



Besproeiingswater:

BOERE GAAN ONDER DRUK BESPROEI

Daar gaan toenemend druk op die besproeiingsboer in die Republiek uitgeoefen word om water optimaal te gebruik, sê mnr David van der Merwe, 'n hoofadviseur van die Waternavorsingskommissie.

Mnr Van der Merwe het op 9 Augustus 'n referaat gelewer by 'n simposium oor *Die benutting van water in die landbou* wat deur die Afdeling Landbouwetenskappe van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns gereël is.

Hy het gesê dat die besproeiingsboer vir die volgende aantal dekades in die skaduwee van drie belangrike beperkings sal moet funksioneer en produseer — skaduwees wat valbyle kan word as die wetenskaplikes aktief op hierdie gebied en die besproeiingsboer nie hulle kant bring nie. Die beperkings is:

- Die hoeveelheid water beskikbaar vir landboudoeleindes
- Toenemende mineralisasie van die besproeiingswater
- Die invloed van die energietoename op besproeiing.

Wat eersgenoemde betref, het hy gesê dat die werklike hoeveelheid water beskikbaar vir besproeiingsdoeleindes in die toekoms nie sal afneem nie. Onder normale klimaatomstandighede word bevestig dat die hoeveelheid water vir besproeiing sal styg van die huidige sowat 10 000-miljoen

kubieke meter per jaar tot 16 000-miljoen. Die persentasie van die totaal wat vir landbouproduksie gebruik sal word, sal egter na raming daal van die huidige ongeveer 70% tot 60% in die jaar 2010.

Nuwe besproeiingskemas sal alleen oorweeg word indien die ekonomiese voordele daarvan duidelik blyk, en teen hierdie agtergrond is dit dus duidelik dat die druk op die Suid-Afrikaanse besproeiingsgemeenskap om water optimaal aan te wend in die toekoms sal verhoog, het mnr Van der Merwe gesê.

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Druk besproei

(Van bladsy 1)

Wat mineralisasie betref, het hy gesê dat alhoewel nywerheidsbe-soedeling 'n bydraende faktor is, die bydrae van besproeiingsaktiwiteite tot die mineralisasie van rivierstelsels nie uit die oog verloor moet word nie. Die moontlikheid bestaan om in die toekoms op groter skaal van besproeiingsterugvloei en ander uitvloeiels (bv. dié van myne en nywerhede en ook riooluitvloeiels) vir besproeiing gebruik te maak.

Wat die energietoestand betref, het mnr Van der merwe gesê dat die gebruik van sprinkelbesproeiing ten koste van vloedsbesproeiing sal toeneem, veral in die vorm van spilpuntbesproeiing wat dramaties toegeneem het tot waar daar tans ongeveer 2 000 van hierdie stelsels in die Republiek gebruik word. Aanvanklik was die energieverstees van spilpuntstelsels ongeveer 1,6 keer hoër as dié van konvensionele sprinkelstelsels, maar met die koms van laedrukstelsels het die syfer tot 0,73 gedaal.

"Alhoewel hierdie verwikkeling vanuit 'n energie-oogpunt verwelkom word, is die situasie dat onoordeelkundige konsentring op die energiefaset van besproeiing teenproduktief mag wees in die sin dat dit soms nie die optimale gebruik van water bevorder nie. Teen hierdie agtergrond is dit duidelik dat die energie-aspek van besproeiing, anders as in die verlede, op hierdie stadium 'n meer prominente rol in die besproeiingsopset speel, soveel so dat dit selfs die doeltreffendheid van besproeiing kan beïnvloed," het hy gesê.

Hy het voorts gesê dat die Suid-Afrikaanse besproeiingsboer sy insiens dié drie fasette suksesvol kan hanteer indien die boer of sy adviseur oor al die nodige inligting beskik om die korrekte besluite te kan neem.

In hierdie verband het hy daarop gewys dat daar steeds 'n groot gaping bestaan in die oordrag van beskikbare besproeiingsinligting na die besproeiingsgemeenskap.

"Die vertraging in die toepassing van navorsingsresultate wat deur sommige op soveel as tien jaar gestel word, is 'n luukse wat Suid-Afrika nie kan bekostig nie," het hy gesê. "Daar moet gestreef word na

die ontwikkeling van 'n meer direkte skakeling tussen die navorser, die voorligtingsbeampte en die boer met 'n betrokkenheid en insette van verteenwoordigers van handelsinstansies."

Hy het voorts gesê dat as daar oorkoepelend na besproeiing gekyk word, dit duidelik is dat dit om die mens sentreer. Dit word deur die mens, met behulp van inligting deur die mens voorsien, vir die mens beoefen. Sy begrip van al die faktore wat by besproeiing betrokke is, sal bepaal of daar op 'n kontinue basis meer voedsel met optimale waterverbruik geproduseer kan word.

"Produktiewe besproeiingsboerdery vorm 'n integrale deel van landbou in Suid-Afrika en moet dus bewaar en uitgebou word. In hierdie proses word ons boere gekonfronteer met 'n taak wat toene-mend gekompliseerd raak en waarin hy al meer en meer die kundigheid van die betrokke vakkundiges benodig. Slegs die doeltreffende benutting van die moderne wetenskap en tegnologie in 'n effektiewe bestuursprogram sal hom in staat stel om produktiewe besproeiingsboerdery suksesvol te beoefen," het hy gesê.

Irrigation return flow studied

Dr RJ (Jeff) Wagenet, an eminent soil physicist and physical chemist from Cornell University, USA, visited the Water Research Commission during September as a consultant on irrigation return flow

research and modelling. The main purpose of his visit was to help with an assessment, and suggest research for improving, our current capability of predicting the contribution of return flows from irriga-

tion schemes to the overall flow and water quality in important river systems. This capability is essential for enabling water resources planners and managers to identify the best of possible options for ensuring a continuously adequate supply of water of suitable quality to agricultural, municipal and industrial consumers.



Dr Jeff Wagenet of the USA (left) and Dr George Green (WRC).

The first part of Dr Wagenet's visit was devoted to orientation visits to the Fish, Sundays, Breë and Berg River Valleys and Vaalharts, in the company of Dr George Green and Mr Charles Chapman of the Commission and various representatives of the Department of Water Affairs, the Department of Agriculture and Water Supply and university personnel currently engaged in aspects of hydrosalinity research and modelling. His visit culminated

in a workshop, held in Pretoria on 17 and 18 September, during which it became clear that to meet water resources planning and management objectives, both in the immediate and long-term future, there is an urgent need to improve

current modelling procedures by developing a cell or grid-based systems management model of an irrigated catchment which is deterministic, based on a clear understanding of hydrosalinity processes and which would not be invalidated

by large-scale changes in the system, such as in land-use or water supply, or its management. Clear guidelines for a research programme to provide such a model and verify it for priority catchments were laid down at the workshop.

Guide for the marine disposal of municipal wastewater

The Water Research Commission (WRC) recently signed a contract with the National Research Institute for Oceanology (NRIO) of the Council for Scientific and Industrial Research (CSIR) for research which involves prototype measurements of the dilution of wastewater discharges from an existing sea outfall sewer, and the compilation of several specialised chapters of a guide for the marine disposal of waste water.

The WRC has been involved in sponsoring research into the disposal of municipal wastewater to the marine environment since 1980. Provided that this form of disposal can be achieved without pollution of the marine environment and the wastewater does not need to be reclaimed, then marine disposal could prove to be more economically viable than other disposal alternatives.

Research in this area has been directed at the development of new and improved technology and management schemes that will enable problems associated with municipal and industrial waste disposal to be solved in both a cost effective and environmentally acceptable manner.

In South Africa at present, the only guide available for the design of marine disposal systems is that published by the Natal Town and Regional Planning Commission in 1969, entitled *The Disposal of Effluents into the Sea of the Natal Coast*. Although this publication served as a valuable and authoritative work in this field, there is a need for a new guide to update the very sophisticated degree of specialisation reached in many of the areas involved and the substantial advances in mathematical modelling techniques and computerisation.

The National Research Institute for Oceanology (NRIO) has been

actively involved in these highly specialised areas of mathematical modelling and computerisation and therefore has the necessary expertise to undertake the necessary work.

The project is designed to run for a period of twelve months and will consist of two stages. The first stage will concentrate on prototype measurements of dilution of wastewater discharges from an existing sea outfall sewer and the second stage the preparation of the specialised sections of the guide for the design of marine disposal systems. The prototype measurements are a prerequisite for the preparation of the proposed guide.

Satisfactory

Discharge of wastewater to the ocean results in dilution, dispersion and purification of the wastewater. The degree of dilution and dispersion, however, depends upon topographic and oceanographic conditions pertaining to the discharge site and will only be satisfactory if a properly designed system is used.

For the design of such a system, a thorough knowledge of the sea bed topography and oceanographic data such as wind, waves and current data is essential. These basic data as well as theoretical dilution predictions are used to produce a design or alternative designs for particular discharges.


An important aspect of such a design is to ensure an acceptable quality of sea water in designated areas of the sea, the sea bed or along the coastline under the most adverse oceanographic conditions.

It is important that dilutions calculated from available dilution theories give an accurate prediction of dilution. Because the methods in use at NRIO for initial dilution predictions are mostly based on analytical solutions of empirical equations resulting from model studies done by overseas laboratories, the need exists to evaluate these methods against prototype measurements before they are included in the proposed guide.

In terms of this agreement with NRIO, prototype measurements to evaluate initial dilution prediction techniques will be undertaken at Cape Town's Camps Bay Outfall.

Several sets of dilution data for controlled discharge situations will be obtained in the field and compared with theoretically predicted dilution levels under the same superimposed field conditions.

Four highly specialised chapters will be compiled by NRIO, and the remaining chapters of the guide internally by the Commission. The whole guide will be produced under the auspices of a committee with wide representation from the public and private sectors.



Lugverkoeling se invloed op omgewing ondersoek

Diep in die boswêreld van Noordwes-Transvaal is Evkom tans besig om die grootste lugverkoelde steenkoolkragstasie in die wêreld te bou.

Die Matimba-kragstasie, naby Ellisras, sal by voltooiing 'n vermoë van 3 600 MW hê en slegs 'n derde van die water benodig wat 'n konvensionele waterverkoelde kragstasie gebruik.

Om dié waterbesparing moontlik te maak, word 'n reeks lugverkoelers, pleks van die gebruikelike watertorings, aanmeakaargeskakel om 'n verkoelingseenheid 50 meter wyd en byna 1 km lank te vorm. Nie minder nie as 288 waaiers, elk 9,5 meter in deursnee sal gebruik word om 600 000 ton lug elke uur deur die lugverkoelde hitte-ruilers te blaas om die hitte, afkomstig van die stoom wat in 'n vakuum in die hitte-ruilers gekondenseer word, weg te voer. Die afvalhitte wat deur hierdie lugverkoelde hitte-ruilers in die atmosfeer vrygestel word, kan vergelyk word met die hitte van 'n ontsaglike veldbrand en kan as die omstandighede reg is, die temperatuur in die onmiddellike omgewing van die kragstasie met soveel as 8°C verhoog.

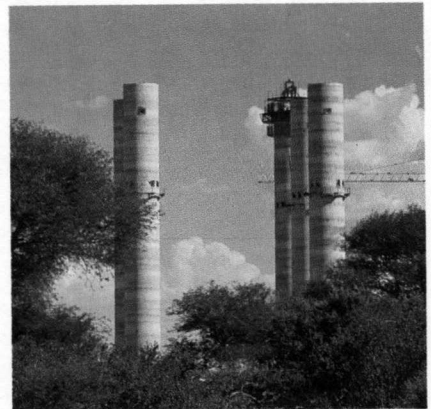
Vir die plasing en die bou van toekomstige lugverkoelde kragstasies is dit noodsaaklik om die

werklike impak van die lugverkoelingstelsel by Matimba kwantitatief te bepaal. Aangesien die omgewing rondom die kragstasie nog relatief ongerepte bosveld is, bied Matimba 'n ideale en unieke geleentheid om basislyn-omgewingsdata te versamel waarteen toekomstige veranderinge na 1986, wanneer die eerste kragopwekkers begin krag lewer, gemeet kan word.

WNK

Die Waternavorsingskommissie het dus as deel van sy betrokkenheid by die optimisering van stelsels vir droë en droë-natverkoeling by kragstasies, 'n ooreenkoms met Evkom en die WNNR aangegaan om termiese terugvoering wat deur droëverkoeling by kragopwekking veroorsaak word, te ondersoek. Die projek sal twee jaar en 8 maande duur en daar is reeds begin met 'n deurlopende dataversamingsprogram by Matimba om die databasis te skep wat benodig word.

Studies op soortgelyke skaal was nog nie elders in die wêreld moontlik nie aangesien die lugverkoelingstelsel by Matimba meer as tien keer groter as enige ander bestaande stelsel sal wees.



Chemical compounds in water and health criteria

"Until such time as we have adequate knowledge to make rational decisions, it is prudent to be rather safe than sorry and therefore limits have to be set for organic compounds to a level as low as possible."

This brief summary of an almost unknown field is the opinion Dr WHJ Hattingh expressed at an in-house conference on pollution control presented by the Department of Water Affairs in Pretoria. Dr Hattingh sketched the dilemma health authorities and scientists have to deal with when determining the link between the chemical composition of a water, especially where organic compounds are involved, and its consumers' health.

As to why so little is known about organic constituents in water Dr Hattingh said that analytical techniques to analyse a water for most of these compounds only recently became available.

"The fact that water is such a good solvent also presents problems in the chemical analysis of organic compounds. It is often almost impossible to isolate and concentrate these compounds from water since they occur at very low levels.

"Present-day analytical capability is such that mainly the volatile organic components are determined. More than 80% of the organic matter is not volatile and is therefore not easily determined," Dr Hattingh said.

Chlorine

What is known however, is that chlorine used in the disinfection of water forms reaction products with the organic matter and that these chlorinated compounds might have deleterious effects. "It is unlikely that these compounds would ever be present in concentrations high enough as to be directly toxic to man but they may cause chronic diseases in man. Therefore the question to be answered is how do we determine these compounds and the effect they may have," Dr Hattingh said.

Two possibilities, as Dr Hattingh sees it, to assess the effect of these compounds is firstly by means of classical epidemiological



Dr WHJ Hattingh, senior adviser of the Water Research Commission.

studies and secondly by using animals of various species and susceptibility.

With classical epidemiological studies "the population is carefully observed, and if possible, compared with a control group," Dr Hattingh said. "Factors such as the quality of the air breathed, occupation, the quality of the food consumed, smoking habits, use of other beverages such as alcohol all complicate the issue. Nevertheless, this is a technique used by epidemiologists and provides some answers in particular where toxic effects are prevalent."

Animals

Dr Hattingh also said that the second approach, namely to use animals, enables possible effects of the compounds to be screened. Effects such as carcinogenicity, teratogenicity and mutagenicity can be assessed. However, the problem remains as to how these results are applied to man.

The ideal position will be to be able to calculate at what concentration level a compound would have no adverse effect. "A number of researchers believe that this can be done and the basis of their hypothesis is that there is no threshold value for a carcinogen. Experimental data, assuming a linear dose-response relationship is then used to calculate the effects that different concentrations might have. In this way the United States Environmental Protection Agency has proposed criteria for a number of so-called priority compounds," Dr Hattingh said.

Inorganic chemicals which have effects on health are mainly the heavy metals Dr Hattingh said. "A world wide tendency", he continued, "has developed that only the toxicity of the heavy metals are recognised and therefore they are often called the toxic metals."

Dr Hattingh said because many of these metals are essential to man and his metabolism, "the concentration at which these metals turn from being essential to being toxic is often very delicate. It is therefore very important that the limits for these compounds should not be so low as to impair the health of the consumer."

He continued that South Africa has a potable water quality standard and defined standards as definite rules embodied in law and gazetted in the Government Gazettes.

However, the South African Bureau of Standards (SABS) as well as the World Health Organization (WHO) have guidelines for potable water both of which have been revised this year.

Dr Hattingh said the tendency in South Africa is to follow the quality criteria of the WHO to allow comparisons of the potable water quality in this country to that of other countries.

SKOON, SKONER, SKOONSTE . . .

Chemiese fosfaatverwydering verder ondersoek

'n Ooreenkoms om chemiese fosfaatverwydering volskaals te evalueer en te optimiseer vir rioolwaterwerke waar syfelbeddings gebruik word, is tussen die Waternavorsingskommissie, die Stadsraad van Boksburg en 'n raadgewende ingenieursfirma Scott en De Waal gesluit. Die projek sal 27 maande duur.

Navorsing oor chemiese en biologiese nutriëntverwydering uit munisipale afvalwater is aansienlik verskerp met die wysiging van die fosfaatstandaard in 1980. Kragtens dié wysiging sal daar vanaf 1 Augustus 1985 'n beperking van 1 mg/l geplaas word op die konsentrasie opgeloste ortofosfate (as P) in sekere nywerheidsafvalwater en munisipale uitvloeisels.

Die grondslag vir die verwydering van fosfate met behulp van chemikalieë is reeds in Suid-Afrika gelê met navorsingswerk wat deur die Waternavorsingskommissie ondersteun is. 'n Projek vir die volskaalse chemiese verwydering van stikstof en fosfate uit syfelbeduitvloeisels is suksesvol deur die Nasionale Instituut vir Waternavorsing van die WNNR en die Stadsraad van Pretoria by die Daspoortrioolwaterwerke in Pretoria uitgevoer. Dié projek het bewys dat dit tegnies moontlik en prakties uitvoerbaar is om volskaals die opgeloste ortofosfaat-konsentrasie met chemikalieë tot onder die vlak van 1 mg/l (as P) af te bring.

By Daspoort is verder aangetoon dat dit nie prakties moontlik en ekonomies uitvoerbaar is om fosfaat te verwyder tot op 'n vlak van 1 mg/l (as P) in die finale uitvloeisel as die chemikalieë voor die primêre verhelderaar bygevoeg word nie. Daar is waargeneem dat ferrichloried hoofsaaklik ortofosfate verwyder het, terwyl ander gebonde fosfate die syfelbedding bereik waar hulle gehidroliseer word tot ortofosfaat wat in die finale uitvloeisel en gewoonlik by 'n konsentrasie van 1,5 tot 3,0 mg/l voorkom. In gevalle waar voorbehandeling in 'n syfelbeddingstelsel benodig word, byvoorbeeld oorbelaaiete beddings, moet dus ook voorsiening gemaak word vir die toevoeging van chemikalieë



nadat die uitvloeisel deur die syfelbedding beweeg het.

Boksburg

Baanbrekerswerk op die gebied van na-syfelbed fosfaatverwydering is ook by Boksburg gedoen. Reeds aan die begin van 1979 het mnr Dries Louw, hoof-skeikundige van die stad, en mnr Hennie Basson, superintendent van die Vlakplaats-rioolwaterwerke buite Boksburg, met 'n reeks eksperimente begin om die tegniese en ekonomiese toepassing van chemiese fosfaatverwydering by Vlakplaats te ondersoek. Hulle navorsing het hoofsaaklik gekonsentreer op volskaalse fosfaatverwydering

deur chemikalieë stroomaf van die syfelbeddings in die humustenks by te voeg. Ferrichloried en poliëlektroliet is in verhouding tot die vloeitogedien en die ortofosfaat-konsentrasie wat so doende in die uitvloeisel ontstaan, is deurlopend gemoniteer. Daar is aangetoon dat die vereiste fosfaatstandaard van minder as 1 mg/l (as P) betreklik maklik deur middel van hierdie tegniek gehandhaaf kon word.

Hulle eksperimente met stikstofverwydering het aangedui dat ongeveer 50 persent van die stikstofverwydering van die aanleg in die syfelbedding plaasvind het. 'n Verdere aansienlike afname in die stikstof is in die verouderingsdamme teweeggebring.

Volgens dr Herman Wiechers, senior adviseur van die Waternavorsingskommissie, word die resultate van die navorsingswerk by Daspoort en Vlakplaats tans saamgevat vir publikasie in 'n tegniese gids onder die titel: "Guidelines for chemical removal of phosphates from municipal wastewaters"

Oor die nuwe WNK-vennootskapprojek met die Stadsraad van Boksburg sê dr Wiechers dat die navorsings- en ontwikkelingsprojekte by Daspoort en Vlakplaats 'n aantal fasette van chemiese fosfaatverwydering geïdentifiseer het wat verdere navorsing verg. Hy sê dat bestaande kriteria vir die bedryf van volskaalse syfelbedwerke om fosfate chemies te verwyder, verder verfyn moet word. Dit sluit fasette in soos byvoorbeeld die optimale toediening van chemikalieë om te verseker dat daar ten alle tye aan die nuwe spesiale standaard voldoen word, asook die optimale bedryf van primêre en sekondêre besinktenks, en anaërobiese verteederders. Optimale bedryf sal verseker dat die minimum hoeveelheid chemikalieë gebruik word wat weer beteken dat mineralisasie en slykproduksie en die gepaargaande onkoste vir plaaslike owerhede tot 'n minimum beperk sal word.

Daar moet ook kwantitatiewe gegewens ingewin word oor die volumes en massas addisionele slyk wat tydens chemiese fosfaatverwydering gevorm word, asook die aard van dié chemiese en gemengde slyke. Hierdie inligting word benodig vir die ontwikkeling van kriteria vir die opgradering van bestaande werke asook vir die ontwerp van nuwe werke sodat items soos byvoorbeeld die besinktenks, pompe, verteederders en droogbeddings op die mees koste-effektiewe manier ontwerp en bedryf kan word.

Dr Wiechers sê die Stadsraad van Boksburg het gedurende 1983 'n derde module by sy Vlakplaats-syfelbedwerke in bedryf gestel waarin daar spesiaal in die ontwerp voorsiening gemaak is vir chemiese fosfaatverwydering. Die werke is dus uitermate geskik vir die Waternavorsingskommissie se nuwe navorsingsprojek.

Papierpulpuitvloeiels ondersoek

Klagtes van die publiek oor die voorkoms van oormatige skuim in die brandergebied by Umkomaas het indirek gelei tot 'n ooreenkoms tussen die Waternavorsingskommissie en die Natalse papierfabriek SAICCOR. Kragtens dié ooreenkoms sal die WNK ondersoek laat instel na SAICCOR se papierpulpuitvloeiels, wat by Umkomaas in die see gestort word, uit die oogpunt van besoedelingsbeheer, waterbesparing en -hergebruik.

Volgens dr Oliver Hart, senior adviseur van die Waternavorsingskommissie, ontstaan die skuim in die see vanweë die teenwoordigheid van lignosulfonate in die papierfabriek se uitvloeiels.

Hy sê daar word lank reeds 'n oplossing vir die skuimprobleem gesoek. Maar ten spyte van die bou van 'n pyplyn in die see en verskeie navorsingsprojekte wat SAICCOR by universiteite en die WNNR gefinansier het, bly die stuiasie esteties nog steeds onbevredigend.

Dr Hart meen die rede hiervoor is

dat alle ondersoeke tot dusver daarop gemik was om die lignosulfonate te vernietig eerder as op die ekonomiese herwinning daarvan en die potensiele hergebruik van die water nie.

Die Hart sê in die buiteland word lignosulfonate deur middel van ultrafiltrasie en tru-osmose uit hierdie tipe uitvloeiels verwyder. Dié prosesse sal ook nou by SAICCOR ingespan word om die nodige uitvoerbaarheidstudies op die uitvloeiels op loodsskaal te doen.

Volgens dr Hart het ander projekte van die Waternavorsingskommissie getoon dat lignosulfonate een van die beste proteïenpresipitate is en indien die produk ekonomies herwin kan word, behoort dit algemeen gebruik te kan word in die behandeling van, onder andere, leerlooierij- en slagpale-uitvloeiels. Lignosulfonate is ook 'n natuurlike bindmiddel wat gebruik word by die bou van paaie.

Die projek sal ses maande duur.

Mym Textiles construct full-scale effluent plant

The Water Research Commission has been sponsoring pilot-plant research and development work on textile effluent treatment for a number of years.

Three of the projects already completed are: the treatment and reuse of wool/synthetic fibre dyehouse effluents; the closed loop recycle/treatment system for sizing/desizing effluents and the treatment and reuse of cotton/synthetic fibre dyehouse effluents.

Based on the results of the latter project, Mym Textiles at Umzinto, Natal constructed a full-scale effluent treatment/water recycle plant.

The WRC has signed a twelve-month contract with Mym Textiles for a project which will cover the following three areas:

- evaluation of the long-term effects of treatment performance

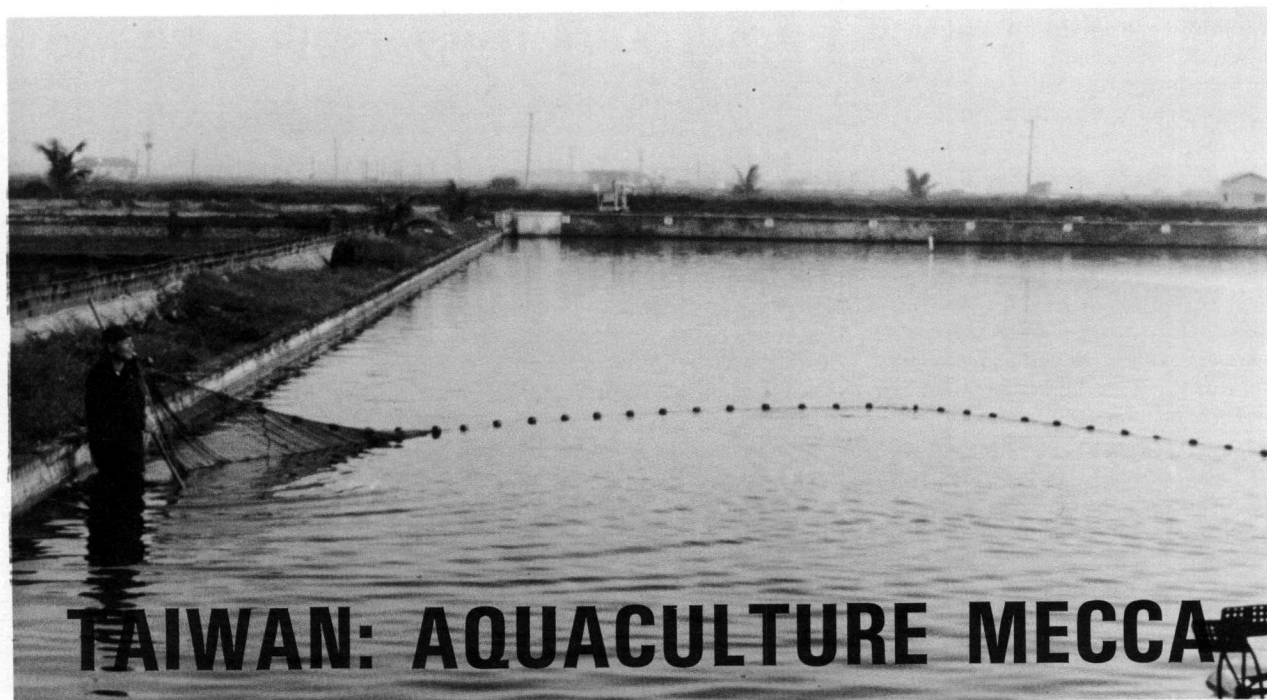
- reuse of product water and optimisation of the process variables and

- confirmation of the detailed design and process economics.

The treatment/recycle plant consists of four individual units for the treatment of scouring effluents, strong dyeing effluents, weak dyeing effluents and concentrates.

The first three units are high temperature dynamic hyperfiltration (reverse osmosis) plants rated at 120 m³/d, 230 m³/d and 300 m³/d respectively. The product water (95% recovery) will be returned for process use. The hyperfiltration concentrates and other high strength wastes from the factory will subsequently be treated by a 50 m³/d evaporator.

An overall water recovery of 99% will be achieved.



A typical fish pond in the south of Taiwan used for eel and prawn farming.

In 1981 the production from aquaculture in Taiwan exceeded 200 000 metric tons accounting for 22% of the total fisheries production in terms of quantity and 32% in terms of monetary value. This statistic captures only a small part of aquaculture in Taiwan.

Aquaculture practices in Taiwan has a long and successful history with a fisheries industry which commenced more than 60 years ago. According to Professor Schoonbee of the Rand Afrikaans University, conditions in Taiwan are extremely favourable for the production and sale of fishery products. With a tropical and sub-tropical climate and warm shallow seas these conditions allow a long productive season.

Professor Schoonbee says the country has developed the know-how through constant research into ways and means of producing large numbers of juveniles of a great variety of organisms used in aquaculture.

"Taiwan is constantly looking for new sources of fish in the sea and the development and improvement of fishing gear are constantly investigated by research teams of the Taiwan Fisheries Research Institute (T.F.R.I.)," he says.

The seven regional branches of the T.F.R.I. under the directorship of Dr PJ Lee, aims at improved methods for important economically bred species.

Professor Schoonbee sees Taiwan as a major fish exporting nation. It

is a leading country in milkfish culture, grey mullet propagation, grass prawn culture as well as tilapia culture. It is expected that more species will be added to the list of aquaculture candidates in the near future. Currently under aquaculture is 52 species, with another 25 candidate species having a high potential for intensive cultivation.

Aquaculture in Taiwan is

classified by messrs I-Chiu Liao and Chi-Hsiang Lee of the Tungking Marine Laboratory in Tungking into two main categories namely that of fresh and brackish water aquaculture and saltwater aquaculture. They continue to subclassify freshwater aquaculture into pond aquaculture and aquaculture in reservoirs, while saltwater's further subclassification is pond



The Fu Hai fish farm in the Pingtung area. The 6,5 hectares of ponds produce 500 tons of red tilapia annually. Since the climate is very good it is possible for the fish farmers to have three crops per year.

aquaculture and shallow-sea aquaculture.

Other types of aquaculture are those in rice-fields (a declining practice) and in floating net-cages (proven practical and successful).

Messrs Liao and Lee says the number of species of aquatic organisms under aquaculture in Taiwan "ranks second among all the countries that practice aquaculture in the world. With respect to aquaculture technology, Taiwan is one of the leading countries in the world judging from the fact that the majority of aquaculturists in Taiwan can skillfully and successfully perform the techniques of artificial propagation for many important species of aquatic organisms under aquaculture."

In the milkfish industry for example, the Philippines, Indonesia and Taiwan are the three major countries in the world practicing milkfish farming. Even though the Philippines and Indonesia have a much better natural environment for milkfish farming than Taiwan, the latter's annual production is still 3-8 times higher.

During the sixties aquaculture in Taiwan had some great achievements which influenced the industry as a whole. In 1963 techniques for the artificial propagation of Chinese carps (*Ctenopharyngodon idellus* and *Hypophthalmichthys molitrix*) were established. Chinese carp fry production fulfilled the needs of both the local aquafarmers and the export industry.

The artificial propagation of the grass prawns (*Penaeus monodon*) were successfully completed in 1968. According to messrs Liao and Lee this revolutionary breakthrough in the prawn culture industry in Taiwan, made the country one of the important prawn culture countries in the world. After a short period of 17 years the production of grass prawn now exceeds 15 000 metric tons.

There are, however, some serious problems the aquaculture industry has to face, such as urban and industrial pollution which seriously affect the industry.

A further problem is the increasing number of countries in the world enforcing 200-mile exclusive economic zones. This will imply a



(Top):

The mullet industry in Taiwan is of particular importance during the annual spawning run of the grey mullet down the Taiwan Strait during which time thousands of tons of ripe fish are caught. The female gonad (seen in the picture) is considered by the people of the Orient as a delicacy. High prices are paid, sometimes as much as \$40 (US) per kg for processed gonads.

(Right):

Dr Liao, Director of the Tungkang Marine Laboratory, with a mature grass prawn.



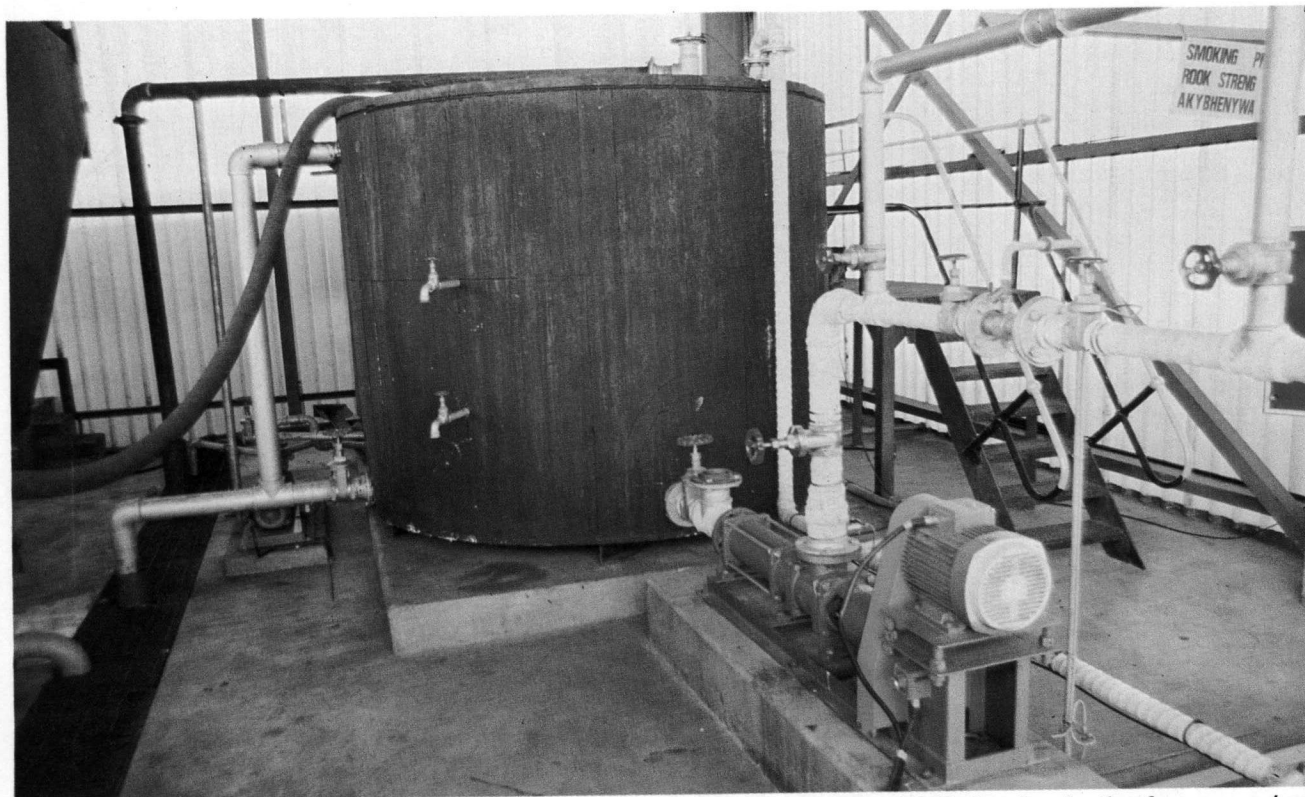
decrease of the production from deep-sea fisheries as well as the total fisheries production. More than one-third of the total fisheries production in Taiwan is contributed by deep-sea fisheries. An obvious solution is for aquaculture to play an even more important role in the future.

Messrs Liao and Lee have seven priorities they consider vital for further development of the aquaculture industry in the Republic of China. These are: sufficient and steady supply of fish and prawn seedlings; improvement of aquaculture techniques; prevention and control of the diseases of fishes and prawns; establishment of special zones for mariculture around the coast of the island; improved management and marketing; introduction of new

candidate species for aquaculture and development of improved strains through selective breeding; and furthermore an exchange of new aquaculture technology with other countries.

The two research scientists from Tungkang see aquaculture's role in the future to be even more important than it was in the past. Not only will its role be important to the fish production on land, but it will also replenish the nearly exhausted natural resources.

In the next issue of SA Waterbulletin we are taking a closer look at Tungkang Marine Laboratory and the enormous achievements they have had in recent years with certain fish species.



A general view of the pilot digester showing sampling points at 1/3 and 2/3 depths. In the foreground are a circulation pump and pipework including venturi.

Autothermal aerobic digestion:

Rapid sludge disinfection at Olifantsvlei Works

At a conference of the International Association on Water Pollution Research and Control (IAWPRC), held in Amsterdam in September 1984, mr JE McGlashan of the Water Research Commission (WRC) and mr BC Trim of the City Engineer's Department in Johannesburg presented a joint paper on sludge stabilisation and disinfection by means of autothermal aerobic digestion with oxygen. Their paper was one of the nine South African papers chosen by the conference organisers to be presented at the conference.

The treatment and disposal of sludge resulting from the purification of domestic wastewaters is receiving considerable attention worldwide, especially in South Africa where this has become one of the major problems local authorities have to deal with.

In their presentation messrs McGlashan and Trim stressed the fact that the organic matter in sludge is a valuable soil improver but that its universal use in agriculture and horticulture carries with it certain risks to public health. In this respect South Africa has

strict guidelines for sludge utilisation in agriculture and horticulture which are particularly severe in regard to the presence of the very resistant ova of the parasitic roundworm *Ascaris lumbricoides*. The guidelines do not take into account the potential health hazards due to heavy metals and other toxic substances and relate principally to the hygienic quality of the sludge.

"Due to the stringent health requirements and lack of suitable disposal options, many of the municipalities are forced to dispose

of sludge on the site of the sewage works," the speakers said.

Because of this and other problems in the sludge management field, the WRC launched a programme of national research. One of the research projects undertaken was with the City Council of Johannesburg and involved a three year programme of research into the effectiveness of autothermal aerobic digestion in terms of the inactivation/destruction of selected micro-organisms.

The basic aims and objectives messrs McGlashan and Trim said,

were to "demonstrate that sufficiently high temperatures can be achieved to ensure the degree of disinfection that would satisfy the health authorities; to establish minimum practical retention periods for the process; to assess the significance of various operational problems; and to establish the stability, fermentability, odour release and dewaterability of the disinfected sludge."

Materials and methods used during the research programme were also discussed.

During the initial test period, when the plant was run on thickened waste activated sludge from the Olifantsvlei extended aeration plant, constant problems were experienced with fouling of the dissolved oxygen probe.

However, after a forced close-down for repairs it became possible to reposition the dissolved oxygen probe to a position in the suction pipe to the recirculation pump thus providing a constant flow of liquid past the membrane.

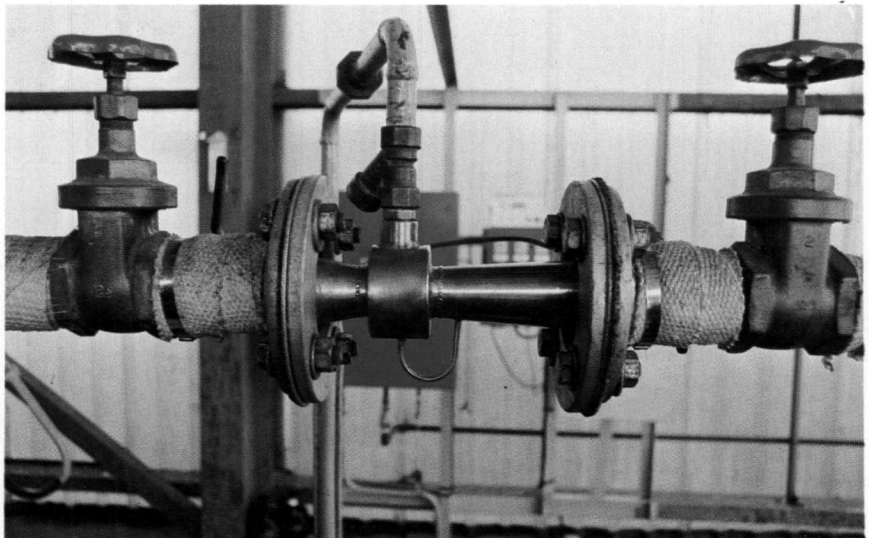
After the modifications had been completed, experimental runs running for about two months each were undertaken using a 50:50 mixture of raw and waste activated sludge at digester retention times of 4 and 2 days respectively.

"During these two runs the oxygen fed to the system was at all times controlled automatically via a signal from the dissolved oxygen meter.

Apart from a number of minor blockages, the digester operated faultlessly during this 4 month test period and produced very encouraging results which included a 100% destruction of viable *Ascaris* ova at temperatures above 55°C," the speakers said.

Unusual characteristics were observed in the final product after aerobic digestion at high temperatures. "Initial investigations showed that on passing through the digester the feed sludge became more fluid and would not settle," they continued.

After examining a wet preparation of the 4 and 2 day retention sludges, two solid phases were discovered. It appeared that the larger solids were debris or other inert material from the feed sludge and the smaller solids almost en-



The vitox venturi with oxygen feed pipe and monitors. The recycled sludge pipe size is 50 mm diameter to avoid blockages at the venturi.

tirely dispersed bacteria. From tests undertaken on the stability and fermentability of the final product it became clear that the sludge was not stable and could ferment readily to form acids which could become a nuisance if disposed of without further treatment. Similar results were obtained from subsequent experiments on one day retention sludge.

Ascaris

Discussing the results of the investigation the speakers pointed out that a 50/50 mixture of thickened waste activated sludge can be disinfected (in terms of inactivation of *Ascaris* ova and *Salmonella*). The temperature in the digester was in excess of 55°C all the time in both the 2 and 4 day trials and ensured a 100% kill of *Salmonella* and the ova of the roundworm *Ascaris lumbricoides*. At subsequent trials at one day retention periods, average temperatures of 59°C were achieved which also ensured a 100% kill.

"This however does not mean that a one or a two day retention period is required for disinfection. The fact that the system was fed at two-hourly intervals tends to indicate that the minimum time required for complete inactivation must be less than 2 hours," messrs McGlashan and Trim said.

"As is evident from the results," they continued, "the aerobically

treated sludge readily ferments when seeded with 10% acid fermented sludge or anaerobically digested sludge. Further treatment of the sludge is therefore necessary in order to stabilise it. A possibility in this respect is Dual Digestion — the combination of a short retention period autothermal aerobic first stage followed by anaerobic digestion for a period of several days to complete the process of stabilisation.

Resulting from the research programme the speakers concluded that:

- "sufficiently high temperatures can be achieved in the process for disinfection of the sludge at retention periods as low as one day;
- "the treated sludge readily ferments anaerobically to form volatile acids;
- "the treated sludge does not settle readily, with no liquid phase appearing even after standing for 3 days;
- "the treated sludge is very difficult to dewater requiring about 10 times the quantity of polymer dose required to dewater conventional extended aeration sludge and
- "at the short retention period investigated, the process should not be considered as a stand-alone process for the stabilisation and disinfection of sludge."



Rooiwalwerke nader voltooiing

Die goeie ou dae om water oor die spreekwoordelike sewe klippe te laat vloei, is vir Pretoria vir goed verby. Dit het duidelik geblyk toe *SA Waterbulletin* onlangs Pretoria se nuwe spogrioolwaterwerke by Rooiwal, noord van die stad, saam met 'n groep stadsraadslede en munisipale amptenare, as gaste van die ingenieursfirma, Meiring en vennote, besoek het.

Die Rooiwalwerke is tans nog onder konstruksie en die mikdatum vir die voltooiing van die eerste

module is April 1985.

Die kapitale besteding op die Rooiwalprojek sal volgens die stadsingenieur, mnr DH Marx, by voltooiing nagenoeg R25-miljoen bedra en is een van die grootste beleggings wat die Stadsraad van Pretoria die afgelope klompie jare gemaak het.

Die aanleg het 'n nominale hidrouliese vermoë van 150 Ml/dag by gemiddelde droëweervloei, maar kan 'n natweerspits van drie keer hierdie tempo hanteer.

Om aan die nuwe spesiale standaard vir die verwydering van stikstof en fosfaat uit die finale uitvloeisel te voldoen, is die Bardenpho-prosesvariasie van die aktiefslykproses gekies.

'n Interessante aspek van die nuwe Rooiwalwerke is die gebruikmaking van outomatiese monitoring en beheer deur middel van elektroniese toerusting. Die stelsel wat geïnstalleer word, sal die optimale bedryf van die aanleg vergemaklik.



Dr James Barnard verduidelik die werking van die aanleg aan stadsraadslede.

Separate water meters installed for flats

A property development corporation, realizing the importance of metering as an anti-waste mechanism, has installed separate water meters into a new block of flats in Pretoria.

Some flat dwellers have for many years complained bitterly that although they do their utmost to conserve water in their own dwelling unit, their neighbours waste water indiscriminately and at the end of the day each pays a similar amount for water consumed by the block as a whole. With individual meters installed at the front door of each unit, this problem has been overcome as the cost of the water for the block will now be distributed in accordance with the individual water readings. In addition those using unacceptable high volumes of water can easily be identified.

According to Mr Charles Chapman, Senior Adviser, Water Research Commission, the meter readings will be used to proportion total water consumption of the whole block, as the water used for gardening, cleaning, etc., will also be reflected in the bulk supply to the block which will still be fed through a single municipal meter. This practice does not constitute the resale of water but merely the recoupment of water costs.

Mr Wally Edelstein, Managing Director of Premier Investment Corporation, believes that the individual metering of flats will become standard practice in South Africa in future.

Dr JP Kriel, member of the Water Research Commission and consultant to the Department of Water Affairs, welcomed this practical application of water economy measures and is of the opinion that many flats units consume more water than households with a similar number of occupants.

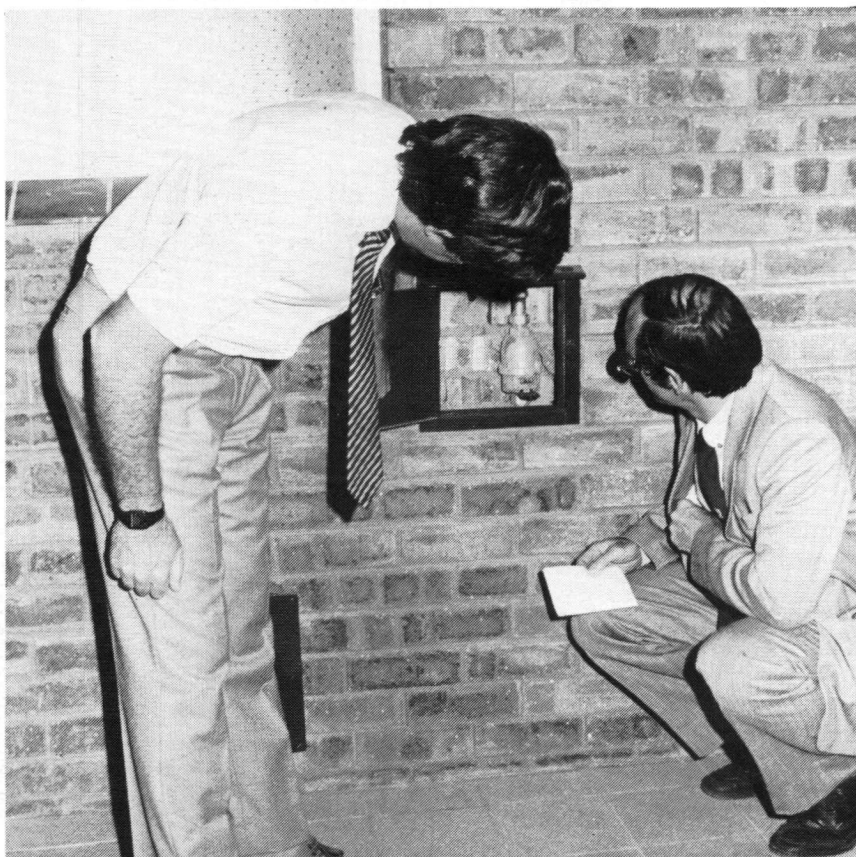


(Above):

The chairman of the WRC, Dr MR Henzen, looking at the advertisement indicating separate water meters in this new property development in Pretoria.

(Below):

Mr Peter Stocks (left) and Mr Charles Chapman (WRC) inspecting one of new water meters at the front entrance to the flat.



In 1979 a programme for aquaculture in Transkei was conceived with two major branches: research and extension services. *SA Waterbulletin* recently visited the Umtata Fish Research Centre to witness the hatchery procedures in induced spawning of the three Chinese carp species, Grass (*Ctenopharyngodon idella*), Silver (*Hypophthalmichthys molitrix*) and Bighead (*Aristichthys nobilis*) carp.

AQUACULTURE IN TRANSKEI

Situated on a five hectare unit, the Umtata Fish Research Centre is the nucleus of aquaculture activity in this 42 800 square kilometer country of the Xhosa people. Professor JF Prinsloo, Head of the Department of Zoology at the University of Transkei, says the Fish Research Centre was established in 1980 with the purpose of launching freshwater aquaculture in Transkei.

Why the Fish Research Centre and why aquaculture in Transkei? "Transkei has very little natural indigenous fish," Professor Prinsloo says. "It is for this reason that the Fish Research Centre was established to execute a series of growth experiments on a variety of fresh water fish, monitoring their responses and determining which fishes were best suited to environmental conditions in Transkei."

Professor Prinsloo explains the reason for Transkei's lack of natural indigenous fish: "One important reason is the high silt load of rivers resulting from soil erosion. This type of soil, fine and powderish, is characteristic of Transkeian soil which results in the high silt load found in dams. The lowest silt load of the Umtata Dam, for example, is higher than the highest level found at the Verwoerd Dam, thus limiting severely its fish production potential."

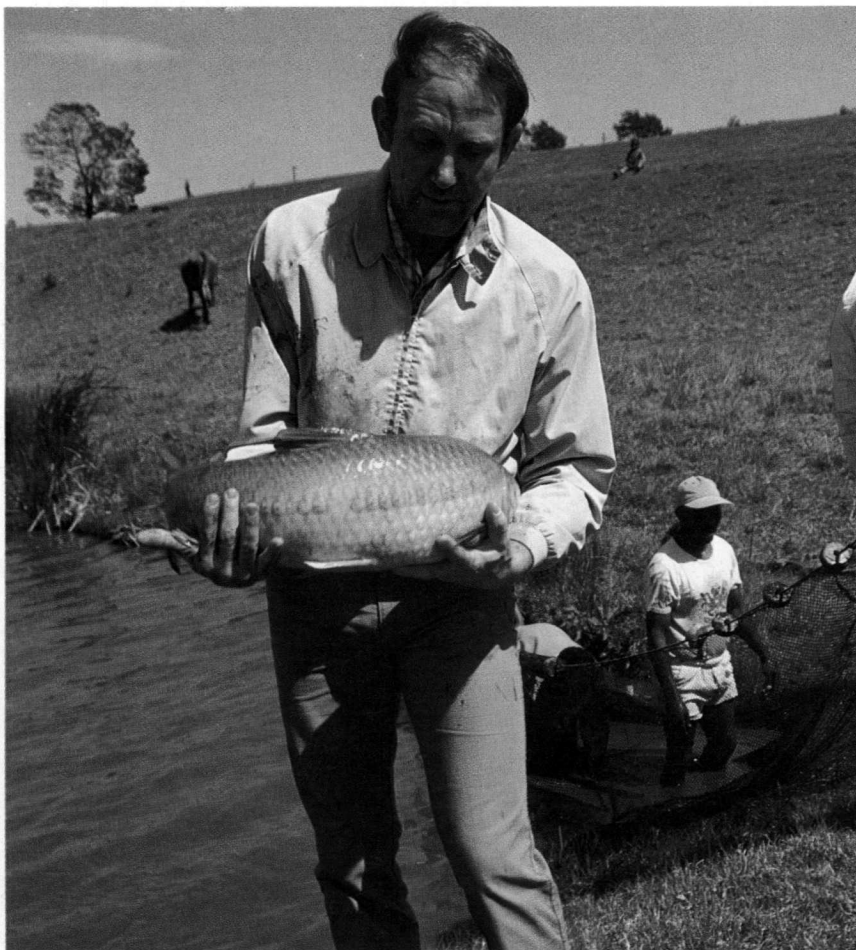
Mike Schramm, a fish research scientist at the University of Transkei, says except for the Xonxa Dam there is not very much scope for commercial exploitation of fish in any of the other larger dams in Transkei.

Mr Schramm has been looking at the fisheries potential of the large dams in Transkei ranging in size from 250 hectares to two and a half thousand hectares. "My recommendations when I finish this project will be directed towards ways one could harvest the fish economically from these water bodies and distribute them to the people in the immediate vicinity of the impoundments. Most of the dams could be harvested by these people at a subsistence level.



A fish pond at the Umtata Fish Research Centre, Transkei.

(Right):
Prof JF Prinsloo holding one of the
fish used for breeding purposes.



It is a shame not to exploit such fish as food. The most limiting feature, however, seems to be the very high turbidity," he says.

Aquaculture in Transkei, therefore, is directed towards provision of additional protein for the people and the optimal use of existing waters. The Fish Research Centre in particular, breeds fish to stock selected dams (and has already stocked 21 dams on an experimental basis during July) and provides fish for those interested in the integrated systems where fish is combined with agriculture cultivation.

Breeding

The breeding process in Transkei commences at an early stage during the year when spawners are kept in special polyculture broodstock ponds. Professor Prinsloo explains polyculture and its advantages: "Polyculture is where different fish species with different feeding habits are stocked in one culture, with a view to creating a balanced system thereby

preventing excessive algal blooms and oxygen depletion in these ponds. The fact that benthic, algal, zooplankton, detritus and macrophyte feeding fish were together, played an important role in maintaining the stability of pond conditions at the Fish Research Centre.

"The ratio's at which the fish were kept in broodstock ponds were: Common (European) carp approximately 60%, Silver carp approximately 25% and Bighead, Black and Grass carp together approximately 15%."

Broodstock received moderate quantities of quality pelleted fish feed as well as organic material in concentrations suitable for stimulation of the food chain in the fish-pond. Selected female spawners had swollen gonads and reddened genital openings while ripe male spawners released milt when slightly pressed.

In a paper on the artificial spawning of fish, written by Professor Prinsloo and Professor HJ Schoonbee of the Rand Afrikaans Univer-

(To page 16)

Aquaculture Transkei

(From page 15)

sity, the hatchery procedures are explained. "Once selected, spawners are immediately transferred to the hatchery and put into 1 000 litre tanks provided with lids or nets which prevent the fish from jumping out. The spawners are then treated for 3 to 6 hours against parasites in well-aerated water.

"After this treatment each female is weighed and then transferred to special holding tanks supplied with a throughflow of water and aeration. Although the ideal situation is to keep one female spawner per 1 000 litre tank, more females can be kept together without any deleterious effects. The surface of each tank is darkened to prevent the fish from being disturbed by movements in the hatchery."

A rather subtle and carefully designed procedure is followed during the injection program. "For the injection programme we only use common carp pituitary gland extract (PGE) and not human chorionic gonadotropic (HCG) as well, a practice followed at other hatcheries in overseas countries. We have found at our own hatchery that the use of HCG may overstimulate the fish eggs so that fertilisation is almost zero," Professor Prinsloo explains.

The pituitary glands, after being removed from the donor fishes, are preserved in 100% alcohol and stored at 4°C for future use.

The injection programme for female spawners consists of two injections 8 hours apart. The first injection is given between three and four o'clock in the afternoon while the second is given between eleven and twelve o'clock the same evening. Coinciding with the second injection of the female spawners, the male spawners also receive a small dosage of PGE.

According to Professor Prinsloo when females in the tanks actively commence swimming around near the surface of the water and splash with their tails, it is a signal



Prof Prinsloo and co-workers stripping fish during the artificial spawning trials.

that they are ready for spawning. Because of their size, female and male spawners are sometimes difficult to handle during the stripping of the eggs and milt, therefore anaesthetics are used to calm them down.

The stripping of the eggs and then the milt over the eggs, was done in a dry plastic bowl, the fertilised mixture being stirred slightly with a rubber cake-spoon. A mixture of urea and salt solution was added during this process to lengthen the life of the sperms for a few more seconds. Fertilisation

takes place within a period of 10 — 15 seconds.

Before the fertilised eggs were transferred to the specially designed breeding funnels, they were rinsed with the same water as that of the funnels in order to remove egg impurities.

The period of hatching mainly depends on the water temperature. "The warm bergwinds hastened the hatching period the previous two years, but because of a cold front earlier this year, breeding of the common carp took some more time," says Professor Prinsloo.

"The percentage for fertilisation of the eggs the previous year," he continued, "was generally above 80% for all the fish species hatched, common as well as Chinese carps. This year the percentage varied between 70% and 90%, except for one fish with a 20% fertilisation. Approximately one million larvae were hatched from 8 female fishes during breeding trials."

According to Professor Prinsloo predation is their most important problem. He says *Xenopus laevis* (better known as the platanna) is very productive and can occupy a waterbody in a reasonably short period. "We have found that within three months, after a certain dam has been cleared from platannas, another 1 740 were found," he says.

Platannas

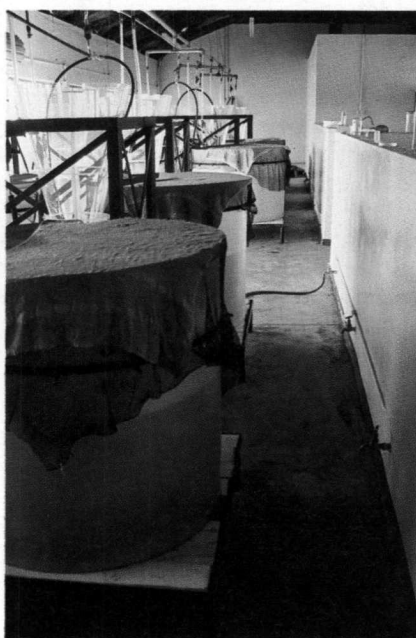
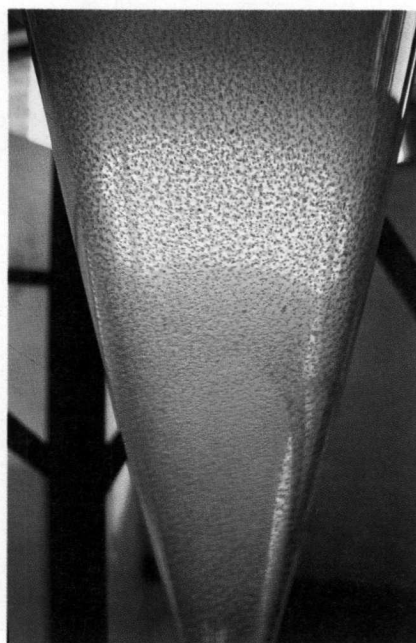
A great deal of research has been done on the control of platannas. The method of prevention Professor Prinsloo regards best is the erection of fences, preventing the platanna from entering the ponds. The use of traps is another control method but was found not to be 100% successful. Nevertheless the platanna population was reduced by approximately 60% by using this method.

A third method which can be very successful in controlling platanna larvae, is to stock the fishponds with some available black bass, but, being a predator itself, the black bass is a potential danger to other juvenile fish.

Professor Prinsloo's future plans for aquaculture in Transkei include, inter alia, the integration of aquaculture and agriculture. "I see many possibilities for integrated systems in this country," he says. "With this type of system, fish production comprises only a small segment of a greater agricultural activity."

The idea and practice of integrated systems have come a long way. The Chinese people have been practicing integrated systems successfully for more than 4 000 years. This idea has been adopted and adapted by Professor Prinsloo for the conditions in Transkei.

Because Transkei's major econo-



(Top): A breeding funnel with thousands of fertilised fish eggs.

(Above): An interior view of the Fish Research Centre. Pictured are some of the tanks where male and female fish are kept separately prior to the stripping process.

mical activity is farming, Professor Prinsloo considers the country suitable for an integrated system. Transkei has adequate water with many locations where the integrated systems could be implemented successfully with irrigation schemes.

Successes in leak control

Two water authorities, Welsh Water and Severn Trent Water, have announced successful field trials of leakage control devices.

"During a month-long test, water supplies into a trial area near Carmarthen fell by 20 per cent as leakage was cut by Welsh Water's new device, an automatic valve-adjuster which protects the pipes from unnecessary stress and strain," says *Water Bulletin*, a journal of the water industry in the United Kingdom.

The *Water Bulletin* says that authorities have fitted similar valves to that near Carmarthen in mains with different characteristics around the Welsh Water region. One such valve has halved local leakage.

The automatic device Severn Trent Water developed will particularly be effective in cutting leakage at night.

Phosphate elimination plant

Europe's biggest phosphate elimination plant was recently inaugurated at Berlin-Tegel.

According to the UK's *Water Bulletin* the plant, which commences operation in 1985, will reduce the average daily phosphate discharge into Tegel lake from 800t to approximately 3.3t.

Lime in acid combat

In an experiment to examine ways of solving problems caused by acid waters, Welsh Water poured two tonnes of lime into the West lake at Llyn Pendam.

The lime, an alkali, was spread on the lake to neutralise the acidic conditions of the water and should increase the pH level from the acidic five to a normal seven.

The lake at Llyn Pendam is vulnerable to the effects of acid water because of the poor nature of the soil which is often naturally acidic, and the success of the experiment would provide hope for lakes which have already lost their fish populations.

Sanciahs news/nuus

NEWS FROM THE SOUTH AFRICAN NATIONAL COMMITTEE FOR THE INTERNATIONAL ASSOCIATION OF HYDROLOGICAL SCIENCES

NUUS VAN DIE SUID-AFRIKAANSE NASIONALE KOMITEE VIR DIE INTERNASIONALE GENOOTSAP VAN HIDROLOGIESE WETENSKAPPE

Who's who in hydrology

After almost a year of questionnaires, sifting and sorting, organising and plain hard work the first register of all hydrologists in South Africa is now available.

The register which was compiled by Dr Peter Roberts, Chairman of SANCIAHS, lists the names, addresses and interests of 262 South Africans who are active in or have an active interest in hydrology. Of these 262 registered hydrologists 84 are from the private sector, 94 from Government departments and 84 from Statutory bodies like universities, municipalities, commissions, councils, etc. According to the register there are 91 practising hydrologists, 57 persons for whom hydrology forms a minor component of their job, 53 full time research officers, 37 managers, 31 teacher/lecturers, 20 hydrological technicians, 9 students and 2 persons who are retired but are still interested in hydrology.

Of the six international commissions and one committee which form the International Association of Hydrological Sciences (IAHS) the Commission on Surface Water heads the list in reflecting the interests of South African hydrologists — 178 hydrologists have indicated that they are interested in the activities of this Commission. After surface water follows the Commission on Water Quality (129), the Commission on Ground Water (110), the Committee on Remote Sensing and Data Transmission (68), the Commission on Continental Erosion (48) and the Commission on Snow and Ice (9).

Dr Roberts says that the register contains sufficient information for the Secretary General to decide on IAHS membership for each individual according to the current requirements.

The register will also facilitate efficient distribution of information to the local hydrological community and will be helpful in the organisation of national and international seminars and workshops.

The register will furthermore form the basis for the election of members of SANCIAHS in the future.

According to Dr Roberts it was decided at the first meeting of SANCIAHS last year that members would be elected every four years (to conform with the four year cycle of the parent body i.e. the SA

National Committee for the International Union of Geodesy and Geophysics) and those hydrologists who register their names under each international commission will elect the Commission Correspondent for that commission.

The register will be updated on a continuous basis and reprinted every two years. New entries or corrections to existing entries should be posted to the Water Research Commission in Pretoria and marked for the attention of the National Correspondent for the IAHS. There is no registration fee.

SA Waterbulletin will in future regularly publish a *Sanciahs news/nuus* column for people interested in hydrological affairs.

We therefore invite readers to send contributions (articles, letters, news, etc.) to:

Dr Peter Roberts
National Correspondent for the IAHS
Water Research Commission
PO Box 824
Pretoria
0001

Members of the South African National Committee for the IAHS elected for the period 1983 to 1987:

CHAIRMAN	Dr PJT Roberts Senior Adviser Water Research Commission PO Box 824 Pretoria 0001	National correspondent (representative) for the IAHS and member of South African National Committee for the IUGG
VICE CHAIRMAN	Mr DWH Cousens Senior Adviser Water Research Commission	Committee correspondent for the International Committee on Remote Sensing and Data Transmission
	Dr CPR Roberts Chief Engineer: Planning Services Dept of Water Affairs Private Bag X313 Pretoria 0001	Commission correspondent for the International Commission on Surface Water

Mr JR Vegter
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Commission correspondent for the
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Resources System

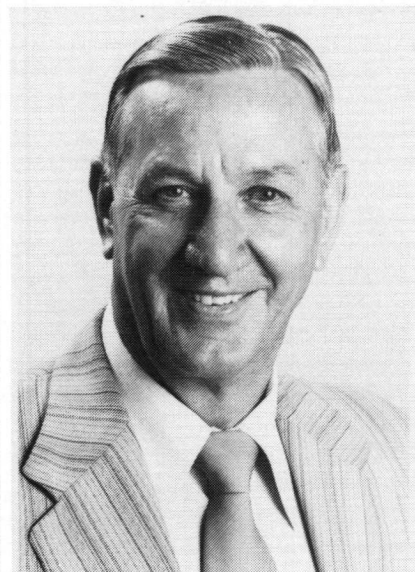
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2196

Additional member: Associate Editor
of Hydrological Sciences Journal

THIART LÊ TUIG NEER



Mnr Dirk Thiart, komiteesekretaris van die Waternavorsingskommissie, lê aan die einde van Desember vanjaar die tuig neer na 'n vrugbare dienstryd in die Staatsdiens van presies 44 jaar en een maand.

Dirk Jacobus Gysbert Thiart is op 1 Desember 1924 op die plaas De Hoop naby Delareyville in Wes-Transvaal gebore.

As een van tien kinders het hy dit nie altyd te breed gehad nie, maar slaag tog met behulp van losiesbeurse om sy skoolloopbaan te voltooi.

"In daardie jare is in standers ses, agt en matriek, anders as vandag, nog eksterne eksamens geskryf. As jy 'n eersteklas in stander ses behaal het, het jy 'n losiesbeurs vir standers sewe en agt gekry wat jou, onder andere toelating tot die koshuis gegee het. 'n Eersteklas in stander agt het weer gesorg vir standers nege en tien," vertel mnr Thiart.

In 1942 matrikuleer hy aan die Hoërskool Christiana en vanweë die werkskaarste gedurende die Tweede Wêreldoorlog werk hy vir die eerste paar maande na matriek op Klerksdorp by die Suid-Afrikaanse Spoorweë as 'n arbeider teen die ruim vergoeding van 45 sent per dag!

Hierna werk hy by die Departement van Landbou en Vervoer en

(Na bladsy 20)

HAVE YOU ANSWERED?

In the August edition of *SA Waterbulletin* readers were requested to indicate their interest in a number of hydrology reports which are out of print and which the WRC is considering reprinting.

If you intend replying to the questionnaire we should appreciate receiving your reply before January 31, 1985, in order to estimate printing costs.

Outfall pipe

A 1.6 km long outfall pipe of 1.5 m diameter was put to sea in the UK. The Langbaugh outfall pipe, says the UK's *Water Bulletin*, claims to be the longest in the UK.

The outfall forms part of Northumbrian Water's Langbaugh sewerage scheme which was

designed to rid the coastal beaches of East Cleveland of pollution.

Says *Water Bulletin* of the operation: "The pipe was winched by two special barges into a deep trench in the sea bed. One barge was firmly anchored and the other pulled towards it with the pipe attached. The pulling operation lasted 72 hours."

THIART

(Van bladsy 19)

in 1954 word hy die eerste Staatsamptenaar wat administratiewe werk by 'n Staatslughawe, Jan Smuts, verrig. In 1958 word hy vir drie jaar na die kantoor van die destydse Staatsdienskommissie gesekondeer waar hy gemoeid is met 'n publisiteitsveldtog vir die werwing van staatsamptenare by hoërskole in die land. In 1961 word hy bevorder na die Departement van Immigrasie se publisiteitsafdeling en in 1969 is hy aangestel by die Minister van Waterwese as Skakelbeampte van Minister Fanie Botha vir die Waterjaar in 1970 en die Groen-Erfenisjaar in 1973.

Op 1 Januarie 1975 is mnr Thiart na die Waternavorsingskommissie gesekondeer en in 1980 weer eens vir twee jaar aan die Ministerie van Mannekrag "geleen" waar hy

opgetree het as Skakelbeampte van die Minister met die Mannekrag 2000-projek.

Mnr Thiart is 'n groot rugbyentoësias en ere-visepresident van die Pretoria-rugbyklub asook die Verwoerdburg-rugbyklub. Hy is ook lid van die Loftus 200-klub.

Hy is 'n stigterslid en vir die afgelope twintig jaar lid van die Verwoerdburgse Rapportryerskorps.

Mnr Thiart is in 1947 met Petronella Wilhelmina Fuchs van Pretoria getroud. Die egpaar het een seun, twee dogters en drie kleinkinders.

Op 'n vraag wat hy na sy aftrede gaan doen, het mnr Thiart gesê: "Ek gaan nou doen wat ek nog my hele lewe lank wou gedoen het — rustig boer in die Nylstroom-distrik."

Ons wens graag namens die lesers van *SA Waterbulletin* vir mnr en mev Thiart ryke seën vir die toekoms toe.

SCHULZE HONOURED

Professor Roland Schulze of the Department of Agricultural Engineering of the University of Natal in Pietermaritzburg has been singularly honoured in that he has been invited to France for two weeks in November to set up the foundations of a scientific exchange in the field of hydrology between French Universities and the Universities of Natal and Zululand.

His stay in France, which includes visits to and lecturing at scientific institutions and universities in Montpellier, Avignon and Paris, has been at the invitation of the Cultural Relations Directorate of the French Department of Foreign Affairs.



HYDRO SYMPOSIUM PROCEEDINGS AVAILABLE

The Hydrological Research Institute (HRI) at Roodeplaat has released the proceedings of the first SA National Hydrological Symposium which was held in September 1983.

Mr H Maaren, editor of the proceedings, says a definite highlight in the publication is the keynote address which was delivered by Professor George Flemming, reader in

Civil Engineering at the University of Strathclyde in Glasgow. Professor Flemming was brought to South Africa by the Water Research Commission.

Mr Maaren says the proceedings are divided in different sessions namely: hydrological processes and hydrometeorology, deterministic hydrology, engineering hydrology, stochastic hydrology,

drought studies and sediment studies. Each session includes an informative overview presented by a prominent South African hydrologist.

According to Mr Maaren the proceedings are a thorough summary of hydrology in South Africa and can be obtained from: **Hydrological Research Institute, Private bag X313, Pretoria 0001.**

M Sc (Limnol) at Rhodes

Applications are invited for admission to the M.Sc. Limnology Degree in the Department of Zoology and Entomology.

The degree of Master of Science in Limnology is designed to provide specialist theoretical and practical training in the scientific study of inland lakes, rivers and wetland ecosystems.

Rhodes University is well placed to offer this degree since a number of its academic departments and associated research groups specialize in aspects of aquatic science, botanical limnology, zoological limnology and fisheries science. Additional specialist knowledge pertinent to the multidisciplinary repertoire of contemporary limnologists is available within the university.

The course is offered within the Department of Zoology and Entomology, under the aegis of the Barclays National Bank Chair of Graduate Limnology.

Entrance requirements are an honours degree (First or Upper Second) in Science.

The course begins in February 1985 and will end on 31 January 1986.

Further details on the Limnology programme, fees, residences and administrative matters may be obtained on written application to:

**The Head of Department
Department of Zoology &
Entomology
Rhodes University
PO Box 94
6140 Grahamstown**

Activated sludge bulking and its control in South Africa

Professor David Jenkins, Professor in Sanitary Engineering at the University of California, Berkeley, USA, recently visited South Africa at the invitation of the Water Research Commission (WRC) to view, discuss and advise on the understanding and control of activated solids separation problems in this country.

During his visits to a number of sewage plants Professor Jenkins mainly concentrated on the bulking and foaming of sludge. He visited the Daspoort, SASOL II, Goudkop-pies, Northern Works, Olifantsvlei, Heidelberg, Fishwater Flats, Cape Recife and Mitchells Plain plants.

These visits and other various surveys revealed solids separation in activated sludge to be a major and extensive problem. According to Professor Jenkins the manual he is currently compiling (on the control of activated sludge bulking and foaming) should be of considerable help to practitioners faced with these problems.

This "Bulking" Manual, which will be available early in the new year, has been sponsored by the USEPA and the WRC. It is being written specifically for South African conditions and will therefore also contain local applications of bulking control technology and because there are not many well documented local applications, an effort will be made to develop such data for future manuals.

The majority of South African bulking problems, Professor Jenkins says in a report to the WRC, appears to be due to low food/micro-organism activated sludge bulking. He therefore feels the selector control approach should be evaluated in the RSA. Possible sites are the Fishwater Flats and Cape Recife Works in Port Elizabeth as well as the Northern Works in Johannesburg.

Professor Jenkins recommends WRC support for such studies and says it is important to have a planned pilot programme to develop selector design parameters. He also suggests that the design and

mechanism of anaerobic selectors be investigated under well defined and controlled conditions.

"The major filamentous micro-organisms causing bulking in activated sludge in South Africa," he says, "are those associated with low food/micro-organism conditions. Because of this a greater

need exists in South African than anywhere else to determine the specific causes for the growth of these organisms in activated sludge. It is only by a determination of the root causes of such problems that the most effective methods of control can be developed."

INLIGTING OOR FOSFATE:

VRAE GESTEL

Verskeie inligtingsessies is die afgelope paar maande onder leiding van dr HNS Wiechers, Senior Adviseur van die WNK, gereël om plaaslike owerhede by streeksbyeenkomste nader in te lig oor die vereistes met betrekking tot die verwydering van fosfaat uit riool-uitvloeiensels.

Hierdie sessies, aangebied in Roodepoort, Kaapstad en Oos-Londen, is gereël nadat 'n behoefte ontstaan het, veral by kleiner plaaslike owerhede, vir nadere besonderhede oor die toepassing van hierdie standaard en oor beskikbare tegnologie om dit te bereik.

Sprekers

Die drie sprekers wat by hierdie geleentheid opgetree het is dr HNS Wiechers (Senior Adviseur, WNK), mnr HJ Best (Hoof: Besoedelings-beheer, Departement Omgewingsake) en mnr JS Wium (Senior Navorsingsbeampte, Nasionale Instituut vir Waternavorsing, WNNR). Hulle onderskeie onderwerpe is *Toepaslike fosfaatverwyderingstegnologie; Agtergrond, Wetlike aspekte en Implementering*

van die Fosfaatstandaard, en Personeelopleiding en bedryfsprobleme.

Tydens 'n sessie wat by die Burgersentrum in Roodepoort gehou is, is die volgende vrae aan die drie sprekers gevra:

- **Wat sal gebeur as biologiese P-verwydering net deels suksesvol is?** Die Departement aanvaar dat chemiese rugsteunprosesse, veral in die eerste 5 jaar, essensieel sal wees.
- **Wat is die kans op vrystelling van die standaard?** Baie skraal, net in baie goed gemotiveerde gevalle en dan sal dit net 'n kwessie van uitstel vir 'n beperkte (kort) periode wees.
- **Wat kan in die toekoms verwag word ten opsigte van 'n strengere standaard?** Die betrokke damme gaan gemonitor word om te sien hoe hulle reageer. Indien verdere verlag-ing in die P-lading nodig is, sal oorweging geskenk word aan "receiving water standards" vir spesifieke damme.
- **Gaan nitraat in die toekoms in uitvloeiensels beperk word?** Ja,

(Na bladsy 22)

INTERNATIONAL WATER DECADE SEMINAR on

WATER SUPPLY AND SANITATION IN DEVELOPING AREAS

Horseshoe Motel, near King William's Town, 12-14 February 1985

This seminar is organized by the South African National Committee of the INTERNATIONAL WATER SUPPLY ASSOCIATION in conjunction with the National Institute for Water Research of the Council for Scientific and Industrial Research.

Topics to be discussed in the programme include:

- Demographic aspects of water supplies
- Requirements and problems with water supply and sanitation in developing areas
- Current status and future plans for water supply and sanitation in Ciskei
- Training programmes for operators
- Health aspects of water supply and sanitation in Ciskei
- Water utilization for agricultural developments
- Economic considerations and financial resources
- Reuse of water
- Underground water resources

A programme of technical visits has been arranged for Wednesday, 13 February and sightseeing tours have been organized for accompanying persons. Special transport arrangements have been made for delegates in the Pretoria/Witwatersrand area with the choice of travel by air or luxury coach.

Full details of the seminar are obtainable from:

Symposium Secretariat S357

CSIR

P.O. Box 395

0001 Pretoria

**Telephone: (012) 86-9211 extension 2063 (Miss Una Wium)
2077 (Mrs. Ann Rhodes)**

LSSA CONGRESS

Limnologists have long regretted the lack of contact between marine and freshwater biologists. The theme of the 1985 LSSA Congress has been chosen particularly for its interdisciplinary nature in the hopes that marine and estuarine biologists will participate. The theme is: **NUTRIENTS AND DETRITUS: PATHWAYS AND PROBLEMS IN AQUATIC ECOSYSTEMS.**

The Congress will centre upon six invited keynote addresses on nutrient cycling and processes of decomposition in freshwater, estuarine and marine ecosystems together with posters addressing these topics; reviews of the large aquatic programmes currently under way, or recently completed in South Africa; a general poster session; short general papers and workshops.

The Congress will be held from 1 to 5 July 1985. Enquiries may be addressed to Jenny Day or Bryan Davies, Zoology Dept, University of Cape Town, Rondebosch 7700.

ECOLOGIST'S SYMPOSIUM

The S.A. Institute of Ecologists is arranging a symposium on "Nuclear Energy and the Environment in South Africa" on 1 February 1985 at the CSIR Conference Centre in Pretoria.

This one day symposium will look at the present and future status of nuclear energy in South Africa. In addition, the environmental impacts of nuclear energy development, using South African case studies, will be examined.

This is the first time in South Africa that ecologists and people from the nuclear energy industry will jointly discuss these problems and promises to be a stimulating symposium. The registration fee (students R20, general R30) will include participation, lunch, and an informal discussion session consisting of a braai. Persons wishing to participate should contact Dr R Robarts, National Institute for Water Research, CSIR, PO Box 395, Pretoria 0001, Phone (012) 86-9211 x 3580.

Inligting oor fosfate

(Van bladsy 21)

hoogs waarskynlik binne die volgende 5 tot 10 jaar. Die SABS het reeds sy drinkwaterstandaard na 6 mg/l as NO₃-N verander. Die Spesiale Standaard vir nitraat gaan van 2 na 6 mg/l (as NO₃-N verander word).

- **Chemikalieë bring 'n verhoging in TDS mee; wat sal gebeur as die Standaardvereistes van 500 mg/l oortref word?** Die Departement sal 'n verslapping van die standaard vir TDS oorweeg.
- **Plaaslike owerhede is ongerus omdat hulle aan die standaard moet voldoen, maar van hulle bure, byvoorbeeld Buitestedelike Rade en oewerbewoners van die betrokke riviere, sal nie aan die standaard kan voldoen nie.** Waar meer as 750 m³/d

uitvloei na 'n rivier gestort word, moet daar in die sensitiwe opvanggebiede aan die P-standaard voldoen word. Waar dit prakties onmoontlik is, sal alternatiewe stappe oorweeg word.

- **Sal die Staat die prys van chemikalieë beheer?** Nee, ons bedryf 'n vrye-mark ekonomie.
- **Waarom word fosfate in wasmiddels nie verban of beperk nie?** Die saak geniet tans aandag en die Waternavorsingskommissie stel 'n verslag in die verband op. Dit is reeds duidelik dat daar wel gepoog sal moet word om die bydrae van fosfate vanuit wasmiddels te beperk, maar dat hierdie beperking op sigself nie voldoende is om eutrofikasie daadwerklik te bekamp nie. Derhalwe bly puntbron-fosfaatverwydering essensieel.

Water management

Hobbs: Demineralise effluents to Barrage

"It is absolutely essential that both urban and industrial effluent be demineralised to approved standards before being discharged into the streams which return it to the Barrage. Water is also sufficiently scarce in South Africa to warrant that there is no let up in the research required to achieve this aim," said Mr Dale Hobbs, Chairman of the Rand Water Board, when he delivered the keynote address at a symposium on purification and distribution of water, which was recently held in Pretoria.

Mr Hobbs said that by far the most pressing problem relating to water purification in the PWVS-region was that of the total dissolved solids returned as industrial or domestic effluent to those streams which flow north and south from the Witwatersrand.

He said that the Advisory Committee established by the Department of Water Affairs to examine this question, had established that an average 913 Ml/d went back, each year, into the Vaal River during the five-year period 1977 to 1982. During that same period the average water sales by the Rand Water Board was 2 008 Ml/d.

"Thus, the volume of water returned to the Vaal River represented 45 per cent of total daily average sales. This is a substantial quantity of water which we cannot afford not to use, and which must be protected almost at any cost," he said.

Mr Hobbs said that the average total salt load in this return water was over 1 000 mg/l. This resulted in an annual total salt load of more than 300 000 tons being redeposited in tributaries of the Barrage and the Barrage itself.

Mr Hobbs also referred to water research in South Africa and said that he would support any plea that more funds be provided for promoting research into water and water-related matters.

"Today, I understand, the annual amount spent on such research is R25 million. In a country with the kind of water problems we have to face, this seems to me to be very inadequate, for in South Africa we have to ensure that less water goes



Mr Dale Hobbs, chairman of the Rand Water Board.

a lot further than in other parts of the western world."

Regarding the present drought Mr Hobbs said that the Rand Water Board's experience since 1965 had shown that on average, water restrictions might be necessary once in every three years.

"We must, therefore, develop management systems and procedures to restrict water consumption, that will be less disruptive than those of the past. In other words, we must prepare a variable-supply policy right now, which can be applied during periods when water restrictions become necessary," he said.

Mr Hobbs said that it was generally agreed that financial measures which discourage excessive and wasteful water consumption was the most democratic method of doing so and also the most acceptable to the public at large.

"To be really effective, a sliding scale of tariffs must be so structured that it not only discourages consumption in excess of the quota laid down, but also rewards those consumers who use less than the quota allocated.

"The Rand Water Board's present sliding scale discourage consumption beyond the quota allocated by raising the tariff, applicable to all water consumed, by 1% for each 1% by which the quota is exceeded.

"A positive element could be introduced into the system by lowering the tariff by 1% for each 1% below the quota.

"A very important element in this approach, however, is fixing the right quota for each consumer. It is important that a quota be determined for each meter.

"At present quotas are determined on the basis of historical consumption during 1982/3; taking account of the relative proportions of industrial and domestic consumption (in the total).

"To be truly equitable, however, any quota should also be based on:

- The number of persons living in a residential unit.
- The size of the erf supplied with water.
- The purpose for which water is being used, i.e. industrial, residential or others.

"Municipalities should waste no time in collecting this data as soon as possible, for inclusion in computer programmes so that more realistic quotas could be determined for each meter," Mr Hobbs said.

Off the press . . . Off the press . . . Off the press . . . Off the press . . .

Hydrology, Civil Engineering: **Pipeflow Analysis**

by DAVID STEPHENSON, *Professor of Hydraulic Engineering, Director of Water Systems Research, University of the Witwatersrand*

DEVELOPMENTS IN WATER SCIENCE, 19

1984 x + 204 pages

Prices: US \$42.25 / Dfl. 110.00

ISBN 0-444-42283-8

This book condenses and compares various methods for analysing flows and pressure variations in pipelines, whether they be pump-

ing systems or multiple reservoir gravity systems. Simple BASIC computer programs are given in many chapters and these will serve as a basis for more comprehensive programs which the reader should be able to write after reading this book.

The practising engineer often tends to neglect the theoretical side, but when the occasion arises he requires a rapid, simple answer to problems of head loss, discharge capacity and pressures. The various computational methods available to him are summarized in this book, starting with simple steady flow problems and advancing through slow motion to water hammer in complex networks. The

iterative techniques for flow analysis of pipe networks such as the Hardy Cross method are known to most water engineers and have been applied extensively without the aid of computers. Some lesser known techniques are in fact simpler to apply on computers, e.g. the linear method. When it comes to unsteady flow, e.g. water hammer, computer analysis is much more rapid than the older graphical method and can account for many more factors such as column separation, changes in section and branch pipes. Numerical methods for computers are easy and accurate provided simple rules are followed.

Pipe systems

In addition to those on flow analysis, sections are given on design of pipe systems using optimization programs, and operation using computer simulation programs. An introduction to computer graphics is given although the book does not cover structural design of pipes as this subject is covered in another book by the same author — *Pipeline Design for Water Engineers* (Elsevier, 1981).

The book will therefore be particularly useful for the water engineer who has to design water reticulation pipe networks, trunk mains, pumping lines and storage reservoirs. The subject matter will also be of use to students of hydraulic engineering and those contemplating research in this field.

CONTENTS: Chapter 1. Hydraulics and Head Loss Equations. 2. Alternative Methods of Pipe Network Flow Analysis. 3. Loop Flow Correction Method of Network Analysis. 4. Linear Method. 5. Optimum Design of Branched Pipe Networks by Linear Programming. 6. Dynamic and Non-linear Programming for Looped Networks. 7. Continuous Simulation. 8. Unsteady Flow Analysis by Rigid Column Method. 9. Water Hammer Theory. 11. Water Column Separation. 12. Water Hammer and Flow Analysis in Complex Pipe Systems. 13. Graphical Water Hammer Analysis. 14. Pipe Graphics. 15. Computer Programming in BASIC. Index.

Send your order to your bookseller or
ELSEVIER SCIENCE PUBLISHERS
P.O. Box 211, 1000 AE Amsterdam, The Netherlands.

New books

Carbonate Chemistry of Aquatic Systems Volume 2: High Salinity Waters

by Richard E LOEWENTHAL, *Senior lecturer, Department of Civil Engineering, University of Cape Town* and

Gerrit van Rooyen MARAIS, *Professor in Water Resources, Department of Civil Engineering, University of Cape Town*

ISBN 0-250-40141-X price not available

This book forms a companion volume to the one published in 1976 entitled "Carbonate Chemistry of Aquatic Systems". Whereas that volume dealt with carbonate chemistry of low salinity waters, for ionic strengths up to about 0.05, this volume extends the theory to high salinity waters for ionic strengths up to about 5.

In both volumes the objectives have been the same — to develop, from a sound theoretical basis, a model for the carbonate system structured in such a fashion that it can be applied readily in the solutions to a wide variety of problems involving this system in the aqueous-gaseous-solid phases.

This book is therefore recommended to chemical oceanographers and chemists who have to deal with problems in water treatment where high salinity waters are encountered, in desalination of brackish waters and in the mining industry. There may also be points of interest to

research physical chemists working in the field of ionic activities.

CONTENTS: Chapter 1. Introduction. Chapter 2: Non-associated binary electrolytes. 2.2 Hydration. 2.3 Partial molal volumes. 2.4 Units of concentration. 2.5 Activity and activity coefficients. 2.6 Modelling of mean and single ion activity coefficients in binary systems. 2.7 Activity of the water component. Chapter 3: Non-associated mixed systems. 3.2 Mean activity coefficients. 3.3 Mean activity coefficients where ionic association occurs. 3.4 Verification of mixed electrolyte theory. 3.5 Activity of the water component in mixed systems. Chapter 4: pH and weak acid-base systems. 4.2 Review of low salinity waters. 4.3 Establishment and measurement of pH. 4.4 Equilibria in high salinity waters. 4.5 Analyses of the carbonate system. 4.6 Alkalinity and acidity. Chapter 5: Phase equilibria. 5.2 Concentration and measurement units. 5.3 Mass parameters and chemical dosing. 5.4 Single phase equilibrium diagram. 5.5 Aqueous-gas phase equilibrium diagram. 5.6 Aqueous-solid phase equilibrium diagrams. 5.7 Three phase equilibrium. 5.8 Application to water softening.

Orders can be sent to Butterworth Publishers, 8 Walter Place, Mayville, Durban 4001.

TOERUSTING

Ten einde 'n inligtingsdiens aan ons lesers te lewer, verwelkom die redakteur bydraes vir publikasie (beperk tot ongeveer 300 woorde en een of twee foto's en diagramme) deur vervaardigers en verspreiders van nuwe toerusting en prosesse wat met die bevordering van water-aangeleenthede verband hou.

Sulke bydraes word egter ontvang of gepubliseer met dien verstande dat: (1) die betrokke vervaardiger of verspreider wat die bydrae lewer, verantwoordelik bly vir die inligting of menings daarin vervat en vir aansprake ten opsigte van daardie toerusting en prosesse; en (2) publikasie daarvan nie impliseer dat die redakteur of die uitgewer of die Waternavorsingskommissie die inhoud van so 'n bydrae aanbeveel of daarmee in ooreenstemming is nie.

Lesers wat meer inligting verlang, word versoek om direk met die vervaardigers of verspreiders in verbinding te tree.

Anton Prinsloo
REDAKTEUR



SA Waterbulletin
PO Box/Posbus 824
Pretoria 0001

EQUIPMENT

As an information service to our readers, the editor welcomes for publication contributions (limited to approximately 300 words and one or two photographs and diagrams) by manufacturers and distributors of new equipment and processes related to the promotion of water affairs.

Any such contribution is, however, received or published on the understanding that: (1) the relevant manufacturer or distributor submitting the contribution is responsible for the information or opinions expressed in it and the claims made therein for that equipment or those processes; and (2) its publication does not imply that the editor or publisher or the Water Research Commission underwrites or is in agreement with the contents of such contribution.

Readers who require further information are requested to contact the manufacturer or distributor direct.

Anton Prinsloo
EDITOR

NEW DOUBLE METER-BOX

Castle Meters has introduced a double meter-box to save time and cut cost in installation and meter reading.

The concept of having a water meter pre-piped in a cast-iron box for easy installation and replacement has been expanded to a double meterbox where two meters are mounted side by side in one box.

Because there is only one excavation to be done, one mains connection to be made and one box to fit for every two houses, service and installation costs are virtually halved. Meter reading and servicing are also rendered more cost effective. There is a capital cost saving too, as one double meter-box is less expensive to buy than two single boxes.

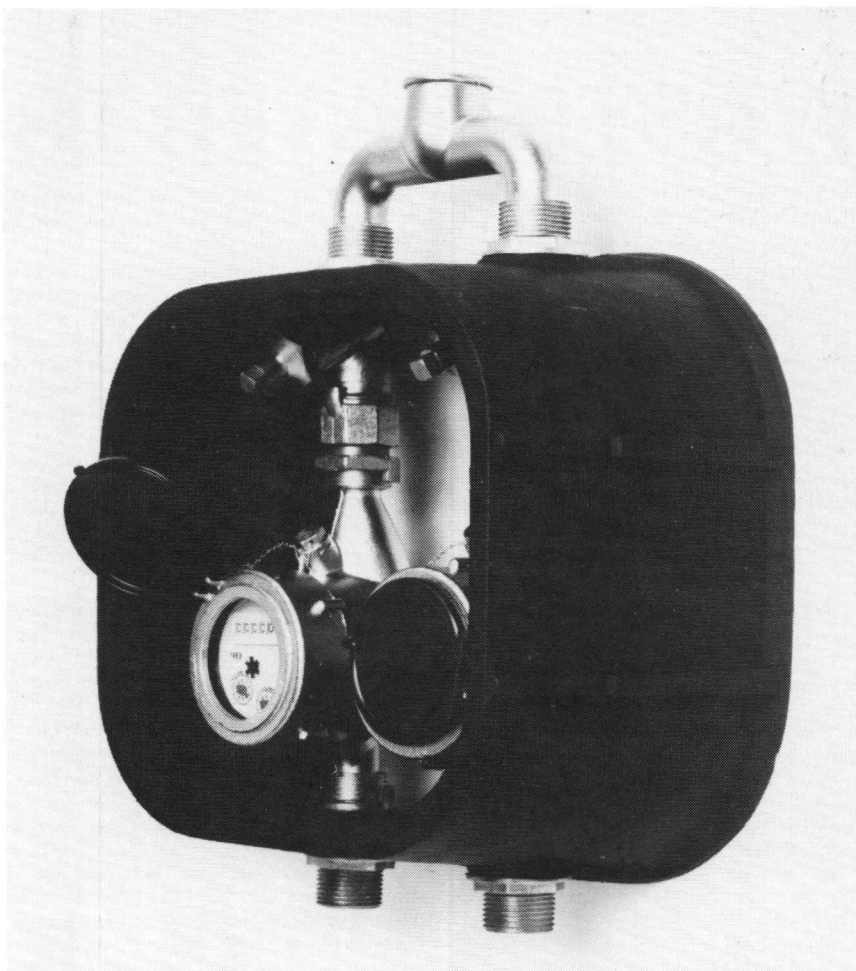
The single inlet connection of the meter box is 25 mm (1BSP) female, while the two outlet connections are available as 20 mm (3/4BSP) female, 20 mm (3/4BSP) male or 15 mm (1/2BSP) male.

With housing developments mushrooming all over the country, local authorities are set to save significantly in terms of installation costs.

As with the single meter-box, the double meter-box houses the accurate and reliable Optima 2000 meter and the box can be installed in a matter of minutes.

Enquiries:

Ron Young
Castle Brass Holding (Pty) Ltd
PO Box 4340
Luipaardsvlei
1743
Tel: (011) 762-2412



PUMPS

West Driefontein Gold Mine near Carletonville recently completed the installation of what is believed to be the longest mine pump station in South Africa. The 180 m long chamber on 4 level of No. 4 shaft contains 16 Sulzer HPH 48-20 10 stage mine dewatering pumps, each of which can pump 120 l/sec. against a head of 860 m.

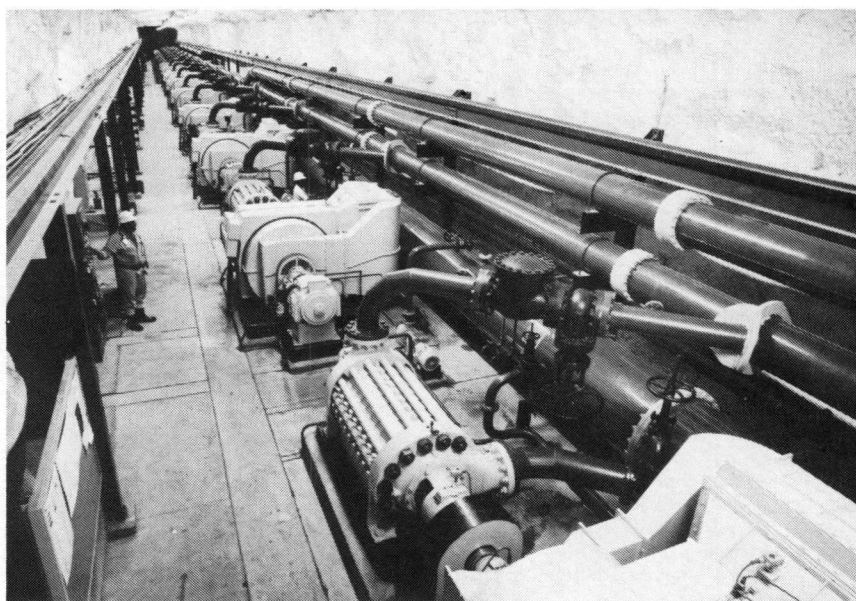
Previously employed at the old No. 2 shaft (which was closed down but has since been reopened) the pumps were fully reconditioned at the mine and reinstalled at a depth of 900 m on 4 level of No. 4 shaft. All the pumps were manufactured by Sulzer in South Africa, the first being supplied nearly 30 years ago.

A second pump station, which will also have 16 reconditioned Sulzer HPH pumps, is nearing completion on 12 level of No. 4 shaft at a depth of 1 100 m.

Eight pumps will operate simultaneously on each level at peak periods, to cope with the water influx.

"The decision to centralise the pumping system for a number of our mines in the area was taken about five years ago" said Mr. Terence Stirling, sectional engineer responsible for all the pumps at West Driefontein.

"Centralisation near the main source of water influx avoids the use of long high pressure pipe columns in underground tunnels. When these pass through unstable rock, falls of ground can have disastrous effects".



In all there are almost 100 large Sulzer multistage pumps at West Driefontein, which is administered by Gold Fields of South Africa Ltd. These include 9 HPH 54-25 units at North Shaft.

Efficiency tests were carried out by Sulzer's Customer Support Department before the 4 level pumps were put into operation.

Their performance equalled that of new pumps. This installation clearly demonstrates the extremely long life ob-

tainable when using Sulzer's range of high head dewatering pumps.

Enquiries:
Sulzer Bros (SA) Ltd
PO Box 930
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2000
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WASTE WATER TREATMENT

LINDE AKTIENGESellschaft, FOUNDED IN Wiesbaden, Germany, in 1879, is engaged worldwide in high rate waste water treatment systems for municipalities and for manufacturing industries.

Frequently employing pure oxygen for intensified biological activity, these LINDE processes are characterized by smaller reactor volumes, space saving and odourless operation. When pure oxygen is employed this is either generated on site, using the well known LINDE air separation process, pioneered by the Company founder, Carl von Linde in 1902 or is furnished by outside LINDE plants, such as the one being built for Fedgas at Alrode.

Famous

Most famous of the LINDE waste water treatment processes is the UNOX SYSTEM (known in Germany as the LINDOX system) with some 200 operating plants in Europe, America and Asia, with sizes ranging from modular units treating a few tons of BOD per day to the giant plants at Detroit and Copenhagen.

UNOX Systems, based on the activated sludge principle, are capable of operating efficiently at very high loadings with F/M of 1.0 and volumetric loads of 4 kgBOD/m³ × d being exceeded in the latest plants.

LINDE sludge treatment processes include

TAS (thermophilic aerobic stabilization), again a high rate process when pure oxygen rather than air is applied.

For large sludge treatment plants, where biogas production is an economic proposition, an aerobic first step is combined with anaerobic digestion in the DDS (dual digestion system) offering overall improvement in operation and vastly reduced digester volumes. Several full scale plants are in operation.

Newcomers to the LINDE treatment process range include VARIOPUR for compact aerobic treatment of food industry waste water. Four of these units fabricated in stainless steel are treating dairy waste waters in Germany.

The very effective LINPOR process for upgrading existing aeration tanks is also used for adding a nitrification step after existing BOD removal. LINPOR uses plastic foam cubes, operates with air and does not require extra clarifier capacity. Several full scale plants in Europe are using this process.

To meet the growing demand for treatment of high strength industrial waste water streams with the benefit of biogas production, LINDE has perfected the LARAN process (LINDE Abwasserreinigung anaerob) in which several novel features are incorporated to make this one of the more reliable systems on the market. Second step aerobic treatment is sometimes incorporated to im-

prove overall efficiency where very low effluent BOD is required.

Enquiries:
S.A. Linde (Pty) Ltd
PO Box 917
Golden Highway
Vanderbijlpark 1900 Tvl.

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Reverse osmosis is particularly suitable for converting sea and brackish water into fresh.

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capillary membranes, sheet-like membranes, tubular membranes.

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- Preassembled and tested at our works, ready to operate at once. No time-consuming and expensive assembly work at the site.

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- The ISO container also serves as the plant building. This saves the cost of otherwise necessary construction work at the site.
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- Can be additionally equipped with a diesel generator if no local power supply exists.
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to 50 cubic metres/hour depending on the salt content of the raw water.

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Enquiries:
TIP-Agentur
Appuhnstrasse 7
2000 Hamburg
West Germany
Tel: 040/82-5245

DRILL

A new mini-drill — easily transported by bakkie — attracted widespread interest when it made its debut at the recent Electric Mining exhibition in Johannesburg.

Designed and manufactured in RSA, the Turnsteel mini-drill has already been evaluated by mining and exploration teams but has aroused an equally high level of interest among municipalities, Government departments, farmers co-operatives and others wishing to undertake their own water well drilling programmes.

Drilling costs are dramatically cut using the mini-drill, which — despite its size — is capable of percussion drilling holes of 130 to 150 mm, and up to 150 mm diameter. Hard rock locations can be dealt with using the "down the hole" hammer incorporated in the design. It can also core drill and is ideal for concrete core drilling and soil sampling.

The prototype drilled just short of 100 m in recent tests, boring mainly through quartz, and already an improved version has superseded the 12 hours drilling time of the original exercise.

Powered by a 26hp diesel engine, the drill head is geared to 0—500 and 500—1 000 rpm. It is designed to use high speed diamond core rods, sized E to NX or NQ, up to 150 mm augers.

Mounted on a trailer fitted with torsion bar suspension, mechanical brakes, etc., it is fully roadworthy and easily towed by a bakkie or a one tonne truck. If require, the whole unit can be mounted on the back of a four wheel drive vehicle.

A spokesman for the distributors, Turnsteel of Craighall, Tvl, RSA., says: "With the present drought situation, and the long term problems this has created, we believe the mini-drill is the perfect answer for those who find the traditional drill too large and not the real answer from the economic point of view, or unsuitable for their particular location. And the fact that it is easily movable by bakkie or light truck is a real bonus."

Enquiries:
Turnsteel Mini-Drill
PO Box 41279
Craighall 2024
Tel: (011) 788-7827



MECHANICAL SEAL

Crane Packing (Pty) Ltd of Springs has introduced to South Africa the Cranpac Type 80 mechanical seal which has recently been specified by SSP Pumps, UK as their standard pump seal. SSP, represented by Mono Pumps (Africa) (Pty) Ltd, manufacture positive, rotary lobe pumps for a wide span of industrial and processing applications. These include the food and beverage industries where requirements are becoming increasingly demanding, and the pharmaceutical, chemical water and waste treatment fields.

Key factors behind the choice of the Cranpac seal were hygiene, safety and corrosion resistance. When the Type 80 was originally developed the needs of food processing were closely observed and the seal currently meets the requirements laid down by US, EEC and UK statutory bodies.

In addition to the hygienic duties of SSP rotary lobe pumps, a large proportion of applications are found in general industrial transfer and effluent treatment involving high, low or medium viscosity materials which can be noxious, aggressive and dangerous. In these situations the Type 80 seal can ensure the necessary standards of plant operator safety and plant protection. Materials pumped include acids, alkalis,

chlorides, hydrocarbons, fertilisers, pesticides, polymers and chemical and effluent slurries.

Other features which led to the selection of the Type 80 as a standard seal include its cartridge design which incorporates the rotary seal ring, wave spring and carrier in one compact quickly fitted assembly. The seal is directional and positive drive is provided by set screws form the pump shaft to the rotary cartridge assembly, thus enhancing endurance on higher viscosity materials.

The Type 80 offers seal faces in both carbon versus stainless steel, and tungsten carbide versus tungsten carbide. "O" ring materials include Nitrile and EP rubber, as well as viton and PTFE (PTFE encapsulated viton).

In addition the seal is designed to fit standard stuffing boxes and it can be mounted internally or externally and used as a single or double flushed seal.

Enquiries:
Crane Packing (Pty) Ltd
PO Box 890
Springs
1560
Tel: 818-2031

CONFERENCES AND SYMPOSIA

ECOLOGY

A symposium on "Nuclear Energy and the Environment in South Africa" is to be held on 1 February 1985 at the CSIR Conference Centre in Pretoria.

Enquiries: Dr R Roberts, National Institute for Water Research, CSIR, PO Box 395, Pretoria 0001. Tel: (012) 86-9211 x 3580.

WATER SUPPLY AND SANITATION

Water Supply and Sanitation

A seminar on water supply and sanitation in developing areas will be held in King William's Town from 12 to 14 February 1985.

Enquiries: Symposium Secretariat S357, CSIR, PO Box 395, Pretoria 0001. Telephone (012) 86-9211 x 2063 or 2077.

WASTEWATER

The 4th IAWPRC workshop on instrumentation and control of water and wastewater treatment and transport systems will be held in Houston and Denver from 27 April to May 4 1985.

Enquiries: Dr HNS Wiechers, Water Research Commission, PO Box 824, Pretoria 0001.

WASTE TREATMENT

An international conference on new directions and research in waste treatment and residuals management will be held in Van-

couver, BC, from 23 to 28 June 1985.

Enquiries: Dr WK Oldham, Conference Chairman, The University of British Columbia, Department of Civil Engineering, 2324 Main Mall, Vancouver, BC, Canada V6T 1W5.

Limnology

The 1985 LSSA Congress will be held from 1 to 5 July 1985 with its theme: Nutrients and Detritus: Pathways and problems in aquatic ecosystems.

Enquiries: Jenny Day or Bryan Davies, Zoology Department, University of Cape Town, Rondebosch 7700.

GROUNDWATER

A symposium, Groundwater 85, is to be held from 1 to 3 July 1985 in Pretoria. The symposium will deal with resource assessment, management and conservation.

Enquiries: The Organizing Secretary, Groundwater 85, PO Box 8856, Johannesburg 2000.

WASTE TREATMENT

The 1st Asian Conference of IAWPRC on the treatment, disposal and management of human wastes is to be held in Tokyo from 1 to 3 October 1985. Abstracts by 30 November 1984.

Enquiries: IAWPRC, Alliance House, 29-30 High Holborn, London WC1V 6BA, UK.

finally . . .

COWed

Nogden Ash called to give me the doubt of his benefit.

"My private doctor (as opposed to my public, or witch doctor) maintains that a glass of warm water is essential for a healthy start to the day. This causes me some anxiety, but also some aching corns, dry mouth, fluttering of the oesophagus, and, most peculiarly, housemaid's knee. You may have noticed, or then, you may not have, depending on your peripheral vision, that a glass of warm water, as a pick-me-up, is a let-me-down.

"In fact, I suggested to him that this was a panacea which he may have received as a medical hint from Florence Nightingale shortly before her sad demise. He assured me that as an *avant-garde* he only listened to Emily Hobhouse.

"Of course, he is a tower of trivia. Unlike we mortals, he does not say: 'The answer is on the tip of my tongue', but: 'The reply is lodged alveolarically in my resonance chamber.' Which reminds me of one of my reptile verses with which I have had so much success at the last chemists' convention (or Antique Dealers Fair, I can't remember which):

A verbose chameleon once uttered:
"The fly's on the tip of my tongue".
He inhaled too soon and then stuttered:
"I'm afraid it has lodged in one of the myriad
infundibuli of the left most lateral part
of my lung."

"Talking about birds, I have been commissioned to do a couple of verses about birds of prey. It is extremely difficult to remain civil when writing on this subject:

Culture vultures
and others of that ilk
have found polluted water
safer than cultured milk.

"They have been COWed into submission," he said wistfully. "Did you know that a voluntary is a piece of organ music, and not a South African who pays his own airfare to Coventry?"

SA WATERBULLETIN

SA Waterbulletin is 'n kwartaalike nuusbrief oor water en watervorsing wat uitgegee word deur die Suid-Afrikaanse Watervorsingskommissie (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.

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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.

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