies by die belangrikste mere en panne in die land aangebring is om skommelinge in die watervlakke aan te teken.

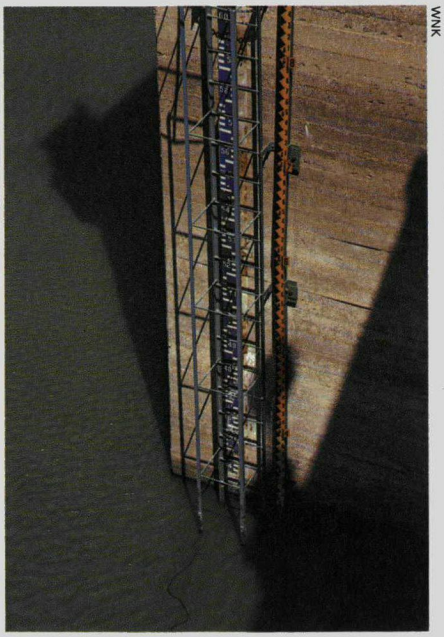
By 'n dam is gewoonlik twee hoeveelhede ter sprake, naamlik

- die volume water in opgaring en
- die invloei wat plaasgevind het.

Dit is in teenstelling met 'n gewone riviermeetstasie waar hoofsaaklik die vloei ter sprake is. By 'n dam word die volume water in opgaring bepaal met meetplate in die dam en die ''kapasiteitstabel''.

Die invloei wat tydens 'n sekere periode plaasgevind het, moet egter *bereken* word met die volgende algemene balansvergelyking:

Invloei = (eindvoorraad — beginvoorraad) + uitlate − winste + verdamping.

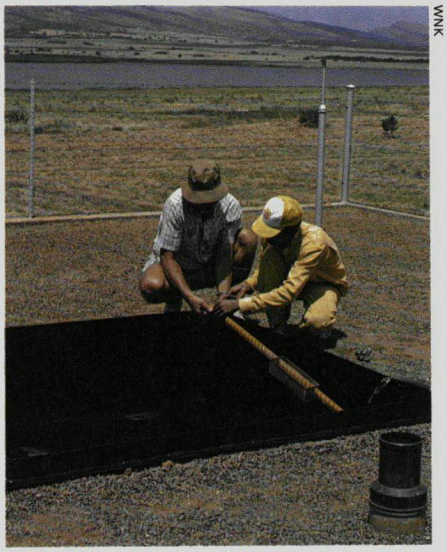


WNK

'n Watervlakmeetplaat.

(Uitlate dek die wye spektrum van maniere waarop water 'n dam kan verlaat soos deur tonnels, kanale, pype, sluise, ens. asook verliese, syfering en oorloopwater. Winste varieer van dam tot dam afhangende van die fisiese opset en word net soos uitlate gemeet met gekalibreerde damstrukture, watermeters en gewone vloeimeetstasies. Die hoeveelheid verdamping vanuit 'n dam word bereken aan die hand van 'n verteenwoordigende verdampstasie in die onmiddellike omgewing van die dam.)

Die reservoirdatabank kan beskou word as 'n naloper van die databanke vir vloei en verdamping. Funksionele spesifikasies is reeds vir hierdie bank opgestel en wanneer die vloei- en verdampingsdatabanke genoegsaam gevorder het, sal die reservoirbank geprogrammeer word. Onttrekkings- en evalueringsprogramme sal dan daarop volg.



WNK

'n Verdamppan.

SEDIMENTDATABANK

Die Departement se sedimentbemonsteringsnetwerk beslaan nagenoeg 300 punte waarvan maandeliks meer as 500 monsters ontleed word. Op die oomblik bestaan daar nog geen databank vir sedimentinligting nie, maar alle resultate en data word reeds op kodeervorms ingevul om dit voor te berei vir uiteindelike rekenarisering. Programme vir die koppeling van die sedimentdatabank met die banke vir waterkwaliteit, vloei en reservoirs sal ook nog mettertyd ontwikkel word.

AWARD FOR PROF SCHULZE

WRC

Professor Roland Schulze of the Department of Agricultural Engineering, University of Natal, Pietermaritzburg has been awarded the prestigious Ernest Oppenheimer Travel Scholarship. It will enable him to travel to Utah State University in America during 1986 to continue his extensive research into water utilisation by different land uses.

Prof Schulze will present a paper at the Second Scientific Assembly of the International Association of Hydrological Sciences in Budapest, Hungary en route to Utah. While at Utah he will be working in the field of water resources management and efficiency, specialising in the application of agrohydrological modelling in developing countries.

Working Committee on Phosphate Removal to meet

The next open meeting of the IWPC Working Committee on Phosphate Removal from wastewater will be held on 26 March 1986. Those interested in attending should contact Committee Chairman, Dr Herman Wiechers, c/o Water Research Commission, PO Box 824, Pretoria, 0001 or phone (012) 28-5461.

SA's nutrient removal experience transferred to Australia

At the invitation of an Australian consultant engineering group, Dr George Ekama, senior research officer in the Division of Water Resources and Public Health Engineering, University of Cape Town, visited Australia recently for three weeks.

The purpose of his visit was twofold. Firstly to participate in a project team to undertake the process design of a new 27 Mℓ/d nutrient removal activated sludge system for Bendigo, Victoria, and secondly to give a number of seminars outlining some recent developments in biological nitrogen and phosphorus removal technology, describing South Africa's experience with this technology at laboratory, pilot and full scale.

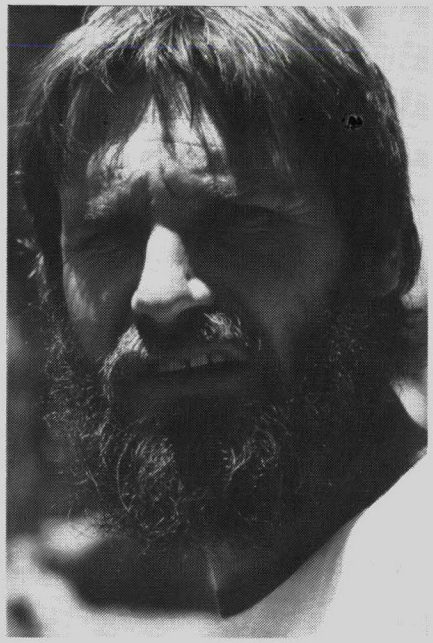
The tasks of the project team included, inter alia, an evaluation of the existing sewage treatment facilities, sewage characterization, pilot plant operation, preliminary design for the new nutrient removal activated sludge system and clarifiers, and an investigation in sludge disposal options.

The project team was led by Mr Paul Dougas, Manager of Sinclair, Knight and Partners, a consultant engineering group in Melbourne, and included Dr Ekama, members of the Bendigo Water Board, Bendigo College of Advanced Education and some staff members of Sinclair, Knight and Partners.

EVALUATION

At the recommendation of Dr Ekama, the team undertook an intensive evaluation of the sewage characteristics, such as flow, COD, TKN and Total P loads, in particular measurement of the readily biodegradable COD. The evaluation indicated that the Bendigo sewage has reasonably favourable characteristics for biological N and P removal but that the readily biodegradable COD fraction is fairly low.

Based on the measured sewage characteristics, a preliminary nutrient removal process design was done. Calculations based on theories, models and experience gained in South Africa indicated that complete removal of N and P by biological means only was unlikely, principally due to the low readily biodegradable COD fraction of the wastewater. This required some special features to be included in the design to maintain flexibility and to achieve the best possible biological N and P removals.



D. JENKINS

Dr George Ekama

To obtain additional information on the nutrient removal capability of the Bendigo wastewater, a 120 ℓ/d pilot plant has been set up in a modified UCT configuration with process parameters close to the anticipated design values. The data from the pilot plant will also serve to check the predicted performance of the full scale design.

The importance of the sewage characteristics in biological N and P removal, has prompted the Bendigo Water Board to undertake an investigation into the industries that contribute to the various COD, TKN, P and readily biodegradable components with the view of possibly regulating these contributors to promote more favourable sewage characteristics.

Dr Ekama presented the recent developments in nutrient removal technology at two seminars arranged by Sinclair, Knight and Partners in Melbourne and Sydney. The seminars were attended by research scientists, academics, and engineers from local water boards and regulatory agencies.

The seminars were very well received and the participants expressed a keen interest in the developments in nutrient removal technology with the view of extending the application of the technology in Australia. Dr Ekama felt that the participants were impressed with the developments in the field in South Africa and the leading role this country appears to have attained in this field, and anticipates that there will be greater co-operation in the nutrient removal field between the two countries in the future.

Water analysis course in Natal

A course in water analysis will be held at the Technikon Natal in Durban from 9 to 11 June 1986.

The objective of this three-day course is to focus the analysts' attention on the precise and specific determinations of metals, organics, etc. found in various types of water.

A series of laboratory exercises will expose analysts to the application of modern analytical instrumentation (GC, AA, LC & IC, Electrochemistry) in water analysis.

Cost: **R345**

Enquiries: The Secretary, Analytical Chemistry Training Unit, Technikon Natal, PO Box 953, Durban 4000. Telephone: (031) 81-8711/31-4212. Telex: 620187.

QUESTIONNAIRE ON WASTEWATER TREATMENT PROCESS CONTROL

by

UNIVERSITY OF CAPE TOWN
Department of Chemical Engineering
Department of Civil Engineering

Research in collaboration with the Water Research Commission of South Africa

1. OBJECTIVE

An informal survey has indicated that a number of wastewater treatment plants in South Africa experience process control problems. These problems generally arise from the variation in the influent load (hydraulic and organic) over the day; for example, dissolved oxygen control in activated sludge systems. To assess the extent of the control problem on a more formal basis, the University of Cape Town, in collaboration with the Water Research Commission, has set up this short questionnaire. The results from this questionnaire will be used to identify specific areas where there are deficiencies in existing control procedures or where implementation of process control can lead to improved plant performance. Dependant on the need, this information then can be used to initiate an investigation into the application of existing control procedures and the development of strategies specific to the types of process encountered in South Africa.

2. GENERAL NOTES ON COMPLETING QUESTIONNAIRE

2.1 Please return completed questionnaire within two weeks.

2.2 Information in the questionnaire will be treated as confidential.

2.3 Do not hesitate to supplement information requested in the questionnaire on separate sheets.

2.4 If you have any difficulties in completing the questionnaire do not hesitate to call Dr Peter Dold (Tel 021 69-8531 ext 609/334).

3. GENERAL INFORMATION

3.1 Name and address of treatment works: .....

.....

.....

Post Code ..... Tel: .....(include area code)

3.2 Name of plant superintendent: .....

3.3 Person completing questionnaire:

Name ..... Position .....

Tel: ..... (Include area code) .....

3.4 Date questionnaire completed: .....

4. TYPE AND SIZE OF TREATMENT PLANT

4.1 Average dry weather flow: design .....
(please specify units).
present .....

4.2 What type of plant is it? (Give its name and describe briefly e.g. trickling filter, extended aeration activated sludge, three stage Bardenpho)

.....

.....

4.3 Do you have a flow balancing (equalization) tank?

YES NO

5. PROCESS CONTROL PROBLEMS

5.1 Do you have any process control problems?

YES NO

5.2 If yes, indicate the severity of your problem:

MINOR DIFFICULT MANAGEABLE IMPOSSIBLE

and also briefly indicate the nature of the control problem(s) (e.g. dissolved oxygen control, settling tank overloading, etc)

a) .....

b) .....

c) .....

5.3 Do you have any monitoring instrumentation?

YES NO

5.4 If yes, indicate nature of monitoring instrumentation (e.g. flow recorder, DO concentration probes, etc):

a) .....

b) .....

c) .....

5.5 Do you have any automatic control equipment/systems?

YES NO

5.6 If yes, briefly describe type of control equipment/system (e.g. flow controllers, DO control by switching aerators on/off, etc):

a) .....

b) .....

c) .....

6. CLOSURE

We wish to thank you for your co-operation in completing this questionnaire.

6.1 Would you be willing to participate in any further investigation and complete a more extensive questionnaire?

YES NO

6.2 Please return completed questionnaire to:

Dr Peter Dold
Department of Chemical Engineering
University of Cape Town
RONDEBOSCH
7700

SANCOLD

SYMPOSIUM ON DAM SAFETY

FIRST ANNOUNCEMENT

PURPOSE: Introduction of the new comprehensive dam safety legislation and discussion of current acceptable practices in dam engineering.

WHO SHOULD ATTEND: Owners of dams with a safety risk, professional engineers and other professionals associated with the design, construction, operation, maintenance and abandoning of dams.

ORGANIZERS: The South African National Committee on Large Dams (SANCOLD) and the Hydraulic and Water Engineering Division of the South African Institution of Civil Engineers.

DATE: 23 – 25 September 1986.

PLACE: Senate Hall, University of Pretoria.

TOPICS:
- Legal aspects and financial implications
- Current practice for the design and evaluation of safety of dams
- Dam safety control during construction
- Current practices for the operation and maintenance of dams.

SPEAKERS: Invited speakers from different organisations will introduce the various topics and ample time will be allocated for short contributions and discussions by delegates.

LANGUAGES: The language media for the symposium will be English and Afrikaans. Simultaneous translation facilities will not be available. Extended abstracts written in both languages will, however, be provided.

FEE: Registration fee R250

The registration fee includes a copy of the symposium papers, refreshments and lunches, as well as a cocktail party on the Tuesday evening.

STUDY TOUR: An optional visit to a rollcrete dam under construction and a dam in operation is planned for 25 to 26 September 1986. The all-inclusive cost (transport, accommodation, meals) of the site visit will be R120.

ENQUIRIES AND CORRESPONDENCE TO:

Symposium Organizer
P.O. Box 3404
PRETORIA
0001

(Tel. (012) 299-2032)
Dr C.P.R. Roberts or Mrs E. Odendaal

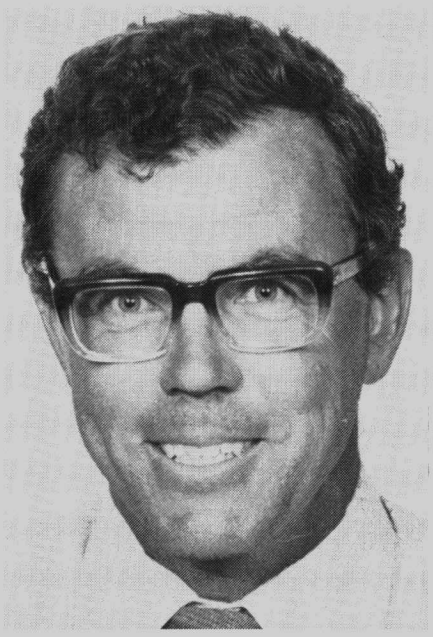
REGISTRATION: To ensure your place at this important symposium and to receive further information please complete and return the postcard in this issue of *SA Waterbulletin* before 30 April 1986.

Algproduksie vir beter waterbenutting ondersoek

Die Waternavorsingskommissie het 'n ooreenkoms met die Universiteit van die Oranje-Vrystaat aangegaan om navorsing te doen oor die beter benutting van water deur middel van algproduksie in vars- en brakwater.

Mnr Steve Mitchell van die UOVS se eenheid vir limnologie, sê algkultuursisteme het die potensiaal om met afval as voedingsbron 'n groot hoeveelheid biomassa met 'n hoë proteïeninhoud te lewer.

"Voorspellings toon dat daar teen die jaar 2000 'n proteïentekort van nagenoeg 400 000 ton, hoofsaaklik as veevoer, in Suid-Afrika sal wees, en een manier waardeur hierdie tekort moontlik gedeeltelik opgelos kan word, is met die kweek van alge".



UOVS

Mnr Steve Mitchell

Mnr Mitchell sê daar is tot onlangs nog baie probleme ondervind met die handhawing van stabiele algkulture in die praktyk en die oes van die alge was 'n duur proses.

Die Universiteit van die Oranje-Vrystaat se eenheid vir limnologie het egter gedurende die laaste agtien maande 'n akwakultuursisteem ontwikkel wat dié probleme grootliks oorkom.

UOVS

Die oes van die alge. Tydens die oesproses word die alge met 'n nylonnet uit die water gesif. Die openinge in dié net is 63 μm groot, maar openinge van tot 112 μm is ook voldoende.

Die sisteem bestaan uit 'n kultuur van filamentagtige alge en invertibrate wat in brakwater gekweek word met veemis as voedingstofbron. 'n Eenvoudige loodsaanleg word reeds vir 'n jaar bedryf sonder noemenswaardige probleme. Aanvanklike resultate dui aan dat die sisteem potensiële voordele bied vir die produksie van proteïen (gemeet in droë massa proteïen per eenheid waterverbruik) in vergelyking met gewasproduksie deur middel van besproeiing. Die stelsel kan toegepas word met beide afvalwater asook brakwater — soos in groot dele van die land voorkom en wat nie lonend vir ander doeleindes gebruik kan word nie. Die stelsel bied ook die moontlikheid van aanvullende opbrengs uit besproeiingswater indien die water eers vir akwakultuur gebruik word en daarna vir konsumptiewe gebruik vir besproeiing.

Die nuwe projek behels 'n korttermynondersoek (een jaar) van algproduksie in vars- en brakwater met afval as voedingstofbron.

'n Literatuurstudie sal onderneem word om die nuwe alge/invertibraatsisteem se potensiaal as 'n proteïenproduksiesisteem vir die meerdoelige benutting van water beter te kwantifiseer.

'n Laboratoriumstudie sal onderneem word om 'n geskikte varswater alg/invertibraatsisteem te ontwikkel asook om die belangrikste prosesbedryfsparameters te identifiseer.

Voorgenoemde studies sal gebruik word om te bepaal of hierdie akwakultuursisteem werklik praktiese potensiaal het. Indien dit wel die geval is, sal daar na afhandeling van die projek oorweging geskenk kan word aan 'n opvolgprojek om die sisteem op loodsskaal te toets en die ekonomiese gangbaarheid daarvan vas te stel.

UOVS

Een van die 10 m^3 damme waarin die alge met veemis as voedingsbron gekweek word.

Recent issues of *SA Waterbulletin* have introduced and reported on the progress of the National Industrial Water and Wastewater Survey (NATSURV). In this issue, examples from the metal treatment industry are presented. These are used to show how detailed information stored on NATSURV's database is helpful when comparing the water efficiency of factories within an industry.

Natsurv: Progress Report

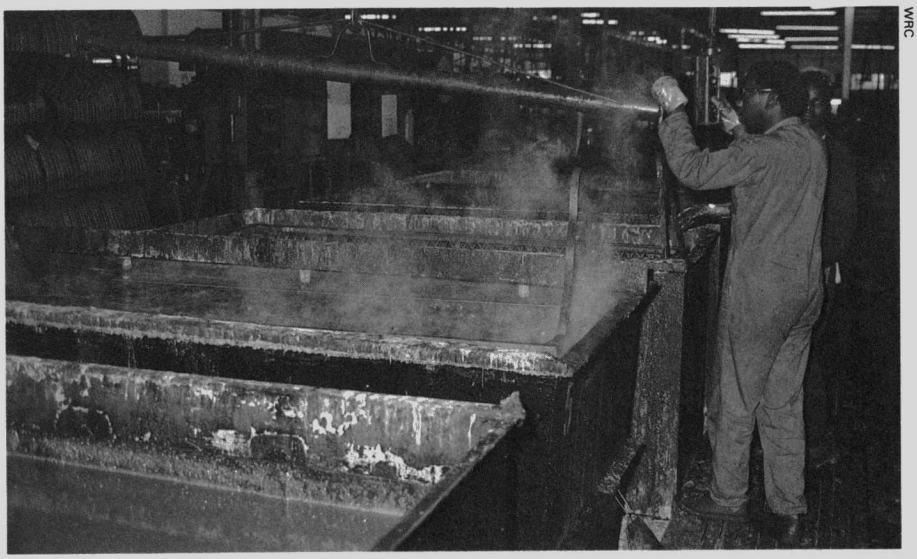
One of the prime objectives of NATSURV is to develop a computer database which incorporates data from the complete spectrum of water-using industries in South Africa. This information will be used for legislative and planning purposes. Data and samples are collected by the NATSURV survey teams to calculate the Specific Water Intake (SWI) and Specific Pollution Load (SPL). As mentioned in the May 1985 issue of SA Waterbulletin, these parameters must be used with care. Fortunately, the NATSURV database has been designed to store very detailed information on each factory visited and this facilitates meaningful comparison of all water-related parameters. In turn, this will provide a basis for the planning of future water supplies by taking account of the specific requirements of each industry.

METAL TREATMENT PROCESSES

Electroplating, phosphating, nitriding and coating are some of the common metal treatment processes which have been encountered by NATSURV. A brief generalised description of these processes follows.

ELECTROPLATING

The item to be plated is always pretreated. This usually involves the following process steps: alkali degreasing, rinsing, electrolytic cleaning, rinsing, acid de-oxidizing or pickling followed again by rinsing. The clean metal object then becomes the cathode while the metal to be deposited forms the anode of an electrolytic cell. When current is passed, the anodic metal goes into solution, is transferred through the solution and deposited onto the cathode. Rinsing and drying follows the plating stage.



WRC

PHOSPHATING

Items are usually phosphated prior to being painted as this provides a degree of corrosion protection as well as giving the surface a particularly good key for the following paint coats. As with electroplating, the item to be phosphated is also pretreated. This usually involves the following process steps: alkali degrease, rinse, acid pickle and rinse. Phosphating is achieved by dipping the item into a phosphoric acid solution and then into a rinsing bath. The surface would be dried prior to painting.

NITRIDING

Steel is nitrided in order to harden the surface. The process involves maintaining the metal at a temperature of 500°C approximately for about 90 hours while subjecting it to active nitrogen, produced at the metal surface by the decomposition of gaseous ammonia. The steel may be pretreated in degreasing and rinsing stages.

COATING

The coating process varies according to the substance which is used to coat the surface of the metal. Preparatory work usually includes cleaning with a degreasing agent followed by rinsing. Then the metal is heated and dipped into the coating liquid. A water quench sometimes follows to set the coat.

NATSURV RESULTS

Some results obtained for the above four processes are presented in Tables 1 to 4. SWI's have been calculated on the basis of total water intake while total dissolved solids (TDS) has been chosen to reflect the

SPL. These SPL's are based on total industrial effluent discharged. SWI and SPL are expressed in terms of surface area wherever possible. However, mass has had to be used where job-lots of varying shape and size were processed.

ELECTROPLATING

The results for the electroplating industry are presented in Table 1. Factories A and B have very similar SWI's and SPL's. It is interesting that factory C which manufactures printed circuits has a significantly higher SWI. The printed circuit manufacturing process differs substantially from normal electroplating. It comprises repeated plating followed by etching and silk-screening all with intermediate rinse stages. This explains the higher water use. The SPL is also higher, but the difference is not as great as for SWI.

Funke & Coombs (1) compiled a detailed report on the electroplating industry and in the course of their study obtained data from three plating shops. The SWIs for these electroplates have been shown as factories X, Y and Z. Their SWIs of 0.69, 0.36 and 0.36 compare very well with NATSURV's results for factories A and B of 0.43 and 0.40 m^3/m^2 respectively. Funke & Coombs also report that the SWI for British electroplaters ranges between 0.15 and 0.39 m^3/m^2, so it appears that there may be scope for some of the South African electroplaters to improve the water efficiency of their operations.

Factory E has a SWI many times greater than that of factory D. This is mainly due to the fact that E is a very small factory and the domestic water consumption is proportionally much higher than for a larger premises.

TABLE 1: ELECTROPLATING

Degrease → Rinse → Electro clean → Rinse → Deoxidise → Rinse → Plating → Rinse

FACTORY	PROCESS	MONTHLY PROD	WATER INTAKE (m^3/month)	SWI (m^3/m^2)	SWI (m^3/t)	TDS SPL (kg/m^2)	TDS SPL (kg/t)
A	Copper & aluminium	6 500 m^2	2 770	0.43	—	0.36	—
B	Zinc & chrome	3 000 m^2	1 200	0.40	—	0.54	—
C	Printed circuits	500 m^2	2 420	4.8	—	1.0	—
D	Zinc, cadium, copper & nickel	220 t	2 800	—	12.7	—	7.71
E	Silver	1 t	340	—	340	—	250
X*	Copper, nickel chrome	4 850 m^2	3 340	0.69	—	—	—
Y*	Nickel & chrome	14 000 m^2	5 000	0.36	—	—	—
Z*	Copper & nickel	1 540 m^2	550	0.36	—	—	—

*Data from Funke & Coombs (1)

TABLE 2: PHOSPHATING

Degrease → Rinse → Deoxidise → Rinse → Phosphating → Rinse

FACTORY	PROCESS	MONTHLY PROD	WATER INTAKE (m^3/month)	SWI (m^3/m^2)	SWI (m^3/t)	TDS SPL (kg/m^2)	TDS SPL (kg/t)
F	Phosphating & painting	27 500 m^2	11 450	0.42	—	0.05	—
G	Phosphating	335 t	3 240	—	9.7	—	15.5
H	Phosphating & painting	350 t	2 270	—	6.5	—	1.8

TABLE 3: NITRIDING

Degrease → Rinse → Heat under ammonia

FACTORY	PROCESS	MONTHLY PROD	WATER INTAKE (m^3/month)	SWI (m^3/m^2)	SWI (m^3/t)	TDS SPL (kg/m^2)	TDS SPL (kg/t)
I	Nitriding of steel	15 t	120	—	8.0	—	—

TABLE 4: COATING

Degrease → Rinse → Heating → Coating → Water quench

FACTORY	PROCESS	MONTHLY PROD	WATER INTAKE (m^3/month)	SWI (m^3/m^2)	SWI (m^3/t)	TDS SPL (kg/m^2)	TDS SPL (kg/t)
J	Coating of mirrors	300 t	30	0.10	—	0.07	—
K	Protective coatings	800 t	1 780	—	2.2	—	0.34

PHOSPHATING, NITRIDING AND COATING

The results collected to date are shown in Tables 2,3 and 4, in-

CHINA CLOSES DIRTY FACTORIES

According to the British journal, *Waterbulletin,* Mr G Qu, Director of Red China's Environmental Protection Agency, recently told delegates at a conference on urban pollution control in Hong Kong that China had closed 11 000 factories in 1981 and 1982 on the grounds of implementing pollution control. He said that environmental protection had moved up the list of China's priorities with tighter controls being put on new pollution sources and stricter management enforced on existing sources.

dicating the small number of these processes so far encountered by NATSURV. It is intended that further examples of each will be surveyed in the near future.

GENERAL

Although the four processes described have many common elements each is substantially different in terms of water usage. This is apparent from details contained by the NATSURV computer database. Factories A, B, F and J have SWI's of 0.43, 0.40, 0.42 and 0.10 m^3/m^2 respectively, similarly factories D, G, H, I and K have SWI's of 12.7 9.7, 6.5, 8.0 and 2.2 m^3/t. While any parameter relating to surface treatment should be based on area logically, in some cases, eg. small items, that is simply not possible. It is encouraging to note that the SWI's within each system are of a comparable order of magnitude.

A further point of interest is the analysis of effluent samples. Heavy metals and cyanides have been included in the NATSURV brief only recently. Results from such analyses will provide important additional information on the water pollution potential of the metal treatment industry in future.

Funke & Coombs showed that the main source of heavy metals and cyanides in effluent discharges was derived from either wilful or accidental dumping of concentrated solutions and not as might be expected from the discharge of large volumes of dilute rinse waters. NATSURV's role is to collect and record operational information such that the industry may operate within a more controlled environment in the future. In addition, the data will show how variations in processes can result in substantially different requirements for water intake and pollution output and hence lead to optimal water efficiency within the industry.

References

1. Funke JW & Coombs P
Water and Effluent Management in the Electroplating and Anodizing Industry, CSIR Technical Guide K29, 1973.

WATERBEHANDELING BEPLAN VIR BUITENSTE RUIMTE

Die ruimtestasie wat die Amerikaanse ruimte-agentskap (Nasa) beplan om vroeg in die negentigerjare in 'n wentelbaan te plaas, bied 'n paar interessante uitdagings aan tegnici en wateringenieurs. Ruimtevaarders sal maande lank op die ruimtestasie moet woon en werk en derhalwe behoefte hê aan gesofistikeerde stelsels waarmee water, insluitende menslike afvalwater, gesuiwer kan word vir hergebruik.

Volgens die Amerikaanse tydskrif *Highlights* is Nasa-wetenskaplikes tans hard besig om stelsels te ontwikkel vir die voorbehandeling van afvalwater wat chemiese afbreking en mikrobiese groei verhoed voordat die water behandel word, asook nabehandeling en moniteringstelsels vir die handhawing van 'n veilige watergehalte. Tot dusver was daar nog geen ruimtetuig waarop die bemanning water kon herwin en hergebruik nie.

Ultrafiltrasie en tru-osmose word tans ondersoek om vas te stel of een van dié prosesse geskik is vir die herwinning van drinkwater uit waswater. Bestaande membraanstelsels is, volgens die tydskrif, nog nie so gevorderd dat dit hiervoor gebruik kan word nie.

Twee laedruk distillasietegnieke — dampdrukdistillasie en termoëlektriese geïntegreerde membraan-evaporasiestelsel word ontwerp om meer gekonsentreerde oplossings, soos urine to behandel. Hierdie stelsels lewer gekonsentreerde pekels wat bewaar en later na die aarde teruggeneem word.

'n Ander metode is om die temperatuur van die afvalwater te verhoog tot op of bokant die kritieke punt (700°F by 3 200 psi). Onder dié omstandighede waarin water soos 'n homogene stof (dit is nòg vloeistof nòg gas) reageer, is opgeloste organiese materiaal geneig om maklik tot CO_2 en water te oksideer.

Nasa het onlangs 'n Amerikaanse maatskappy, Bend Research, in Bend Oregon gekontrakteer om 'n ligte, sintetiese membraanmodule te ontwerp. Die eerste toetse met die apparaat het positiewe resultate gelewer. Die membraan wat getoets is, verdeel rou waswater in twee strome. Die een stroom bevat die besoedelstowwe en die ander gesuiwerde water geskik vir hergebruik.

Hierdie navorsing sal ook op aarde toepassings hê, veral in die gebruik van kleinskaalse oorlewingstoerusting. Maar, soos die Amerikaners besef, al sou 'n stelsel ontwerp word wat menslike afvalwater in drinkwater kan omskep, is daar nog die probleem dat die publiek die idee onaanvaarbaar kan vind en verwerp.

Remote Sensing at the Hydrological Research Institute

Satellite Remote Sensing's potential in assisting the management of South Africa's water resources has been investigated at the Hydrological Research Institute for the last 5 years. With the help of the Satellite Remote Sensing Centre and the National Physics Research Laboratory of the CSIR, work has been carried out in various fields. Although only the top of the iceberg has been touched, steps have been made into this new technology and two events highlight this movement.

The first event was a colloquium entitled 'Remote Sensing Applications in Water Resources', held on October 15th, 1985, by the Hydrological Research Institute. The intention of the colloquium was to communicate the research that has been carried out at the Hydrological Research Institute. The multidisciplinary topics generated great interest and a full house of some 60 people attended.

Ulrich Looser, concerned with erosion and sedimentation problems in catchments, presented a paper entitled 'Monitoring Soil Erosion and Land Use Change in Natal using Remote Sensing, with special reference to the Mfolozi Catchment'. A visual interpretation of pre- and post Domoina flood Landsat imagery was reviewed together with aerial photographs taken in 1960 and 1984. Evidence of change in erosion, sedimentation, cultivation, forest and shrub, water, population and settlements was shown on both satellite and aircraft derived information.

WATER QUALITY

Alison Howman and Phillip Kempster have been investigating water quality conditions in impoundments using Landsat imagery. The objective of the research was to determine the potential and limitations for quantitative measurement of suspended solids and algae. Plate 1 is a false colour satellite image

HRI

Plate 1: A satellite image of the Bloemhof Dam showing suspended solids (blue-white) and an algal bloom (red).

showing suspended solids (bluish white) in the northern arm and an algal bloom (red) in the southern arm of Bloemhof Dam. A method has been established which enables accurate, synoptic information of the distribution and concentration of these conditions to be obtained and the method was presented in the paper 'Quantifying Water Quality Conditions in an Impoundment using Landsat Data'.

Hugo Maaren presented a paper on the 'Use of Satellite Remote Sensing in Mapping Irrigated Land-Use'. The talk pointed out the practicality and the cost effectiveness of monitoring irrigation with the aid of satellites and three levels of monitoring were discussed. The first level separates irrigated from non irrigated land use. The second level distinguishes between different crop types within the irrigation lands and the third assesses water stress, water use and yield prospects. The potential for surveying irrigation schemes on a national scale at these three levels was envisaged.

Alan Seed faced the challenge image processing technology presents to hydrological modellers in the paper 'Use of Image Processing Technology in Hydrology'. Effective management of large volumes of data, convenient data base structures, together with powerful software mapping and regionalization are considered as the basis for the next generation of hydrological models.

Mike Howard demonstrated the Barringer Hand Held Ratioing Radiometer which is being used to ascertain which thematic mapper wavebands are applicable to the assessment of algal concentrations in impoundments.

The colloquim papers are available on request.

A second event, one that is the result of years of hard work and persuasion, is the acquisition of an image processing system. the image processing system chosen is a fully integrated, upgradeable system with multi-user and multi-tasking capabilities. It is anticipated that the new system will be up and running by July 1986. The image processor is seen as a significant step towards bringing satellite data, large data bases and geographic information systems closer to water resources managers, hydrologists and limnologists.

Persons interested in the image processing system or the work that is being carried out are invited to contact any of the researchers at the following address:

Hydrological Research Institute, Private Bag X313, PRETORIA 0001. Tel.: (012) 82-1415/82-1076

SLUDGE PROGRAM NOW AVAILABLE FOR IBM OR OLIVETTI

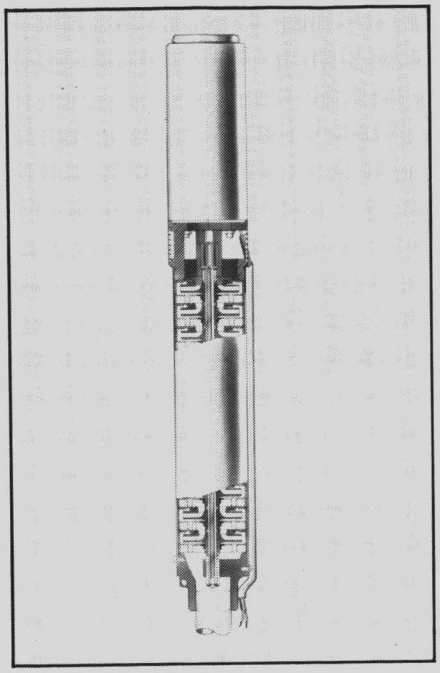
This computer program for activated sludge processes was described in the August 1985 issue of *SA Waterbulletin.* At that time the progam was only available in a version suitable for Hewlett Packard HP 86/86 micro-computers but work has now been completed on translating it into a version suitable for either IBM PC or OLIVETTI PC machines. As there is a substantial amount of work involved in carrying out translations, it is not planned to develop versions for other machines at this stage. However, the IBM/ OLIVETTI PC version will be updated in the future to incorporate new developments.

The program facilitates the design or analysis of any of the activated sludge process configurations currently being used in South Africa. In the case of design, only the influent flow and the wastewater characteristics are required as input and the program will calculate the relevant mass fractions, mixed liquor recycle ratios, influent characteristics, process volumes and oxygen requirements. In the case of analysis, the process configuration needs to be known and recycle ratios, effluent characteristics and oxygen requirements will be calculated.

Enquiries regarding the program should be directed to Ian Palmer of Ninham Shand Inc, PO Box 1347, Cape Town, 8000, telephone (021) 21-4610. The program can be purchased from the Engineering Computing Company at the same address (telephone (021) 21-4610). The purchase price remains R500 with an additional R100 per annum payable for support. The program is available free of charge to non-profit organisations, but the support price of R100 per annum will also apply to them. Half of the income from the program is paid by the Computing Company to the University of Cape Town.

HIGH CAPACITY BOREHOLE PUMP

A completely new concept in the design of borehole pumps has been introduced by Matheson & Bremner



to provide high-capacity pumping in 100 mm boreholes.

Known as the series XP and YP, the new pumps can produce up to 14 000 ℓ/h and heads up to 165 m.

Considerable attention has been given to making the new Jacuzzi XP and YP pumps corrosion-proof. Stainless steel has been used for the inserts for the shaft bushes, as well as for several other areas including the mechanical parts of the motor. In addition, a patented seal has been developed for the impeller eye in order to reduce wear, and thus maintenance costs.

Enquiries: Matheson & Bremner, PO Box 104, Isando 1600.

"FLOWMAKER" — THE AERATION BOOSTER

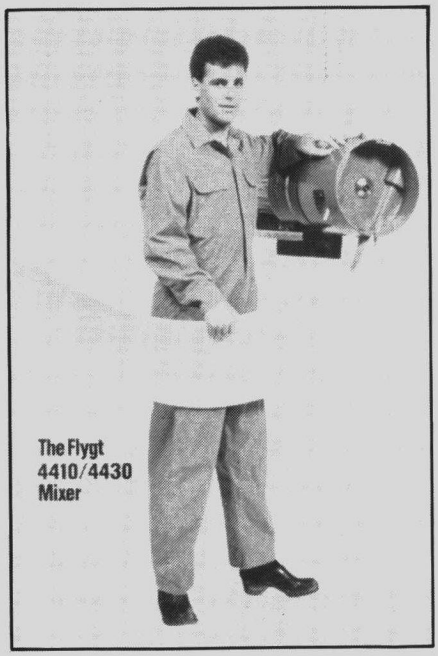
There are two traditional ways to mix and aerate sewage. Air diffusers utilise air action but at the expense of aeration efficiency; surface turbines produce an aerating action but often at the cost of inadequate mixing.

Hugh Mellor, the pump people, have now introduced the Flygt "FloMaker" — a slow-speed mixer which can boost oxygenation by spreading bubbles rising from the aerator and making them rise more slowly. This simple, yet extremely efficient system is achieved by mounting the FloMaker in the horizontal axis on to a vertical support, similar to other Flygt mixer arrangements. The slow-speed propellor sets the water in motion at about 0,5 m/s, or whatever suits the particular application spreading the bubbles over a large tank area so that the upward velocity of the water decreases, thus increasing the time for aeration.

The FloMaker propellor, which can be set between 1,4 and 2,5 m diameter, has exceptional self-cleaning properties coupled with high performance. This is useful in many aeration tanks where rags and other debris are present. The blades are made of impact resistant glass-fibre reinforced polyurethane.

The motor speed is reduce to the required propellor speed by a 2-stage gearbox. The gear ratio can be selected to match propellor combination, desired pitch angle, inflow rate to propellor, etc.

Two sizes of FloMaker are available — the 4410 with a capacity of 3,4 m^3/s, up to 2.400 N thrust, and 2,6 kW motor, and the 4430 with a capacity of 4,1 m^3/s, up to 3.100 N thrust, and 4,4 kW motor. The 4410 propellor speed



The Flygt 4410/4430 Mixer

can be set between 17 and 40 RPM, and the 4430 between 32 and 54 RPM.

The FloMaker can be used in many other applicatios, including process mixing, and fish farming.

Enquiries: Hugh Mellor (Pty) Ltd, PO Box 700, Edenvale 1610. Tel: (011) 609-4030.

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The biology and conservation of South Africa's VANISHING WATERS

Published by the Centre for Extra-Mural Studies,

University of Cape Town,

in association with

The Wildlife Society of Southern Africa

The Biology and Conservation of South Africa's Vanishing Waters

by Bryan Davies and Jenny Day

Freshwater Research Group, Zoology Department, University of Cape Town

Resumé

Bryan Davies and Jenny Day are two biologists concerned about the deterioration of South Africa's inland waters. In lecturing on their subject they have been hampered by the lack of any suitable texts with a South African flavour. This book is designed partly to fill that gap. It has been written not only for undergraduate students but also for highschool pupils and their teachers, and indeed for anyone interested in freshwater life, where it lives, and its conservation. The language has been kept simple, technical terms being defined and explained in the text and in a glossary.

The first section of the book deals with the distribution and types of inland waters in South Africa (rivers, "dams", wetlands, pans and so on), while the second part goes on to describe the plants and animals of lakes and rivers, how they live, and the effects that they have upon the water in which they live. The third part considers the effects of human intervention on rivers and lakes, examining in particular the consequences of damming rivers and the problems encountered in coastal lake systems. The fourth concerns human use of water: who uses it, how much is used, where it comes from, alternative sources of water and how water may effectively be conserved in this arid land. The last chapter describes a variety of methods for examining the ecology of freshwater systems and includes an extensive list of potential projects that will be particularly valuable for school teachers.

"The authors must be congratulated for having produced such an authoritative and readable book, which will provide, for the first time, a comprehensive perspective of our water resources and their management."
Dr Nolly Zaloumis, President, Wildlife Society of Southern Africa.

"This thought-provoking and readable book is packed with facts about South Africa's most scandalously treated resource – water. I hope it becomes compulsory reading in all our schools, to say nothing of our municipal council chambers."
John Comrie Greig, Editor, African Wildlife.

"I welcome most enthusiastically this outstanding publication. Bringing together in one place a rich spectrum of material from numerous widely scattered sources, it will be of great use to many teachers – and students. I support it most strongly and hope that further publications will follow."
Prof P.E. Spargo, Director, Science Education Unit, University of Cape Town.

"This book explores the ecological functioning of freshwater systems, and probes the environmental options in South Africa's water crisis. Written for the lay-person and scholar alike, the book is both instructive and provocative – indeed, it is a privilege for the Wildlife Society to be associated with a book of this stature."
Guy Preston, Chairman: Publications sub-committee, Western Province Branch of the Wildlife Society

NEW NO-DRIP VALVE

A combined pressure reducing and expansion relief valve that eliminates the expansion drip has been developed by Castle Brass Works for the convenience of the architect and plumber.

In modern apartment blocks and office complexes it is often difficult to find a suitable point of discharge for water "expanded" due to heating in a pressurised system.

By adapting their Masterflo II valve to fit a pressurised expansion tank, Castle Brass Works have solved the problem of expansion drip. The heated water is expanded into the tank and later fed back into the system. While the principle is not new, Castle has made the concept viable for domestic applications in South Africa.

Called the Masterflo XTS, the valve is easy to install because no expansion pipe is needed and this in-line valve is available with copper to copper connections for 400kPa systems.

Enquiries: Colin Grant, Castle Brass, PO Box 4340, Luipaardsvlei 1743. Telephone: (011) 664-8150.

MOTOR SOFT-START REACTOR STARTERS

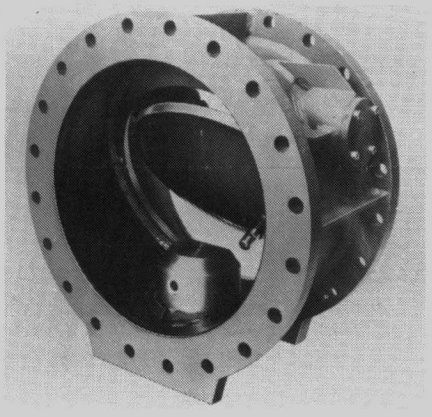
The use of a starting reactor to overcome problems such as inrush currents, switching transients and high starting cirrent is becoming increasingly popular for all sizes of induction motors. The reactor reduces voltage and current to the motor during the starting period and gives better starting characteristics than transformer starting.. Torque is proportional to the square of the voltage and as the voltage rises from an initial minimum, torque increases smoothly. At maximum speed, a present timer closes a bridging contactor, shorting out the reactor and allowing the motor to attain full speed and power without transient current and torque surges.

GEC Distribution Equipment Co's first soft-start reactor has been installed by Agrico Machinery (Pty) Ltd at a farm in the Leslie area where it controls the start-up of a 132 kW pump motor feeding a 100 hectare Zimmatic centre pivot irrigation system. Further soft start reactor starters are now being provided for similar applications.

The reactor starter incorporates a special choke designed to allow a fixed voltage drop. This voltage is predetermined by design and is easily adjustable using stadard percentage line tappings. Low voltage reactors are air cooled and high voltage reactors can be either air or oil cooled. To add a reactor starter to an existing direct-on-line starter only requires the addition of an extra bridging contactor and a timer. Reactor starters can be supplied by GEC Distribution Equipment Co for any voltage up to 11 kV and ratings from 5 kW.

Enquiries: GEC Distribution Equipment Co., Private Bag 1004, Germiston 1400. Tel: (011) 825-3144

SLAM-FREE VALVE



A novel valve which overcomes one of the most difficult problems of pumping stations, the slamming of non-return valves and suppression of pressure surges caused by slamming, will be marketed in South Africa by Ainsworth Engineering, of Denver.

The slanted seat, swing-check valve with internal damper is manufactured by VAG-Armaturen, of Mannheim, West Germany, but Ainsworth Engineering are considering local manufacture.

The closing time of the new valve was considerably shortened by reducing the disc stroke by 20 per cent. This greatly diminishes the danger from pressure surges and, with the aid of a specially-developed damper, non-slam closure is achieved.

The disc features a sealing face of pure nickel which seats against a slanted disc seat face of built-up stainless steel welding in the body, both faces being microfinished. Made of corrosion-resistant materials and unaffected by dirt, the dampener can be dismantled for inspection without removing the valve from the pipeline.

Valves are produced in 12 sizes ranging from 200 to 1 000 mm, in pressuring ratings of 1,0 and 1,6 MPa.

Enquiries: Ainsworth Engineering (Pty) Ltd, PO Box 25653, 2027 DENVER. Tel: (011) 615-7190.

FLAMEPROOF PUMPS

The full range of the Flygt "C" family of submersible pumps is now available in flameproof from to SABS 314-1971.

Capacities are from 2 through to 300 ℓ/s, and heads up to 6 m with motor ratings from 2 through to 30 kW.

There are five basic models in the range, and with a selection of about 100 impellers, Hugh Mellor are able to provide a submersible pump with maximum efficiency for any particular application. This applies to both the flameproof and non-flameproof range of Flyght "C" submersible pumps.

The flameproof range are low-priced available with large throughlets up to 100 mm, making them an ideal cost-effective solution to pumping such media as coal slurries.

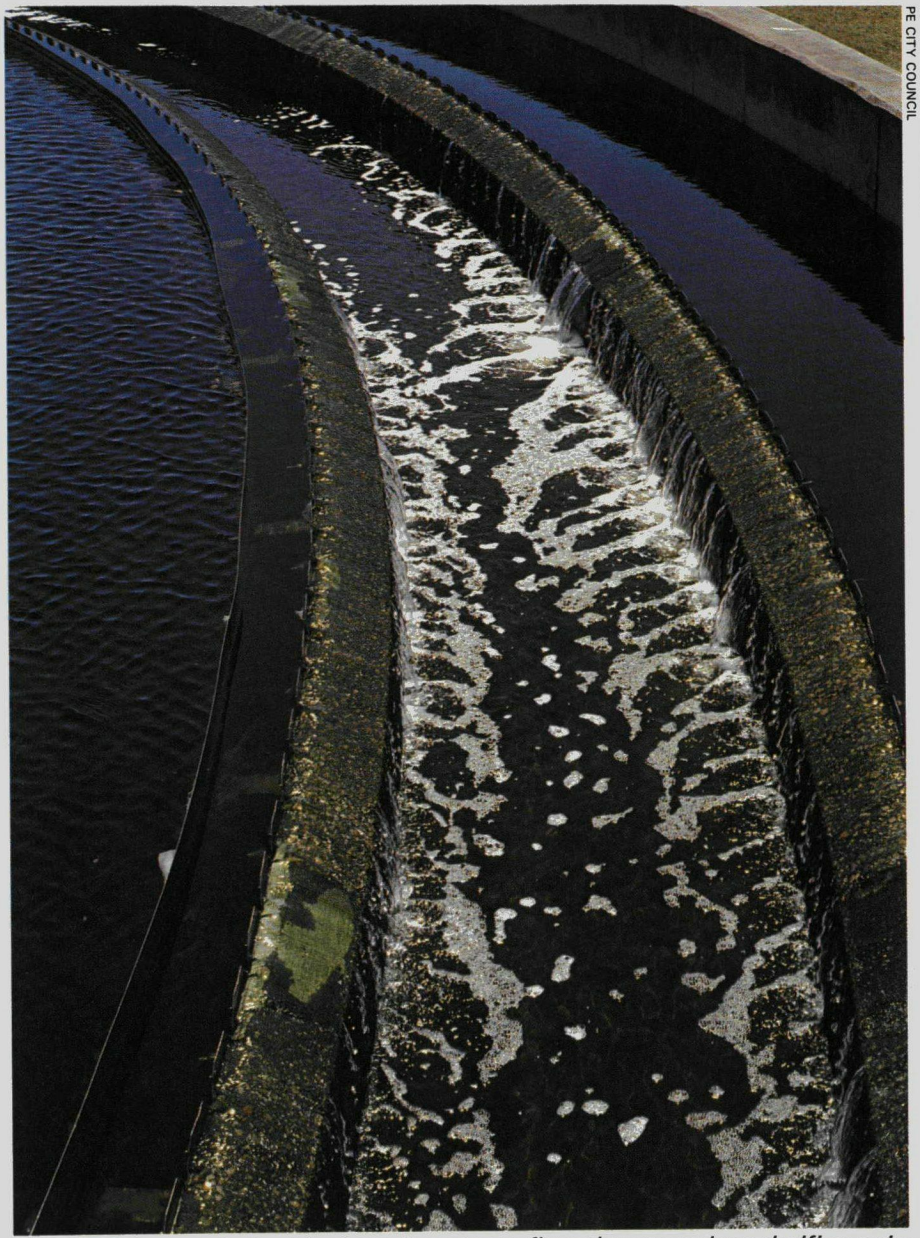
Enquiries: Hugh Mellor (Pty) Ltd, PO Box 700, Edenvale 1610.

Another RSA first for Port Elizabeth

The City Council of Port Elizabeth has been experiencing serious sludge bulking at the Fish Water Flats Water Reclamation Plant for many years now. This has lead to unacceptably high suspended solids in the final effluent from the plant and a cost-effective technical solution had to be found.

Council staff under the guidance of Messrs John Slim (Manager, Water Reclamation Works) and John Vail (City Chemist) started addressing the sludge bulking problem seriously about three years ago. The literature and other sources of information were scanned for technical solutions to the problem. The more obvious remedial methods were either a reduction in settling velocity in the settlement tank or an improvement in settling characteristics of the sludge solids.

The first alternative could only be practical achieved by the provision of additional settlement tank capacity at a captial cost estimated at that time (1983) to be R1 430 000. The second alternative could be achieved by the elimination or reduction in the organisms which cause the solids to have poor settlement characteristics. One method that has been applied with success elsewhere was the use of chlorine for the selective killing of these organisms, the key to which is the correct dose to eliminate only the organisms causing the problem. Experimentation with the use of this selective bactericide has resulted in development of a successful technique to keep bulking under control. Currently chlorine is used, only when bulking is excessive, on one of the works' domestic sewage modules (20 Ml capacity). Chlorine is added to the return activated sludge line when necessary at an average monthly dosing rate of about 700 kg. Even though signs of overdosing, turbid effluents and very low SVI (sludge volume index), have been noticed on occasion, nitrification has not been impaired. At current chlorine usage rates costs are R14 000/module/year. If this method of control were used for all four activated sludge modules (at the current doses) the cost would be approximately R60 000/year.



PE CITY COUNCIL

After treatment sludge blankets do not overflow the secondary clarifier weirs anymore.

This technique is now considered satisfactory for dealing with the problem, although it is fairly costly and does not address the root cause of the problem, i.e. the factors which make the filamentous bacteria proliferate.

A potentially inexpensive design solution to the Port Elizabeth's bulking problem, referred to in the trade as "low F:M bulking", is the use of "selectors". This technique was pioneered, *inter alia* by Chudoba of Czechoslovakia and Eikelboom of the Netherlands. Development work and further research on the technique in the USA has been undertaken by Prof David Jenkins and his students of the University of California, Berkeley. During his visit to the RSA during June 1984, under the aegis of the Water Research Commission, Prof Jenkins generated a considerable amount of interest in the "selector" technique as a solution to "low F:M bulking ", the RSA's major cause of activated sludge bulking.

Towards the end of 1984, Port Elizabeth City Council Staff undertook laboratory tests to assess the potential of "aerobic selectors" to solve their bulking problems. The results looked very promising and were sufficiently encouraging to them to try the technique at full scale. An experimental three-compartment selector was installed in the aeration basin of one of the domestic activated sludge modules. This selector, when all three compartments are used in series, has a hydraulic residence time (based on flow plus recycled sludge) of approximately 0,6 hours. The selector is aerated with compressed air supplied through a single drilled pipe to give a dissolved oxygen (DO) concentration of approximately 0,1—0,2 mg/ℓ. In the selector an approximately 30% reduction in Whatman No 1 filtrate COD occurs.

The selector has been in operation, employing all three compartments in series, from July 1985. During this period the monthly average secondary effluent suspended solids have improved steadily from the 40-50 mg/ℓ range to less than 10 mg/ℓ. Little change in SVI values have been observed, however it is evident that the SVI measurement is not a true reflection of the actual in-plant settling performance of the Fishwater Flats activated sludge. Because of this diluted SVI" (DSVI) tests are being run which show better correlation with settlement results. Sludge blankets do not overflow the secondary clarifiers weirs anymore.

Since approximately November 1985, the selector system has been operated with only one small compartment in service (average hydraulic retention time based on flow plus RAS = 0,12 hours). There is evidence that under these conditions of operation the SVI values are gradually deteriorating, filament levels are increasing and sludge blankets are occasionally overflowing the secondary clarifier weirs. These observations suggest that the 0,12 hour selector retention time is not sufficient.

Plans are to return selector operation to give an 0,6 hour retention time and operate to obtain steady state data that include DSVI. Furthermore, consideration is being given to a more effective technique for aerating the selector. If the results are as promising as those obtained during July-November 1985, consideration will be given to modify the other plant modules as well. Selector installation cost was approximately R50 000 for the one module and hence would be about R200 000 for the four domestic modules of the works. On-going yearly costs (i.e. aeration) are minimal. Compared to the present projected cost for additional secondary clarifiers (R2 000 000) selector costs are an order of magnitude smaller!

City Engineer, Mr Arthur Clayton and his staff are to be congratulated on their efforts to progress in attempting to find a cost effective solution to one of the RSA's most vexing wastewater treatment problems. Further details of their experimental full-scale study will be published at a later date.

PE CITY COUNCIL

Bulking sludge at Port Elizabeth's Fish Water Flats Water Reclamation Plant.

PE CITY COUNCIL

The three-compartment selector under construction.

Zandvlei ideal for integrated catchment management programme

Have you ever wondered what it must feel like living in Venice? Near Muizenberg, situated next to Zandvlei on interesting mysterious water alleys, Marina da Gama is the epitome of Venice in bright sunny South Africa.

Zandvlei is one of the most heavily utilised water bodies in the country. Apart from the Marina da Gama residential area, the recreational activities include yachting, canoeing, wind-surfing and bird watching.

It is also an extremely perturbed system receiving high nutrient loads from both diffuse and point sources. These sources constitute agriculture, horticulture and urban runoff, dischage resulting from accidents at industrial premises adjoining rivers, wastewater from overflows resulting from mechanical or electrical failure at pumping station, blockages in the sewerage system and solid wastes deliberately introduced into the influent rivers.

In terms of the pollution loads, the end result has been an explosive growth response by *Potamogeton pectinatus* (Sago Pond Weed) and it led to an expensive on-going harvesting programme by Cape Town City Council. It has been stressed that in order to effectively control the plant, studies should be undertaken on its growth dynamics in the vlei and the Marina da Gama as well as its effect (together with its associated invertebrate communities), on the water quality within the vlei. Some research carried out by the Freshwater Research Group, Zoology Department at U.C.T. has already indicated the importance of the *Potamogeton* associated invertebrates in maintaining water quality (Steward & Davies in press). Now it is time for City Council staff to follow up the work and to develop a rational harvesting programme.

In addition to this research it is essential to develop the necessary database in the form of permanent wind speed and direction, current measurement and inflow pollution loading rates.

In this context, the most important aspect of all concerns the development of flow gauge data on influent rivers and on the tidal exchanges through the estuary mouth. Without such data it is not possible to interpret past results in terms of nutrient loading within the vlei or to develop a rational management policy for the vlei.

Zandvlei is monitored at quarterly intervals for nitrogen and phosphorus nutrient inputs which can reflect wastewater pollution, as well as suspended solids, organic matter algal pigments whose levels reflect the state of the algal population with respect to proliferation or decline.

The monitoring operations give a comprehensive surveillance of the system at present, but will also have to be augmented in future to maintain the quality of the water as well as the environment.

Zandvlei provides one of the most ideal sites in the country for the development of an *integrated* catchment management programme, a development which could provide a model for integrated management of all other catchments within our borders. However, the major stumbling block to this integration of catchment management is the very fragmented nature of the administration operating in different sectors of the catchment.

REFERENCE:

Stewart, BA & BR Davies (in press). Effects of macrophyte harvesting on invertebrates associated with *Potamogeton pectinatus* L. in the Marina da Gama, Zandvlei, Western Cape. *Trans. roy. Soc. S. Afr.* **46**(1).

A choking problem

ANTON STEYN

Many of South Africa's good existing reservoirs are gradually losing their storage capacity due to sedimentation. In the Eastern Cape, for example, the heavy silt load of the Sundays River has blocked up 39 per cent of the Van Ryneveld's Pass Dam and more than 40 per cent of Lake Mentz.

According to Mr AF Ellis, chief engineer of the Department of Water Affairs, it is estimated that more than 120 million tons of sediment enter South African rivers annually. In total this could represent the loss of a fair sized dam each year, requiring considerable capital investment to replace. Besides the loss of reservoir storage, sedimentation can also cause raised backwater flood levels, more unfavourable water depth to exposed area conditions, sedimentation of outlet structures and effects on the stability of the dam structure.

The dredging of silted-up dam basins is often suggested as a solution and even the deepening of basins by excavating soil and placing it along the banks.

Naturally water engineers are giving serious consideration to such thoughts themselves and the Department of Water Affairs and the International Commission for Large Dams (ICOLD), have already conducted a number of feasibility studies in this regard. Up to now the dredging costs have always been higher than the cost for creating equivalent new water storage through raising or at another site. The costs have now even included the problems associated with the environmentally acceptable and safe deposition of the material.

A recent cost figure for the dredging of Welbedacht Dam in the Caledon River was R1,04/m^3 whereas creation of alternative storage was estimated at R0,11/m^3, or one tenth of the dredging costs.

When thinking of soil excavation one should also consider the vast quantities of material involved. To deepen Vaal Dam by one metre would involve the removal of over 300 million m^3 of material. To undertake this task manually, would take about 10 000 strong force more than 30 years to complete if the reservoir could be maintained at a low level! By comparison 17 million m^3 of material went into Sterkfontein Dam wall, South Africa's largest earth works to date. This was carried out by six 90 ton bottom dump trucks and a number of large scraper loaders over a period of about 4 years. The comparison shows that it is uneconomical and impractical to deepen an existing reservoir.

For much smaller dams, excavation is definitely a proposition and is practised extensively, for example in Ovambo in South West Africa. Here the terrain is completely flat and water is pumped during the short flooding period from the so-called *oshanas* (very low gradient river valleys without well-developed, defined, flood channels) into pumped storage dams. These have been excavated to depths up to 5 m and the material has been built up around the excavation to give a total storage depth of about 10 m.

Even for larger schemes in rivers where the sediment load is high and good dam sites are limited, off-channel storage should be considered as an alternative. This is in fact an option now being investigated for additional water supply to Bloemfontein from the Caledon River.

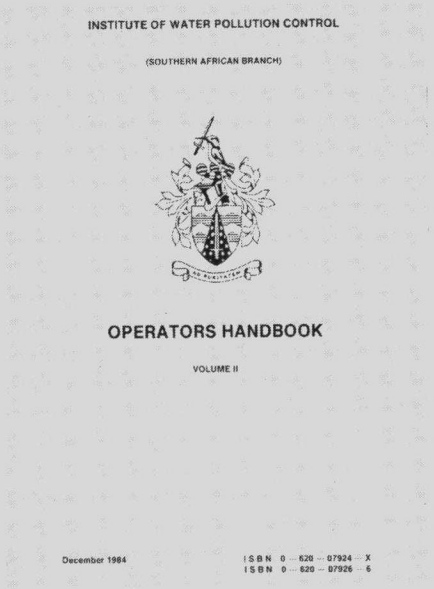
As far as sedimentation of reservoirs is concerned, the old saying still holds that prevention is better than cure. We should all realize that soil erosion is a national problem in South Africa and needs national attention both from the State and from organized agriculture.

Since the inception of the Soil Conservation Act in 1946 considerable progress has been made with erosion protection, particularly on cultivated lands. At present the Department of Agriculture and Water Supply contributes about R6 million per year to this effort in the form of subsidies and own inputs in key conservation works. However, it has been found that 60 per cent of the country's veld is in a poor condition, mainly from overgrazing.

To save South Africa's grazing lands a national grazing strategy was announced in May 1985 by the Minister of Agriculture and Water Supply. At the same time urgent attention should be given to areas where traditional agriculture is practised, and which are often important water catchments, to halt the serious land degradation still taking place.

SEWAGE TREATMENT: OPERATORS HANDBOOK — Revised Edition

Institute of Water Pollution Control (Southern African Branch)



The operation of wastewater plants plays a vital role in the total management of the water environment. The best designed plant will fail to produce a good effluent if it is poorly managed, while a poorly designed plant can produce a satisfactory effluent given first class management.

In each case the operator plays a key role. It was to assist these operators in South Africa that the IWPC produced the original Handbook, and it is in recognition of increasing demands on such men to meet the challenge of implementing rapidly advancing technology that the Handbook has been revised in 1985.

Some of the original chapters have been slightly amended while other chapters have been completely rewritten bringing the reader to the latest advances in knowledge and technology.

Contents: VOLUME I — Basic Principles of Sewage Treatment; Calculations; Chemistry; Chemical Tests Applicable in Sewage Purification; Hydraulics.

VOLUME II — Preliminary Treatment; Primary Sedimentation; Sludge Digestion; Thickening and Dewatering; Sludge Disposal; Industrial Effluents.

VOLUME III — The Activated Sludge Process; Biological Filtration; Secondary Sedimentation Tanks and Clarifiers; Tertiary Treatment; Disinfection; Small Sewage Treatment Works; Ocean Discharges.

VOLUME IV — Management; Maintenance; Records; Safety; Instruments; Pumps.

1985
Price: IWPC members R27; non-members R35
ISBN 0 620 07924 — X
Available from: Institute of Water Pollution Control, PO Box 81249, Parkhurst, Johannesburg 2120. Telephone: (011) 728-7373.

A SOUTH AFRICAN EXTREME-VALUE MODEL FOR THE DETERMINATION OF THE CUMULATIVE DISTRIBUTION OF POINT RAINFALL RATE

by RJ Seeber

A semi-empirical model for the probability distribution of point rainfall rate is presented in this report. The model was developed for predicting the probability distribution of rain attenuation on microwave links on the southern African subcontinent. It is an extension to the extreme-value theory presented by Lin.

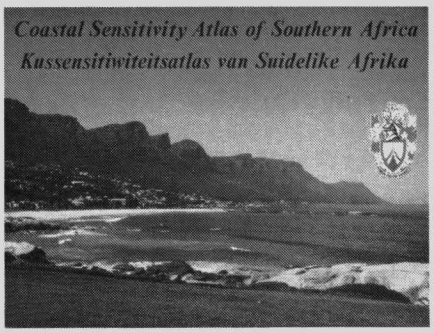
The model assumes a log-Gumbel distribution for the annual series of rain-rate maxima and a log-normal distribution for the time-varying rain rate. The extension involves the establishment of generalized relationships for the parameters α and U of the log-Gumbel distribution. It was found that U is a function of mean annual rainfall (MAR), climatic region and rain-gauge integration time, while α is a constant. The relationships were obtained from an analysis of a depth-duration-frequency diagram for southern Africa, by Midgley and Pitman.

The diagram represents an analysis of the annual maximum rainfall depths at various durations, of 56 stations spread throughout the subcontinent. The resulting model gives distributions which are a function of MAR, climatic region (''coastal'' or ''inland'') and integration time. The application of the model for 15-minute predictions at 17 locations on the continent gave satisfactory results, but at two islands in the southern oceans the results were poor.

The results on the continent are as good as can be obtained by a 2-year measurement programme. Due to a lack of data no tests were made at other integration times. Various reasons, however, are given why the model should be valid down to 5 minutes at continental locations.

It should be useful for predicting rain attenuation on terrestrial and earth-satellite links on the southern African subcontinent, as attenuation models using rain-rate distributions of this integration time are available. The rain-rate and attenuation distributions may thus be obtained at locations for which no rain-rate data are available. The model therefore eliminates the problem of geographic interpolation of rain-rate distributions.

1983 **148 pages**
Available from: The National Institute for Telecommunications Research, PO Box 3718, Johannesburg 2000 Telephone: (011) 648-1150/6.



COASTAL SENSITIVITY ATLAS OF SOUTHERN AFRICA

compiled by Lynette F Jackson and Steve Lipschitz

A coastal sensitivity atlas of Southern Africa has been compiled by the Sea Fisheries Research Institute of the Department of Environment Affairs and mapped by the Institute of Cartographic Analysis at the University of Stellenbosch. This atlas was produced for the Department of Transport to aid in the prevention and combating of oil pollution of the coastline.

It consists of a series of 34 (1:250 000) topographic charts

covering the entire coastline from the Orange River to Ponta do Ouro. The coastline has been colour-coded on the basis of geomorphological characteristics and sensitivity to oil pollution with supplementary symbols highlighting features of special importance such as estuaries, bird colonies, industrial utilisation of sea water, marine reserves and other biological information. Introductory notes on the use of the atlas and relevant environmental information is supplied as well as a detailed explanatory bilingual text adjacent to each chart.

The atlas was compiled to provide information for oil spill contingency planning and to aid decision making during oil spil situations. However, the broad spectrum of information contained in this atlas makes it a useful document for any organization or individual that has an interest in the management of the resources of the coastline of Southern Africa.

1984 **78 pages**
Price R40,00
ISBN 0797200282

Available from: The Director, Department of Transport, Private Bag X193, Pretoria 0001.

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Edited by JN Lester and PWW Kirk

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VERKIES

CONSTANCE STUART

Dr George Green, senior adviseur van die Waternavorsingskommissie, is verkies as president van die Suid-Afrikaanse Vereniging vir Gewasproduksie. Dié Vereniging met 'n ledetal van nagenoeg 550 beywer hom vir die bevordering en uitbouing van die wetenskap en tegniek van gewasproduksie in al sy vertakkings.

Limnological Society of Southern Africa

ANNUAL CONGRESS 1986 WINDHOEK

30 JUNE — 4 JULY 1986

The theme is **Aquatic Ecosystems** and prospective authors are invited to submit titles for papers or posters on any topic relevant to Southern African Limnology and Marine Science.

Deadlines: Paper and poster titles — March 1986;
Abstracts — April 1986: Registration — May 1986; Response for excursions — March 1986.

Excursions 4 — 6 July 1986

- Eastern National Water Carrier, via Von Bach Dam and Omatako Dam to Waterberg Plateaux Park. Follow the canal to Uitkomst, visit vegetation transects at Brandwag and view Hoba meteorite and Otjikoto Lake. Overnight in Tsumeb or Grootfontein. Return via Swakoppoort Dam, lunch at Gross Barmen.
- Via Gamsberg to Gobabeb, overnight at Desert Ecological Research Unit on the Kuiseb River, via Schwarzenkuppe and Rooibank pumping scheme to Swakopmund. Next day via Central Namib State Water Scheme to Rössing Mine. Lunch at Nonidas and return to Windhoek.

Enquiries: S Bethune, Chairman L.O.C., c/o Department of Water Affairs, Private Bag 13193, Windhoek 9000

DRINKING WATER

The 2nd national conference on drinking water will be held in Edmonton, Canada, from 7 to 8 April 1986. The theme is: *Treatment for organic contaminants.*
Enquiries: Dr WJ Hargreave, Department of Civil Engineering, University of Alberta, Edmonton, Alberta. T6G2G7 Canada.

AQUATIC ECOSYSTEMS

The 3rd international GAP workshop with the theme *'Respiration and its effects on the measurement of aquatic primary productivity'* will be held in Durban, South Africa, from 27 April to 3 May 1986.
Enquiries: Dr Richard Robarts, Chairman, Organising Committee, c/o Symposium Secretariat S371, CSIR, PO Box 395, Pretoria 0001.

SEWERAGE

A symposium on *sewerage — value for money,* presented by the Institute of Water Pollution Control will be held from 14 to 15 May 1986 in London, England.
Enquiries: Roy Harris, Flanchford, Bassetsbury Lane, High Wycomb HP11-1HS, Buckinghamshire, UK.

FLOODS

An international symposium on flood frequency and risk analysis will be held in Baton Rouge, USA, from 18 to 21 May 1986.
Enquiries: International Symposium on Flood Frequency, Department of Civil Engineering, Louisiana State University, Baton Rouge, LA 70803-6405, USA

WATER QUALITY

A symposium on water quality assessment, organised by the water quality division of the National Institute for Water Research, will be held on 26 and 27 May 1986 at CSIR conference centre in Pretoria.
Enquiries: NIWR, S403, CSIR, PO Box 395, Pretoria 0001.
Telephone: (012) 86-9211 × 2231 (Mr P Coombs or Mrs R Oellermann).

WATER AND DEVELOPMENT

An international conference on water and development will be held in Marseille, France, from 9 to 11 June 1986.
Enquiries: Colloque International, L'eau, La ville et le Developpement, 52 Rue Madam, 75006 Paris, France.

TECHNOLOGY TRANSFER

A seminar on the transfer of appropriate technology in water supply and sanitation will be held at the Mmabato Sun Hotel in Mafikeng, Bophuthatswana from 10 to 12 June 1986.
Enquiries: Symposium Secretariat, S.265, CSIR, PO Box 395, Pretoria 0001. Telephone (012) 86-9211 ×4412 (Mrs M Meyer).

ENVIRONMENT

An international conference on chemicals in the environment will be held form 30 June to 3 July 1986 in Lisbon, Portugal.
Enquiries: Chemicals in the Environment Conference Secretariat, c/o Prof R Perry, Public Health and Water Resource Engineering, Department of Civil Engineering, Imperial College, London SW7 2BU, UK.

LSSA

The annual congress of the Limnological Society of Southern Africa will be held at the Safari Hotel, Windhoek, from 30 June to 4 July 1986. The theme will be *'Aquatic Ecosystems'.*
Enquiries: S. Bethune, Chairman, Local Organising Committee, c/o Department of Water Affairs, Private Bag 13193, Windhoek, 9000, SWA/Namibia.

HYDROLOGICAL SCIENCES

The second scientific assembly of the International Association of Hydrological Sciences will take place in Budapest, Hungary, from 2 to 10 July 1986.
Enquiries: Dr A Szöllösi-Nagy, Executive Secretary 2nd IAHS Scientific Assembly, Water Resources Research Centre (VITUKI) H-1453, Budapest, P.O. Box 27, Hungary.

AQUATIC PLANTS

A conference on research and applications of aquatic plants for water treatment and resource recovery will be held from 20 to 24 July 1986 in Orlando, Florida, USA. Papers invited.
Enquiries: Dr Wayne H Smith, Chairman, Aquatic Plants Conference Steering Committee, University of Florida — IFAS, McCarthy Hall, Room G040, Gainesville, FL 32611, USA.

AQUACULTURE

A symposium on aquaculture in South Africa will be held from 23 to 24 July 1986 at the Rand Afrikaans University, Johannesburg.
Enquiries: Miss M Robertse, Foundation for Research Development, CSIR, PO Box 395, Pretoria 0001.

SLUDGE AND SOIL

A pre-IAWPRC conference on the use of soil for treatment and final disposal of effluents and sludge will be held in Salvador from 13—15 August 1986.
Enquiries: Mr AMP Silva, Cetrel, Km 19 da BA. 536, Estrada de Camacari, Monte Gordo Camacari, 0453 Salvador, Bahia, Brazil.

IAWPRC

The 13th IAWPRC biennial international conference will be held in Rio de Janeiro, Brazil, from 17 August to 22 August 1986.
Enquiries: IAWPRC, 1 Queen Anne's Gate, London SW1H 9BT, England.

WATER VIROLOGY

A specialised seminar on water virology, associated with the 13th IAWPRC biennial conference will be held from 17 to 22 August 1986 in Rio de Janeiro, Brazil.
Enquiries: Dr WOK Grabow, National Institute for Water Research CSIR, PO Box 395, PRETORIA 0001.

MARINE DISPOSAL

A post-IAWPRC conference seminar on the marine disposal of wastewater will be held in Rio de Janeiro from 25 to 27 August 1986.
Enquiries: Dr RG Ludwig, c/o ABES, Avenida Beira-Mar 216-13° andar, 20021 Rio de Janeiro — RJ, Brazil.

ORDER NOW!

AVOID THE FLOOD

The Scientific Services of the Department of Water Affairs announces the following list of published hydrological reports:

TR 89:
Some unsolved problems in river flow, by W.J.R. Alexander, 1979. 86 pages with figures. Price: R4,02.

TR 102:
Southern African storm rainfall, by P.T. Adamson, 1981. 45 pages & tabulated 1 to 7 day point rainfall frequencies at more than 2 000 stations. Price: R31,73.

TR 105:
Maximum flood peak discharges in South Africa, by Z. Kovács, 1980. 16 pages & figures, flood peak catalogue. Price: R2,90.

TR 116:
Documentation of the January 1981 floods in the South Western Cape, by Z. Kovács, 1983. 46 pages & 17 figures, 32 photo's, summary of rainfall and runoff at 85 sites, hydraulic principles. Price: R22,63.

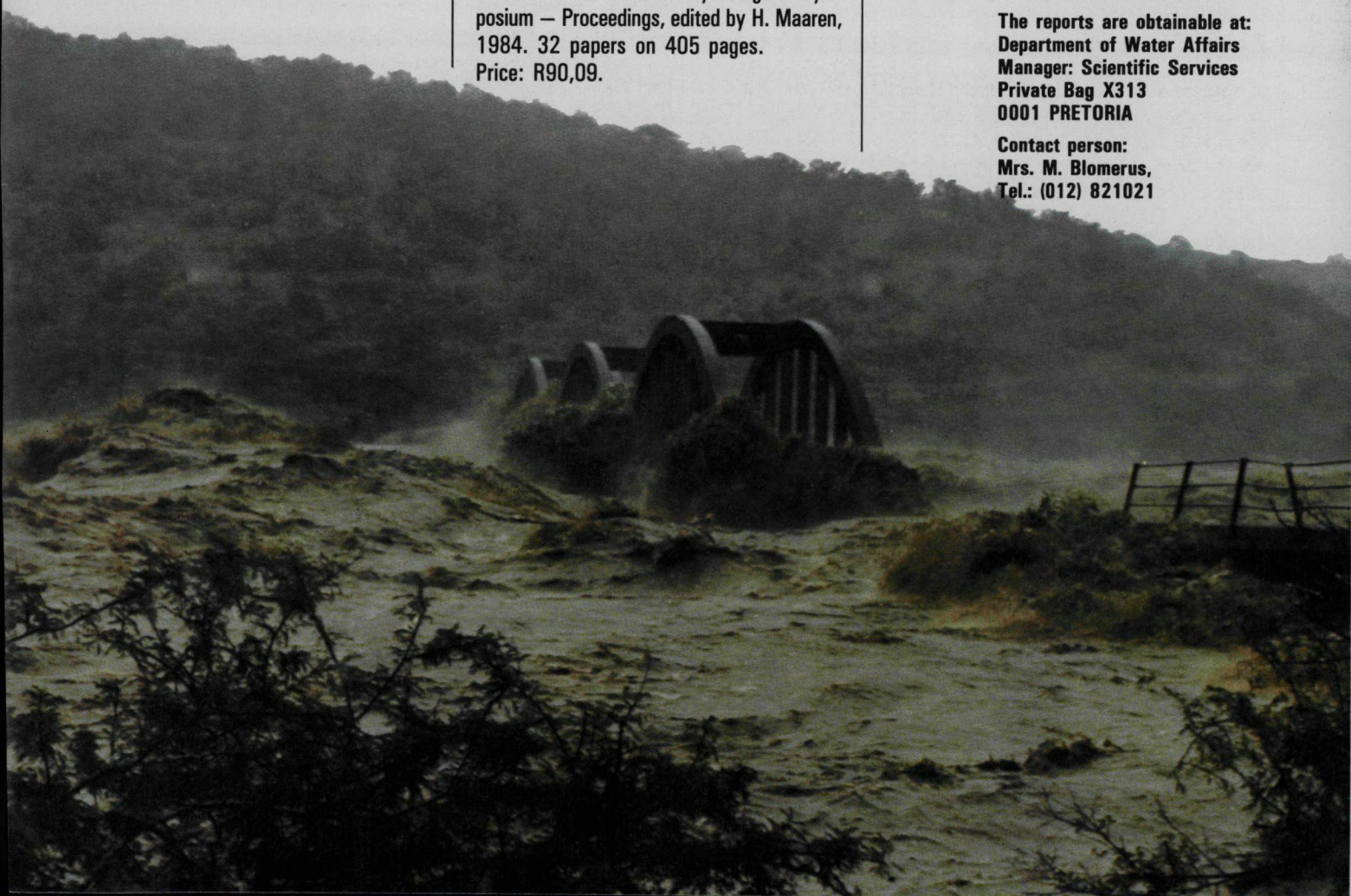
TR 119:
South African National Hydrological Symposium – Proceedings, edited by H. Maaren, 1984. 32 papers on 405 pages.
Price: R90,09.

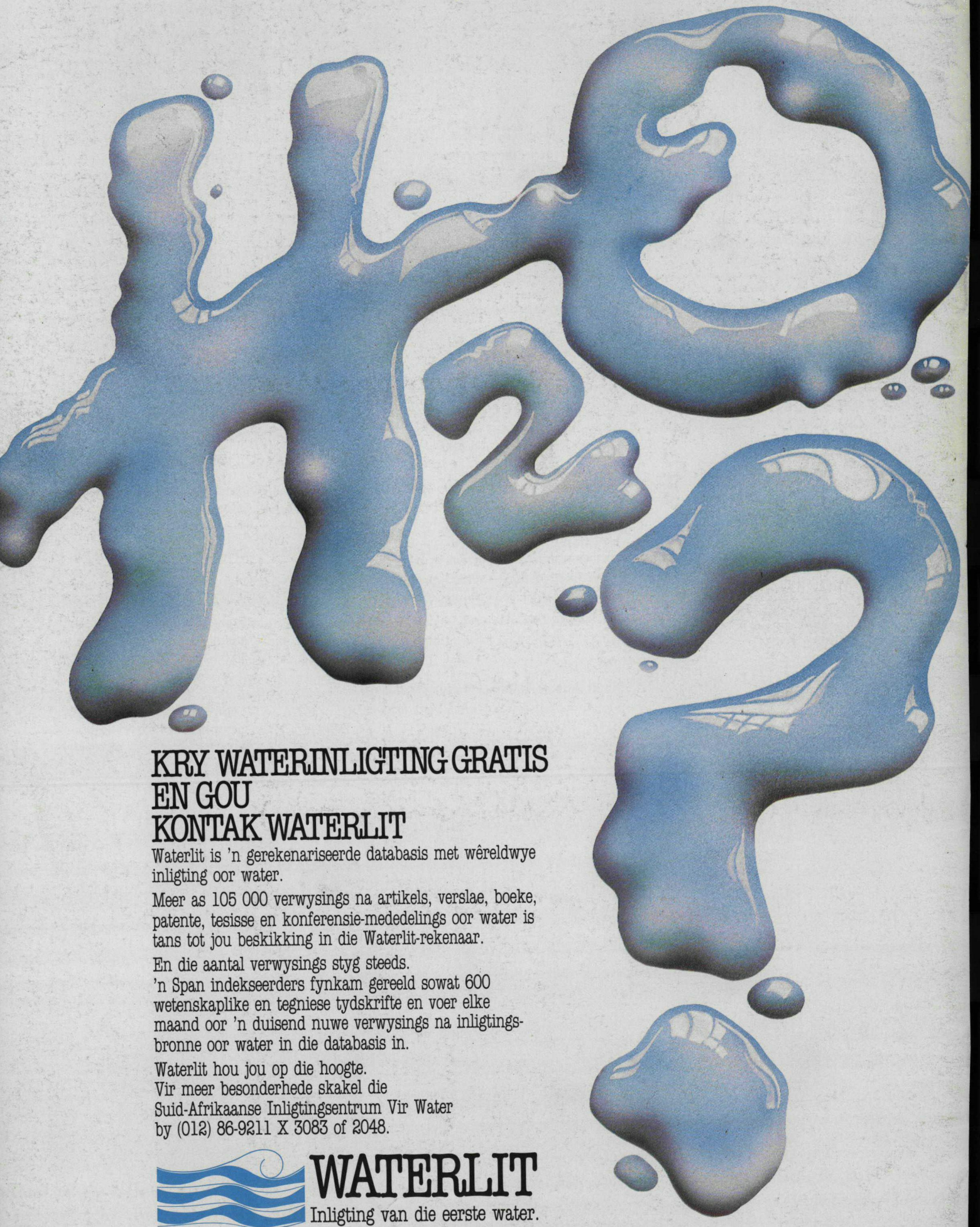
TR 120:
Documentation of the March–May 1981 floods in the South Eastern Cape, by D.B. Du Plessis, 1985, 55 pages & figures, photo's, summary of rainfall and runoff at 53 sites. Price: R14,84.

TR 122:
Documentation of the 1984 Domoina floods, by the Sub-directorate Flood Studies (Directorate Hydrology), 1985. 46 pages & figures, 55 photographs, summary of rainfall and runoff at 85 sites. Price: on enquiry.

The reports are obtainable at:
Department of Water Affairs
Manager: Scientific Services
Private Bag X313
0001 PRETORIA

Contact person:
Mrs. M. Blomerus,
Tel.: (012) 821021





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