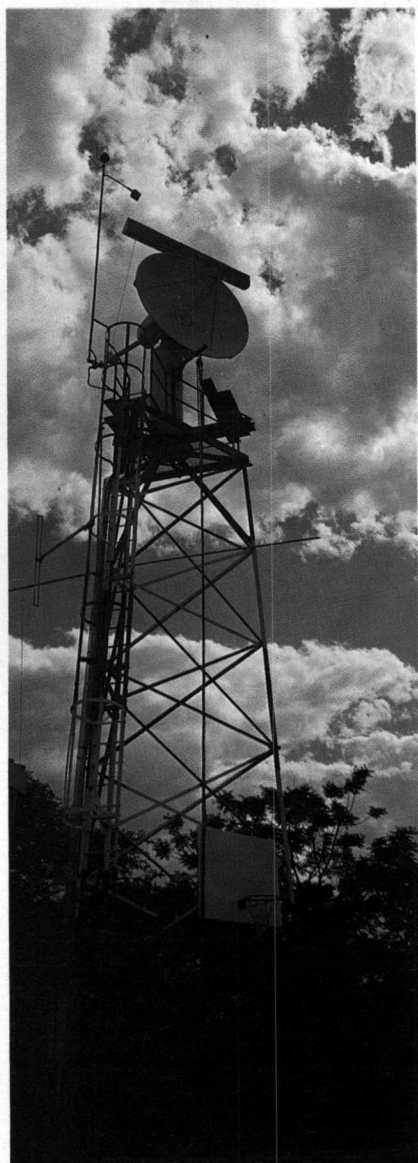


WATERBULLETIN

Nuusbrief van die Waternavorsingskommissie
Newsletter of the Water Research Commission

FEBRUARY/FEBRUARIE 1983



The radar antenna of the Nelspruit weather modification station silhouetted against a summer sky.

Weather modification

NEW PROJECT ON RAINFALL

The Water Research Commission recently initiated a new scientific rainfall stimulation project in the Nelspruit area in the Eastern Transvaal. The project will run over a period of four years and is designed to determine whether potential exists for rainfall stimulation in the area around Nelspruit. It is intended that a detailed study of the rain producing clouds should be carried out to determine whether opportunities for beneficial modification of the clouds occur and if so, how often these opportunities occur and how the clouds could best be treated to increase the rainfall.

The four year research programme is regarded as the first phase of a long term research programme that could take as long as 15 to 20 years. Modification of convective clouds is not an easy task and it may take many years of research before the technology for rainfall stimulation has been refined to a stage where it can be applied in an operational project involving area wide seeding of clouds. If the first phase indicates that potential exists for rainfall stimulation then it may be possible to design a fully randomised experiment for phase two of the programme in which the effectiveness of the technology developed in phase one can be tested and evaluated in terms of the change in rainfall and the effects that this would have on stream runoff, groundwater and soil moisture.

The Republic of South Africa is a water scarce country. It has been estimated that water demand will exceed the total available supply by

about the year 2020 and the quality of the water is rapidly deteriorating as a result of increased usage and resultant pollution. Urgent research on possible alternative sources of water supply is needed and rainfall stimulation represents one of the few alternatives that may provide more water without adding dissolved salts that have to be removed.

Crisis

Although positive results for the research into rainfall stimulation are by no means assured, the national water supply and the demand situation is such that South Africa cannot afford not to investigate this possible alternative source of water before a crisis situation arises. In this respect the research on methods of increasing the atmospheric water supply is similar to the search for oil in South Africa. In both cases there is no

(To page 5)

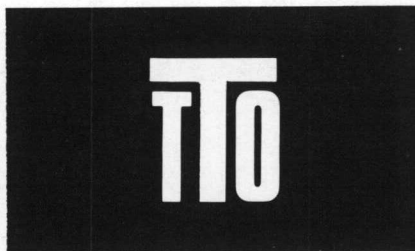
***In dié uitgawe
In this issue***

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TEGNOLOGIEOORDRAG

In hierdie rubriek sal gereelde aankondigings verskyn van publikasies, simposia of ander gebeurlikhede met 'n praktiese inslag wat kan help om die gaping tussen navorsing en toepassing te oorbrug.

**TECHNOLOGY TRANSFER**

In this column regular announcements will be published of publications, symposia and other events of practical import which could contribute towards closing the gap between research and application.

'Waterherwinning uiters belangrik'

RSA — Water net genoeg vir 65-m, sê minister Hayward

'Doeltreffende rioolwatersuiwering en waterherwinning is twee van die belangrikste werktuie ter bereiking van die doel van optimale waterbenutting in die Republiek, veral as dit as 'n geïntegreerde proses bedryf word,' het die Minister van Omgewingsake en Visserie, mnr Sarel Hayward, onlangs gesê by 'n besoekdag aan die Goudkoppies- en Bushkoppiewerke van die Stadsraad van Johannesburg.

Mnr Hayward, wat 'n handleiding oor waterherwinning amptelik namens die Waternavorsingskommissie (WVK) in ontvangs geneem het, het daarop gewys dat Suid-Afrika water vir slegs 65-miljoen mense het. Beroepe op die bevolking om geboortebepoering toe te pas, het dus geen politieke of rassegrondslag nie; dit is bloot 'n maatreël teen die gemeenskaplike probleem van skaarste aan water.

In dié uitgawe In this issue

- Krag uit die water 6
- Minister opens new wool scouring plant 11
- NIWR Jubilee invitation 13
- Spring protection .. 14
- Besproeiing 17
- Equipment 22



Sy Edele SAS Hayward, Minister van Omgewingsake, neem die handleiding oor waterherwinning in ontvangs van mnr Piet Meiring.

Handleiding

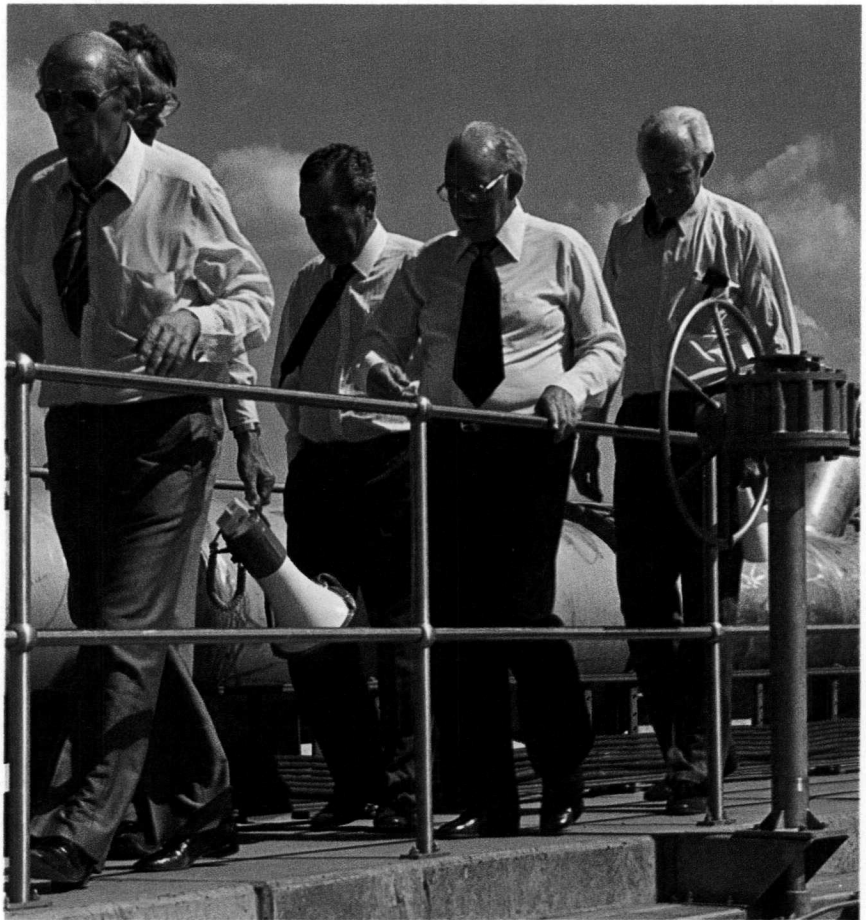
Die handleiding, *A guide for the planning, design and implementation of a water reclamation scheme*, is deur mnr PGJ Meiring van die raadgewende ingenieurs Meiring en vennote aan die Minister oorhandig. (Die handleiding is beskikbaar by die WNK, Posbus 824, Pretoria 0001).

Die minister het gesê dat dit welbekend is dat die RSA 'n waterskaars land is. 'Veral op streeksgrondslag kan ons verwag dat die vraag na water die lewering vanaf konvensionele bronne in die nabye toekoms gaan oorskry. Daarom is dit so noodsaaklik om die gehalte van ons natuurlike waterbronne te beskerm en om daardie bronne so optimaal moontlik te benut. Doeltreffende rioolwatersuiwering en waterherwinning is twee van die belangrikste werktuie ter bereiking van hierdie doelstellings veral as dit as 'n geïntegreerde proses bedryf word.

'Die Waterwet van 1956 het 'n belangrike rol gespeel om rioolwatersuiweringstryk in die RSA op 'n gesonde voet te plaas. Wetgewing kan egter nie buite die begrensing van bewese en ekonomies uitvoerbare tegnologie beweeg nie', het hy gesê.

'Navorsing moet wetgewing vooruitloop, en hier het navorsing deur die Nasionale Instituut vir Waternavorsing (NIWN) en deur verskeie munisipaliteite sedert die vyftigerjare 'n prysenswaardige bydrae gemaak. Met die totstandkoming van die WNK in 1971 is dié navorsing versnel en beter gekoördineer en is die toepassing van navorsingsresultate ook meer doelgerig nagestreef', het mnr Hayward gesê.

'In die werk wat vanoggend aan u bekend gestel is, beweeg Suid-Afrika op die voorpunt, en verskeie instansies het hiertoe bygedra. Ek dink aan die NIWN wat die oorspronklike navorsing oor biologiese nutrieëntverwydering gedoen het; die raadgewende ingenieurs, mnre Meiring & Vennote, wat die toepassing van die tegnologie die eerste keer aanbeveel het en die Stadsraad van Johannesburg wat die waagmoed aan die dag gelê het om die eerste stad te wees om die



Enkele van die eregaste by die verrigtinge te Goudkoppies tydens die besoek afgeneem. Van links na regs verskyn mnr JF Otto, direkteur-generaal van Omgewingsake en lid van die WNK; mnr Sarel Hayward, minister van Omgewingsake; dr MR Henzen, voorsitter van die WNK; en mnr GB Gordon, adjunkstadsingenieur (Gesondheidsdienste) van Johannesburg.

tegnologie direk op volkskaal te implementeer en met voorbedagte rade 'n buigsame aanleg te bou wat na voltooiing aan volkskaalse toetse en waarnemings onderwerp sou word ten einde meer van die omstandighede waaronder die proses van fosfaatverwydering optimaal verloop — *en vir toekomstige ontwerpdoeleindes* te wete te kom.

'Ek dink aan die Universiteit van Kaapstad met sy hoogstaande bydrae tot die ontwikkeling van prosesontwerpskriteria, en die Universiteit van Pretoria vir sy werk oor die basiese meganismes van die proses. Ten slotte, dink ek aan

die Waternavorsingskommissie wat deur sy koördinerende en finansiële ondersteuning die kundigheid van die verskillende instansies saamgesnoer het om die oorspronklike tegnologie verder na te vors en te ontwikkel. My dank en gelukwensing aan al die persone en instansies wat deel van hierdie span uitmaak.'

Die Minister het gesê dat na aanleiding van navorsing wat oor die afgelope paar dekades gedoen is, die WNK besluit het dat die kennis wat op dié wyse gegenereer is, in 'n enkele handleiding saamgevat moet word sodat die praktiese gebruik daarvan bevorder sou word.

'Ek wil graag my waardering teenoor die Kommissie vir sy inisiatief en mnre Meiring en vennote vir die opstel van die handleiding uitspreek,' het hy gesê en voorts die navorsers vir hulle bydrae tot

(Na bladsy 4)



Besproeiing:

NUWE VERSLAE VRYGESTEL

Die Waternavorsingskommissie het die publikasie van twee nuwe verslae aangekondig wat voortspuit uit besproeiingsnavorsing wat deur die WNK gefinansier is.

Een verslag met die titel: *Die ontwikkeling van doeltreffende besproeiingsmetodes vir toepassing op skuinsgronde* is deur die Departement Siviele Ingenieurswese van die Universiteit van Stellenbosch opgestel op grond van die navorsing wat hulle vir die WNK verrig het.

Dié projek het hoofsaaklik gesentreer om

- stroommeting en die beheer van water in die hoofverspreidingsstelsels onder toestande van relatief groot hellings, in ooreenstemming met die vereistes van die geskikste besproeiingstelsel vir die betrokke situasie. Die resultate dui daarop dat die meet en beheer van besproeiingswater onder hierdie omstandighede met goeie akkuraatheid en teen redelike koste behartig kan word met behulp van bestaande toerusting, aangevul deur toerusting wat plaaslik ontwerp en gebou kan word.
- 'n vergelykende studie van die werkverrigting van vier besproeiingsmetodes onder toestande van relatief groot hellings. Die vier metodes wat ondersoek is, is mikrospruite, mikrovore, drupbesproeiing en sprinkelbesproeiing op 'n terrein met 'n helling van 1:7. Dit het geblyk dat al die genoemde stelsels bestuur kan word om bevredigende resultate in terme van waterverbruik te lewer, mits voldoende inligting oor grondvogtoestande en weersfaktore beskikbaar is. Die gevolgtrekking is dat die akkuraatheid waarmee besproeiingstelsels bestuur word om by die variasie in die grondeienskappe aan te pas 'n belangriker faktor as die keuse van die besproeiingsmetode is. Die meting van grondvogtoe-

stande op 'n roetinebasis en met bevredigende akkuraatheid is dus belangrik met die oog op die doeltreffende gebruik van besproeiingswater op skuinsgronde.



Kool is as proefgewas by die skuinsgrondeprojek gebruik.

Die ander verslag wat deur die WNK vrygestel is, het te doen met grond faktore wat 'n invloed het op die optimale benutting van besproeiingswater in die Swart state. Die finale verslag is deur die Departement Grondkunde van die Universiteit van Fort Hare voorberei wat die navorsing namens die Kommissie uitgevoer het. Dit bestaan uit dele, nl *The determination of the profile available water capacities of soils* deur M Hensley en JM de Jager, en *Determination of soil properties related to irrigation and drainage*, deur DA Russell. Hierdie projek het op twee aspekte gekonsentreer, nl:

- Die ontwikkeling van 'n tegniek om die profielbeskikbare waterkapasiteit van 'n grond te bepaal. Hierdie tegniek is op die

plant as indikator gebaseer en kan deur relatief onopgeleide personeel uitgevoer word. Die waardes vir die profielbeskikbare waterkapasiteite volgens hierdie metode verkry, is meer realisties as dié verkry met die konvensionele benadering wat op grondvogspanning gebaseer is. Alhoewel die totale waterbehoefte van 'n gewas nie hierdeur geaffekteer word nie, word die frekwens van beproeiingstoedienings wel beïnvloed. Voorlopige wiskundige modelle vir die voorspelling van die profielbeskikbare waterkapasiteit is ontwikkel, maar hierdie modelle benodig verdere verfyning.

- Bepaling van daardie grondeienskappe wat by die ontwerp en bestuur van vloedsbesproeiingstelsels van belang is. In hierdie faset is hoofsaaklik gekonsentreer op daardie faktore wat waterbeweging op 'n besproeiingsbedding beïnvloed, asook die faktore wat infiltrasie van die water onder dinamiese toestande affekteer. Die tweedimensionele gedrag van besproeiingsbeddings en die gebruik daarvan in die ontwerp van besproeiingsbeddings is dus ondersoek.

Navrae oor die verslae kan gerig word aan die Voorsitter, WNK, Posbus 824, Pretoria 0001.

Waterherwinning

(Vanaf bladsy 2)

die handleiding bedank. 'Dié handleiding staan in die teken van die pogings wat aangewend word om ons waterbronne beter te benut'.

Mnr Hayward het ook gesê dat die navorsingsgemeenskap en die raadgewende ingenieurs die tegnologie ontwikkel het waarop die handleiding berus. Die daadwerklike samewerking van plaaslike owerhede, provinsiale administrasies, staatsdepartemente en raadgewende ingenieurs is nodig om die tegnologie te implementeer.

Na die oorhandiging van die handleiding het die Minister 'n geleide toer van die Goudkoppies- en Bushkoppiewerke meegemaak.



New project on rainfall

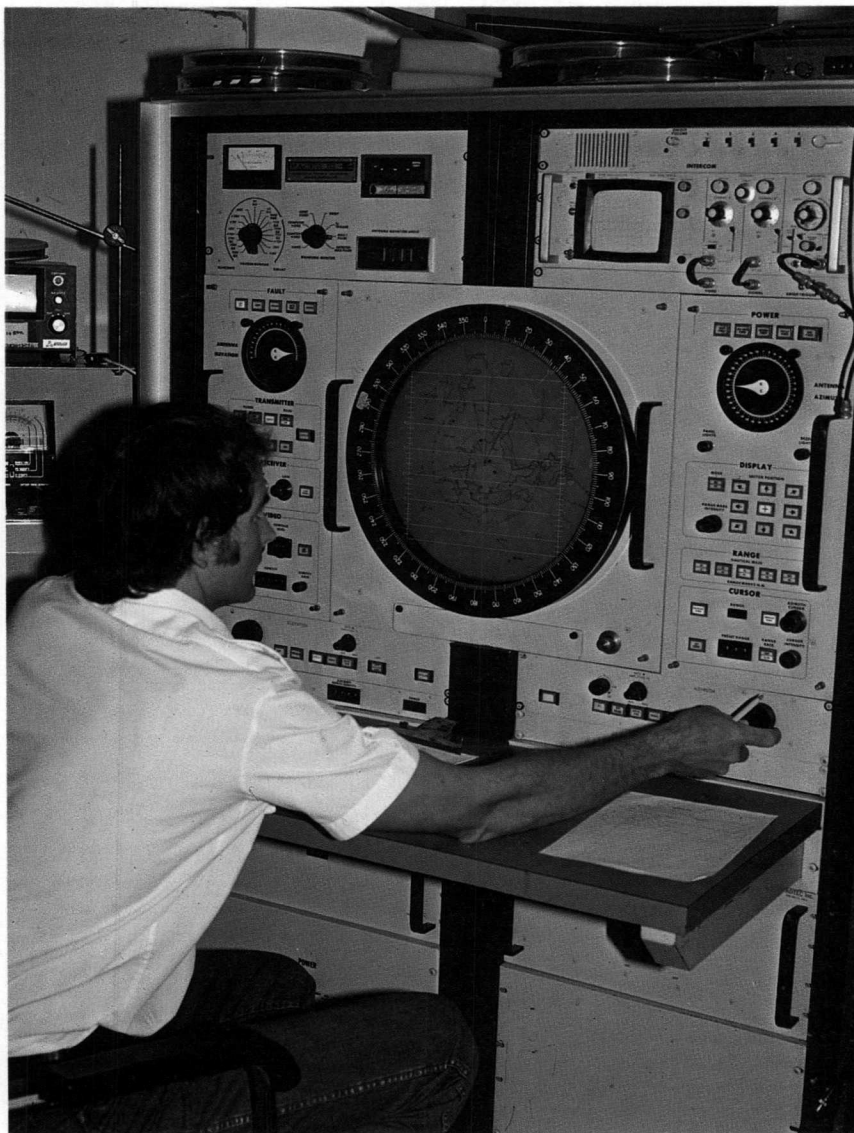
(From page 1)

guarantee of success and the costs are high but a positive result would be of tremendous value to the country.

In order to carry out the research programme at Nelspruit, a non-profit company called "Company for Research on Atmospheric Water Supply" (CRAWS) has been registered on 22 December 1982 under Section 21 of the Companies Act. In terms of an agreement between CRAWS and the Water Research Commission, CRAWS will be responsible for conducting the research programme with funds made available by the Commission. CRAWS has contracted Simpson Weather Associates (SWA) of Virginia, USA, as the principal investigators who will undertake the research and Cansas International Corporation (CIC) who will operate the field and aviation equipment under the direction of the principal investigators. The team of scientists that has been assembled for this programme includes some of the most eminent names in weather modification and their expertise will also be of great value to the Bethlehem Weather Modification Experiment being conducted by the Department of Transport. It is envisaged that the two projects will work in close co-operation towards the alleviation of the national water supply and demand situation.

Informed

In the meantime four members of the Water Research Commission staff recently visited Nelspruit following allegations that the WRC's rainfall stimulation project might be the cause of the continuing drought in the area. At a meeting that took place at Louw's Creek, Dr MR Henzen, chairman of the Water Research Commission, Mr D van der Merwe (chief adviser), and Dr PJ Roberts (senior adviser) and Mr D Cousens, (adviser of the Commission), informed members of the local farmer's association why the Water Research Commission is in-



The radar operator studies cloud buildup over the Lowveld as part of the new rain stimulation project initiated by the Water Research Commission.

vestigating this possible alternative source of water.

During the discussions some of the questions asked by those present were the following —

Q: Why was the Nelspruit area chosen for the research work?

WRC: Data collected during a previous research project on cloud seeding in Nelspruit indicated that it may be worthwhile to further investigate the suitability of clouds for rain augmentation in the area.

Q: Does the present research project have any connection with hail suppression or with the previous hail suppression project?

WRC: No. The present research project is a scientific information gathering project and therefore all

seeding of clouds will be done for research purposes, on a limited scale, and not for operational purposes.

Q: Is silver iodide being used as a seeding agent?

WRC: No, at the moment only dry ice is used which can cause no environmental pollution.

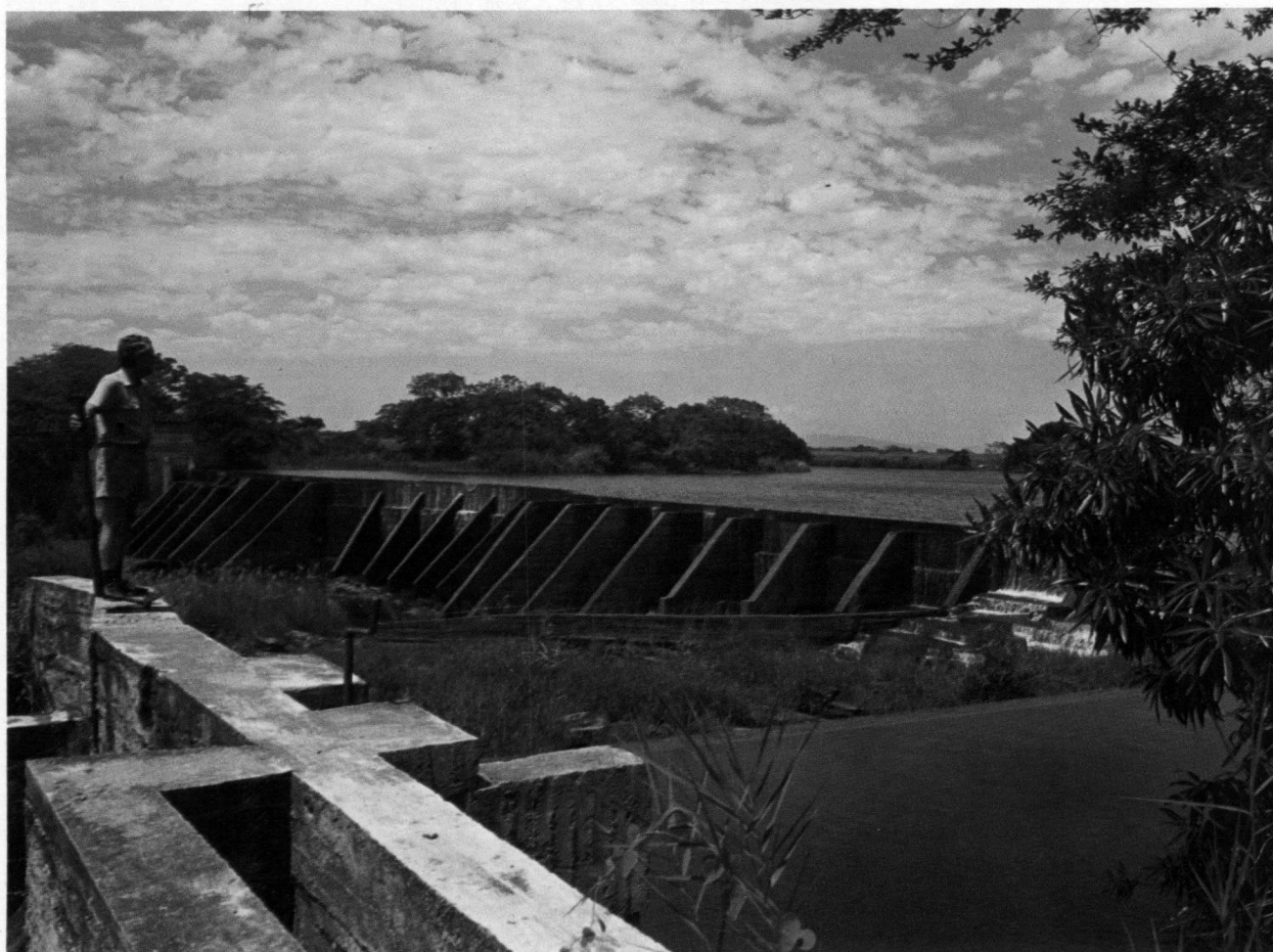
Q: How many clouds were seeded during the project in 1982?

WRC: In the period January to April 1982 18 clouds were seeded and in the period covering October to December 1982 nine clouds.

One of the Malelane farmers, Mr IT Spear, was also chosen during the meeting to serve as an observer on the WRC steering committee responsible for the project.

Om 1 260 ha suikerriet en 370 ha piesangs te besproei, soos die Schoemans van Lomati-landgoed doen, vereis baie water — en baie krag. *SA Waterbulletin* het onlangs die geleentheid gehad om met mnr Monté Schoeman te gaan gesels oor die besondere manier waarop die broers en 'n swaer van die familie te werk gegaan het om hierdie twee knelpunte te oorbrug. Die strategie kan in dié titel saamgevat word:

KRAG UIT DIE WATER



Mnr Monté Schoeman met die dam wat in 1948 gebou is, op die agtergrond.

Anderkant Nelspruit en Malelane se bosse in die Onderberggebied kan die somerlug soos vlekvrre staal oor die Laeveld krom. In hierdie hetige wêreld aard talle gewasse, en wanneer mens na die geil groei kyk, vóél mens die vrugbaarheid van die grond. Hierdie gebied ontsnap egter ook nie aan die beperkende faktor wat die landbou oor bykans die hele Republiek ten laste lê nie, naamlik 'n gebrek aan water.

'Dit is beslis ons grootste probleem,' sê mnr Schoeman. 'Alhoewel die gebied oor ongeveer tien persent van die afloop van die Republiek beskik, het ons hoegenaamd geen opgaarfasiliteite nie.'

Die reën in die gebied is seisoenaal — vanaf November tot Februarie; daarna volg die lang droë

tydperk waartydens daar besproei moet word. As 'n besproeiingstelsel dan vir die plaas ontwerp moet word, word baie min van reënval gebruik gemaak.

Dit is hierdie toedrag van sake wat daarvoor sorg dat die plaas se kragbehoefte ongeveer 2 200 kVA beloop — en die besondere van

hierdie landgoed is dat dit oor sy eie kragopwekeenhede beskik waarmee helfte van die benodigde krag verkry kan word. As die totale hoeveelheid krag van EVKOM aangekoop sou word, sou dit ongeveer R23 000 per maand beloop — die besparing wat dus met hierdie bykans unieke maatreël

verkry word, is voor-die-hand-lig-gend.

Water word naamlik vanuit die Lomatirivier vir die opwekking van hidroëlektriese krag onttrek. Die skema kan 1 020 kVA lewer deur middel van vyf turbine-eenhede.

Die turbinekanaal is ontwerp met 'n val van 1 in 4 000 en 'n vloeitempo van 4,249 kumek. Toevoerpype na die turbine-eenhede bestaan uit twee parallelle pyplyne, een met 'n maksimum deursnee van 1 143 mm en die ander 1 370 mm, en elk 445 meter lank.

Die toerusting in die turbinekamer bestaan uit vyf Frametipe turbine-eenhede wat elkeen direk aan 'n wisselstroomontwikkelaar gekoppel is. Twee van die eenhede is in staat om 420 kVA elk te ontwikkel wat 'n watervloei van 1,7 kumek sal verg. 'n Derde eenheid het 'n opwekvermoë van 180 kVA met 'n vloeitempo van 0,849 kumek; die oorblywende twee sal 75 kVA en 60 kVA onderskeidelik teen vloeitempo's van 318 en 256 liter per sekonde verskaf.

Daar sal gemerk word dat die som van dié vermoëns 1 020 kVA oorskry — vanweë die feit dat die eenhede nie almal gelyktydig gebruik sal word nie. Onder volvragtoestande sal slegs drie van die groot eenhede vir die opwekking van 1 020 kVA gebruik word. Dit sal 'n vloeitempo van 4,2 kumek benodig. Wanneer die vloei in die rivier onder hierdie tempo daal, sal van die kleiner eenhede ingeskakel word sodat die beskikbare vloei van die rivier te alle tye met die maksimum doeltreffendheid benut sal word.

Stoomkrag

Wanneer die vloei in die rivier verder verminder, sal daar van stoomkrag-eenhede gebruik gemaak word om die addisionele krag by te bring. Hiervoor het mnr Schoeman-hulle vier stoomenjins en twee dieseleenhede geïnstalleer. Die stoomenjins word vanuit 'n stoomketel gevoed — 'n ou lokomotiefketel — en die twee dieseleenhede sal met generatorgas aangedryf word. Die stoomen-hede word tans met steenkool bedryf, maar die idee is om later die suikerrietoppe in pilvorm as brandstof te verwerk.

In normale tydperke, vertel mnr Schoeman, word alle besproeiing op die landgoed geskeduleer.

'Wanneer ek van skedulering praat, word sekere faktore in ag geneem,' sê hy. 'Die hooffaktor is natuurlik die behoeftes van die plant, wat met verdampingspanne gekorreleer word. Die ander aspekte wat aandag moet geniet, is die waterbehoefte van die plant op 'n bepaalde groeistadium, die waterhouvermoë van die grond, die diepte van en die tipe grond.'

Grond

In dié besondere gebied is daar basies drie soorte grond: 'n rooigrond wat afkomstig is van die Swartland-basiese grondstelsel;

'n sanderige grond wat van die graniet afkomstig is en 'n swart turf wat meer alluviale grond is.

Omdat hulle eienskappe verskil, word daar vir die drie soorte grond verskillende stelsels gebruik.

Wat die *suikerriet* betref, word gemiddelde verdampingsyfers (wat oor 'n lang termyn per jaar en per maand vasgestel is) gekorreleer deur 'n klas-A verdampingspan te gebruik. In baie droë en warm tydperke is die verdamping hoër as wat die gemiddelde syfer aandui, en hiervoor word die verdampingspan benut sodat aanpassings in die skedulering gemaak kan word. Die Schoemans gebruik ook verdampingsyfers vir verskillende blaarbedekkings wat deur die

(Na bladsy 8)



'n Blik op die vyf turbine-eenhede wat op die Lomatilandgoed gebruik word om meer as 1 020 kVA vir besproeiingsdoeleindes op te wek.

KRAG UIT DIE WATER

(Vanaf bladsy 7)

suikernavorsingstasie te Mount Edgecombe verstrek word.

Wat *piesangs* betref, word die Nelspruitpan gebruik om verdamping te bepaal. Die rede hiervoor is dat die piesang vir verskillende groeistadia nie juis verskillende water behoeftes het nie. Elke blok piesangs beskik oor so 'n pan waar die werklike verdamping 'n aanduiding gee van die skedulering wat toegepas moet word.

'As ons begin besproei,' vertel mnr Schoeman, 'dan word die pan tot op sy volle voorraadhoogte aangevul. Die besproeiingsiklus word voltooi en daar word nie weer besproei voordat die verdampingspan vir ons toestande 35 mm verloor het nie. Op hierdie wyse oorbesproei 'n mens nie, jy ervaar ook nie droogte nie, en die grond versuip nie.'



Geen grond op Lomati lê ledig nie. As daar nie katoen buiten die piesangs en suikerriet gelewer word nie, sorg hierdie krisante saam met komkommers dat daar 'n winsgewende oes is wat daagliks op die Randse markte van die hand gesit word.

Dat dié resepsie werk, blyk maar al te duidelik uit 'n produksie van nagenoeg 100 000 ton suikerriet wat in 1981 daar opgelewer is.

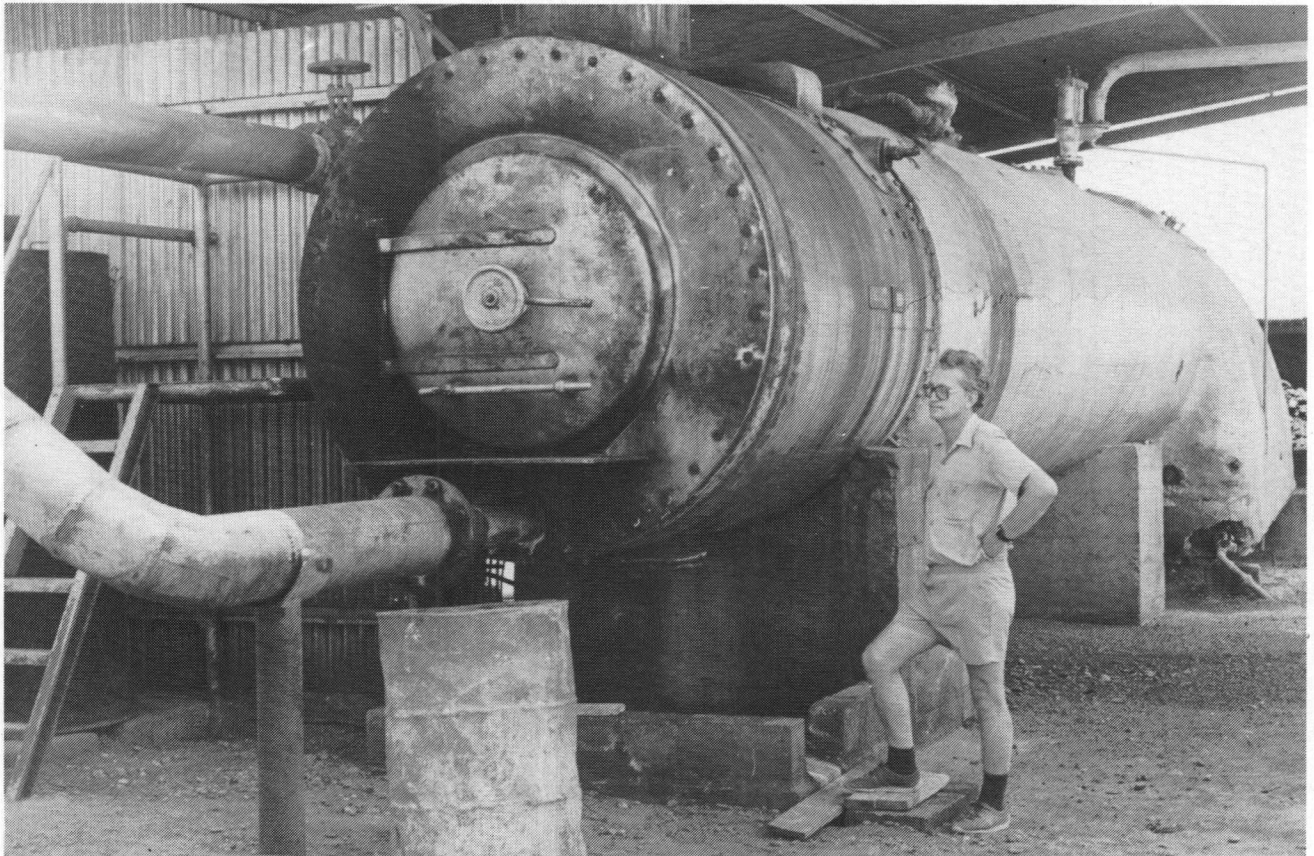
Verskeie besproeiingsstelsels word op dié landgoed gebruik. In 1966, toe die suikernywerheid daar gevestig is, was sprinkelbesproeiing aan die orde van die dag. Voorheen is vloedsproeiing oor die hele gebied toegepas. Met-

terjare is beter stelsels aangekoop ('sommige was duurder maar nie noodwendig beter nie!) en nou is daar 'n hele reeks op die plaas.

'Op die oomblik word semi-permanente stelsels geïmplementeer, waar die aluminiumpype permanent in die land lê en daar van sleeptoues gebruik gemaak word om die sproeier te verskuif, afhangende van die waterbe-



Jong piesangbome onder besproeiing op die plaas van die Schoemans.



Mnr Monté Schoeman by die stoomketel van 'n ou lokomotief waarmee hulpkrag opgewek sal word as die vlak van die rivier te laag daal.

hoefte,' sê mnr Schoeman. 'Sandgronde het 'n staantyd van so kort as vyf uur per posisie; rooigronde het staantye van tot twaalf uur.'

Kruipspuiter en spilpuntstelsels is ook in die verlede op verskillende tye gebruik.

Gemiddeld word in die sogenaamde Kaalruggebied (die omgewing waar Lomati geleë is) 0,71 liter per sekonde per hektaar vir besproeiing benodig. Hierdie syfer is deur mnr Schoeman bepaal nadat hy 'n opname van bykans die hele rivier gedoen het

om waterverbruik te probeer vaststel. Reënval, verdampingsyfers en panfaktor vir elke gewas is onder meer by die studie in aanmerking geneem. In sy geval word daar 22 pompstasies benut om hulle eie behoeftes van ongeveer 35 kusek te bevredig. Sommige van die stasies is op die rivier geleë terwyl ander naby damme is wat uit die rivier gevul word.

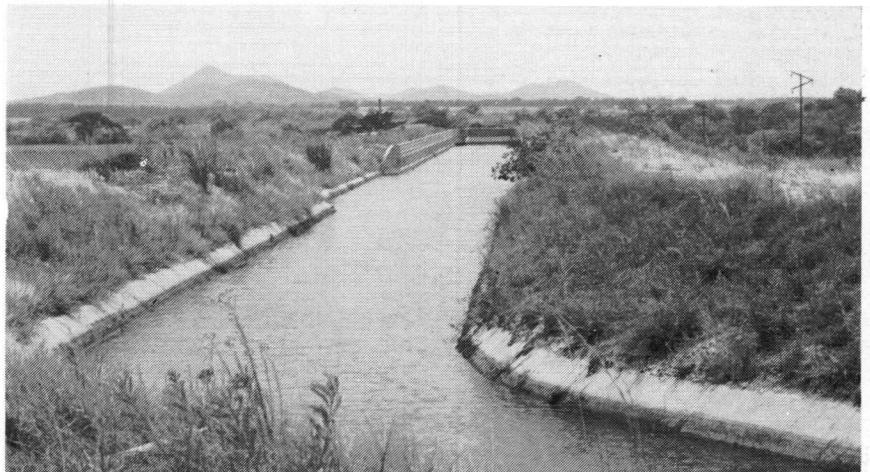
Hierdie voortreflike boerdery het egter nie oornag uit die lug geval nie. Mnr Schoeman, self 'n opgeleide landbou-ingenieur, lê

sterk nadruk op die familiepoging wat die landgoed gemaak het wat dit vandag is.

'My vader het die boerdery in 1948 begin, toe daar net 12 morg grond skoongemaak was,' vertel hy. 'Sy uitgangspunt was dat ons totaal selfonderhoudend moet wees — en daarop word ons besigheid dan ook gebaseer. Die huise op die landgoed het ons self gebou; die turbine-eenheid het ek ontwerp en is hoofsaaklik deur die oudste broer geïnstalleer.'

(Na bladsy 10)

Die kanaal wat water vanaf die dam na die turbinekamer voer. Die hidroëlektriese skema van die plaas is deur die Schoemans self ontwerp en gebou en het geweldige besparings aan kragkoste tot gevolg.



KRAG UIT DIE WATER

(Vanaf bladsy 9)



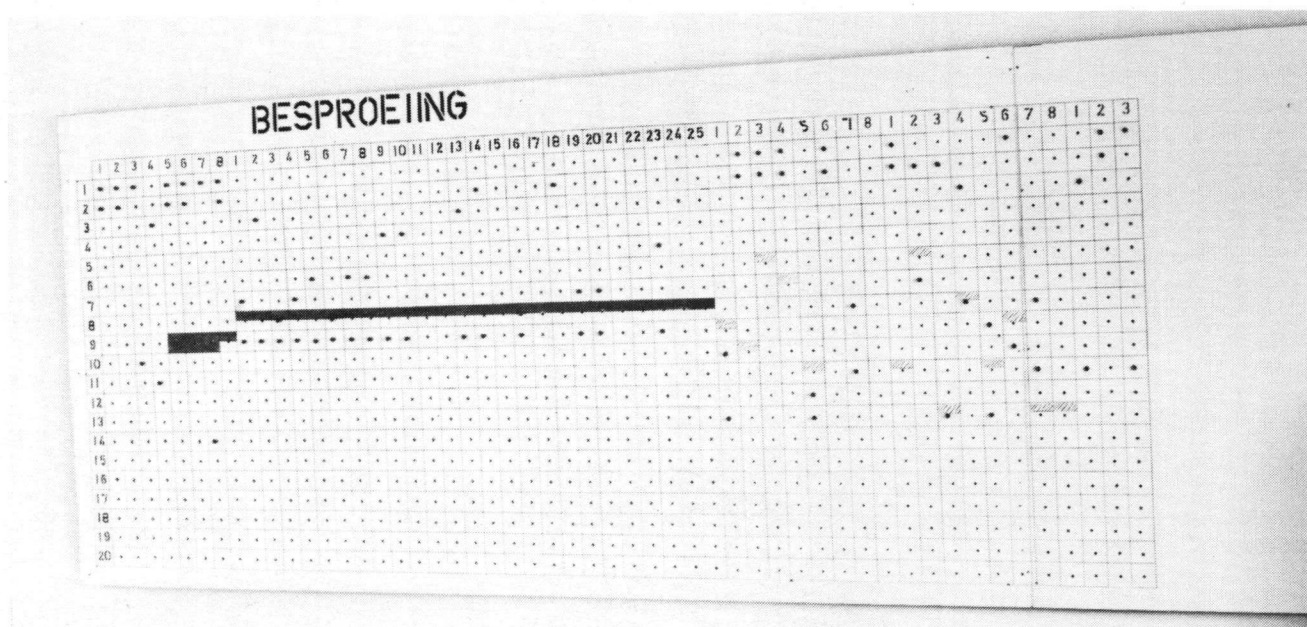
Die merkwaardige hiervan is dat dit alles ou, gebruikte toerusting is wat in die plaas se werkwinkels herstel is. Slegs die skakelborde en -tuig is nuwe toerusting, en dit is ook die enigste item wat deur buitestaanders ontwerp is.

Hoe doeltreffend hierdie boere werk, word waarskynlik ook weerspieël in die feit dat die Kaalrugarea elf persent van die totale piesangproduserende oppervlakte in die land beslaan, maar 15% van die produksie lewer.

Van die jonger geslag is drie seuns reeds in die besigheid betrokke terwyl een seun en twee dogters tans met verdere studie in die landbou besig is. Daar is nie die minste twyfel dat hierdie bedryf-wighede sal bydra om die plaas se doeltreffendheid verder te verhoog nie.

In hierdie opsig staan die dam wat mnr Schoeman se vader in 1948 in die Lomatirivier begin bou het, miskien as simbool van die doeltreffendheid waarmee dinge hier op die landgoed uitgevoer word.

(Links): Die pype wat na die turbines voer en (onder) die beheerpaneel vir besproeiingskedulering.



Wool scouring effluent:

NEW PLANT OPENED BY MINISTER



Mr OTH Beier (left), chairman of the Beier Group, with the Minister of Environment Affairs, Mr SAS Hayward, immediately after the plaque was unveiled.

"The wool scouring industry in South Africa uses approximately 600 000 cubic metres of water per annum and its effluents have a pollution load of 8 million kg of solids (sand, clay, vegetable and fibre). This creates a substantial effluent problem which has received much attention, both here and overseas."

This was said by the Minister of Environmental Affairs, Mr Sarel Hayward, when he recently officially opened a new wool scouring effluent purification system at the Beier Group's wool combing plant in Isipingo. Also present at the opening were senior officials from the Water Research Commission and the South African Wool Board.

Mr Hayward said that the International Wool Secretariat had recognised that the disposal of wool scouring effluents was one of the major problems facing the industry. "They believe that it is becoming of increasing importance because wool importing countries in the western world are applying

very stringent pollution legislation.

"Hence, in the future, they will want more and more clean wool rather than greasy wool. This means we can expect to scour increasing volumes of grease wool here in South Africa in the coming year."

The Minister said he was very conscious of the fact that South Africa also had to face these pollution problems. "As we are a water-short country, we have to be very careful in protecting the quality of water resources. The disposal of high strength industrial effluents is already difficult and will become more so in the future," he said.

The Minister pointed out that the Water Research Commission had

advocated that effective solutions to the problems of water depletion had to be sought by the optimum utilization of the available water. Moreover, wastewater renovation, reclamation and reuse will have to form an integral part of the national water economy to effect a balance between supply and demand.

"Obviously, industry has a major role to play in these developments, not only because it is a large user of water, but its effluents contain many of the substances which are difficult to remove by conventional treatment technologies."

Mr Hayward said it was therefore pleasing to note that industry

(To page 12)

NEW PLANT

(From page 11)

on its own accord was also tackling their individual problems of pollution.

"I know that considerable effort has gone into the implementation of the technology of the Beier wool scouring effluent purification system and I congratulate those people involved.

"I do believe that the example set by Messrs OTH Beier in the establishment of the full-scale treatment plant reflects the attitude of the majority of our industrialists in South Africa regarding their desire to assist in combating pollution of our natural water resources," the Minister said.

The Beier/ALFA-System has been operational for the past 18 months at Beier's wool combing plant in Isipingo where it has been purifying the effluent from the total plant which processes approximately 13 million kg of greasy wool per annum.

Over the past 10 to 15 years the Beier Group has expended well over one million Rand on pure research in an endeavour to solve the very serious problem of purifying wool scouring effluent. The Beier Group recognized that without solving the effluent problem of wool scouring the industry as a whole would not be able to grow. In many countries all over the world wool scouring mills have been closed down because of the detrimental effect the effluent from these mills was placing on the environment.

The real problem to date has been the disposal of the wool scouring effluent which is high in oxygen absorption demand, residual fats, suspended and dissolved solids. Municipalities have become more and more reluctant to handle this effluent and often refuse to accept it at all. The cost of discharging to the sewers, if permitted, has reached enormous proportions and will continue to escalate rapidly. At present the cost to dispose effluent from the Isipingo plant would be in the vicinity of R1,40 per m³.

However, unperturbed by the magnitude of the problem and the

many set-backs the goal was pursued until a breakthrough was achieved when an idea from Beier's was married with another from ALFA-LAVAL. This then produced the Beier/ALFA-system.

The plant is a totally closed loop system where the only losses of water are through the wet wool leaving the wool scouring machine and the moisture in the sludges.

Principally there are three basic streams:

- a wool recovery stream which produces a superior grade wool wax being the conventional system;
- a sludge stream from which the heavy solids are recovered in a spadeable form and the liquid after further processing produces a secondary grade wool grease;
- a further sludge stream from which the solids are also recovered in a spadeable form. The liquid phase is then further processed through an evaporator from which a sludge is obtained and two primary condensates. The first condensate if fed to the boiler and the second is returned to the wool scouring plant.

Advantages

- Water usage is reduced to one to two litres of fresh water per kilogram of greasy wool input compared to the average in the industry today which is in the vicinity of eight to ten litres of fresh water per kilogram of greasy wool input.
- The plant operates as an independent unit and can therefore be connected to any existing scouring plant with only minor modifications being necessary.
- Sludges are removed in a spadeable form.
- Approximately 97 percent of the possible wool grease is recovered.
- The cost of purifying one cubic metre of effluent is 70 cents based on today's cost which includes capital depreciation as well as interest and running

costs but excludes the saving which would come about from the elimination of the ponds which are commonly used today.

- Energy input is to a large extent recouped by fully utilizing all hot liquid phases.
- Floor area for the full size plant which includes the wool grease recovery plant is 800 m².
- Further developments are at an advanced stage to reduce costs still further.

With this purification system the Beier/ALFA team have answered the challenge and come up with a viable full scale plant which will ensure that the wool processing industry can expand and in addition keep our environment free of pollution.

PRG SCORES WITH FIVE



Prof Ray Groves.

The Pollution Research Group of the University of Natal has once again distinguished themselves by having three poster presentations and two papers accepted for the 1st World Congress on Desalination and Water Reuse to be held in Florence in May (details on back page).

Prof Ray Groves, head of the PRG, Messrs Chris Buckley and Malcolm Simpson, and Dr K Treffry-Goatley collaborated on the posters and papers on, inter alia, membrane separation for industrial effluents and water reuse, fouling and modelling of ultrafiltration for desizing effluent, reverse osmosis for textile dyehouse effluents, etc.

Prof Groves and Messrs Buckley and Simpson will be attending the congress.

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Please send me an invitation to the NIWR Silver Jubilee celebrations on Tuesday, 12 April 1983.

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KWARTEEUFEESVIERING NASIONALE INSTITUUT VIR WATERNAVORSING

12 APRIL 1983

Die Nasionale Instituut vir Waternavorsing sal in April vanjaar 25 jaar oud wees. Om die geleentheid te vier, sal die Instituut op Dinsdag, 12 April 1983, vir genooide gaste oop wees. Die verrigtinge begin om 08h00 en duur tot 16h30. Ligte verversings sal beskikbaar wees.

Die werksaamhede van die Limnologie-, Waterkwaliteit-, Bioteegnologie-, Fisies-chemiese Tegnologie-, Tegnologiese Toepassing- en Gemineraliseerde Water-tipesafdeling kan besigtig word, asook die loodsaanlegfasiliteite by die Daspoort-eksperimentele terrein.

Vir u uitnodiging voltooi die poskaart hierby en stuur aan die Direkteur, Nasionale Instituut vir Waternavorsing, Posbus 395, Pretoria, 0001.

SILVER JUBILEE NATIONAL INSTITUTE FOR WATER RESEARCH

12 APRIL 1983

The National Institute for Water Research will be 25 years old in April this year. To mark the occasion, the Institute will be open to receive invited guests on Tuesday, 12 April 1983. The program begins at 08h00 and continues until 16h30, with light refreshments available.

Visitors will see the work of the Limnology, Water Quality, Biotechnology, Physical-Chemical Technology, Technological Application and Mineralized Water Divisions. There will also be a chance to inspect the pilot plant installations at the Daspoort experimental station.

Get your invitation by completing and returning the accompanying post card to the Director, National Institute for Water Research, P.O. Box 395, Pretoria 0001.

Besproeiing in VSA bekyk

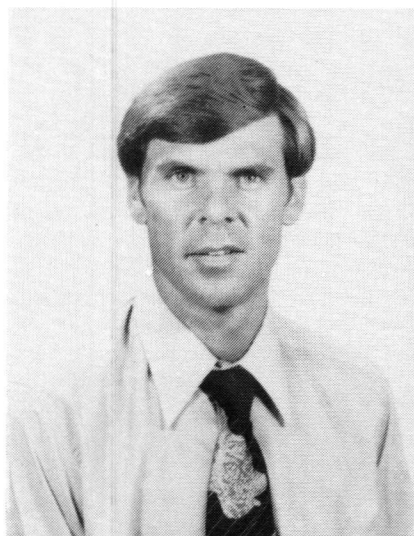
Dr LK Oosthuizen van die Universiteit van die Oranje-Vrystaat het aan die begin van die jaar na Amerika vertrek waar hy 'n studie sal maak van die metodes wat in die VSA gebruik word om die ekonomiese doeltreffendheid van watergebruik vir besproeiing te verhoog.

Hy sal vir 'n jaar saam met professor Vernon R. Eidman, van die Departement van Landbou- en Toegepaste Ekonomie aan die Universiteit van Minnesota in St Paul aan 'n projek oor die ekonomiese evaluasie van besproeiingsdoeltreffendheid werk.

Dr Oosthuizen het gesê daar bestaan tans 'n dringende behoefte in Suid-Afrika aan navorsing oor hierdie onderwerp.

"Die doeltreffendheid van watergebruik by die belangrikste be-

sproeiingsgewasse in die Republiek is nog nie ekonomies geëvalueer nie en dit is ook nie bekend watter



Dr LK Oosthuizen.

ekonomiese aansporingsmaatreëls vir boere nodig is om meer doeltreffende waterskeduleringsmetodes te aanvaar nie," het hy gesê.

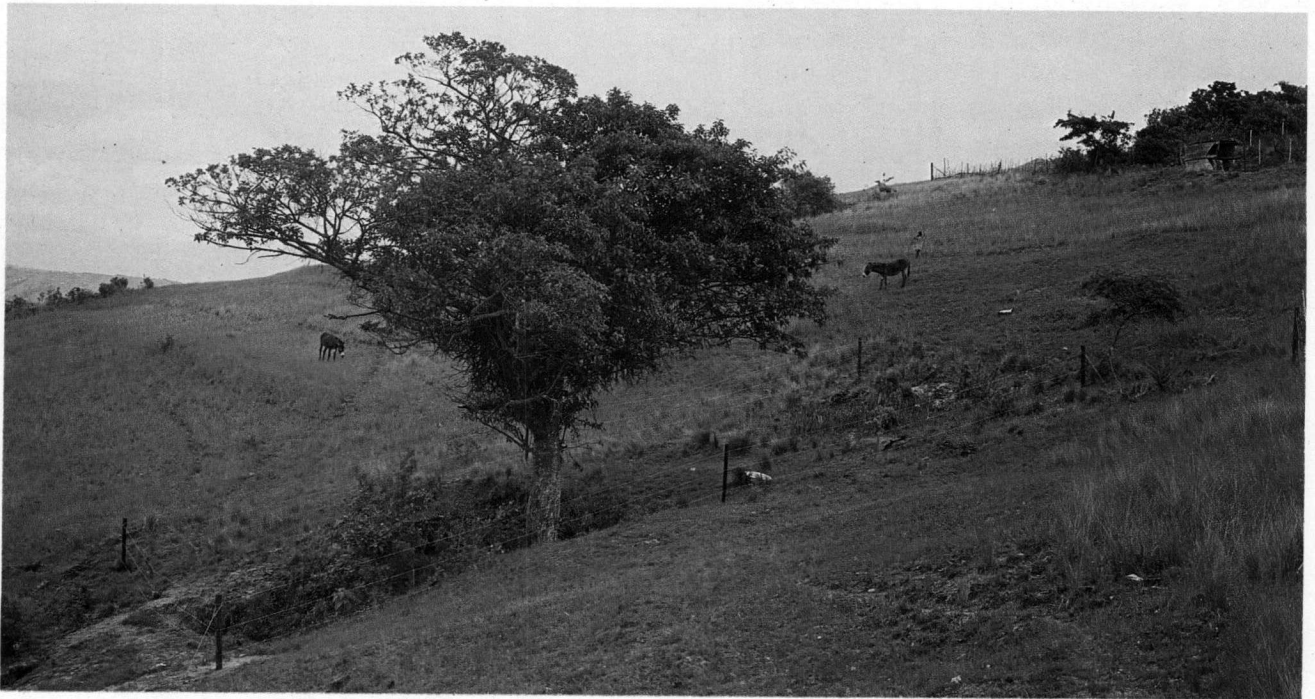
Navorsing toon aan dat besproeiingsdoeltreffendheid deur middel van besproeiingskedulering verbeter kan word. Op die oomblik word besproeiingskedulering gebaseer op grondvogbalansmetodes wat klimatologiese data en empiriese formules gebruik om evapotranspirasie te bepaal. Ekonomiese en biologiese inligting ten opsigte van die effek van alternatiewe besproeiingskeduleringsstrategieë word dringend benodig om besproeiingsboere in staat te stel om die effek van meer doeltreffende besproeiingskeduleringsprosesse te evalueer.

Dr Oosthuizen beoog om by sy terugkeer in Suid-Afrika 'n projek oor die ekonomiese doeltreffendheid van watergebruik vir besproeiing, soortgelyk aan die een in Amerika, in die Vrystaat uit te voer.

"Every fourth hospital bed in the world is occupied by a person who suffers from diseases caused by polluted water . . . The most important activity that can be undertaken to improve the health conditions of the rural population in developing countries consist in assuring a practical supply of clean water."

— World Health Organisation (WHO)

SPRING PROTECTION IN NATAL



A spring in Natal, fenced off against animals and as protection against pollution.

Thirty kilometres inland from the city of Durban in the Valley of a Thousand Hills lies the Valley Trust Centre. Brainchild of Dr Halley H Stott who founded it in 1951, the Valley Trust is a socio-medical project concerned with promoting the health of the local people through better nutrition and the establishment of safe water supplies.

Working from a small clinic the Valley Trust has according to Dr David Whittaker, former Medical Officer at the Trust, "experimented with health promotion in a way that the health care establishment has not been able to and therefore the organisation has acquired experience unique in Southern Africa".

Dr Stott emphasised the link between food and health and said, "I have chosen this infertile hilly country because it is typical of the area in which many Africans live and I want to show that by using

local organic matter and domestic waste, they can grow nutritious food and thereby help themselves to lessen many of the diseases that I am certain stem from malnutrition."

Initially kwashiorkor and tuberculosis were rife in the Valley, but Dr Stott believed that these and many other diseases which afflicted the residents of the Valley could be prevented through education in nutrition and hygiene and at minimum of cost.

Because he was dealing with a simple people living in a sparsely populated area his objectives and methods were simple: to teach the residents the relationship between ill-health and bad eating habits; to show them by example how to grow vegetables that contained the vitamins and minerals necessary for good health, and then to instruct them in the art of cooking what they had grown to gain the

maximum benefit from their food. In this way a system of trenched gardening has been developed where no chemical fertilizer is used but only compost, organic matter and very little water. Slowly over the years the results of the Valley Trust methods manifested themselves. Kwashiorkor, tuberculosis and gastro-enteritis cases dropped dramatically, and the general health of the local people showed a marked improvement.

The importance of proper nutrition in the promotion of a community's health is, however, only one side of the coin. Equally important is water, because in rural areas polluted water is often a major cause of disease.

For many people living in the Valley area springs are the only source of water supply. Unfortunately these springs are often neglected by those who use them and therefore become polluted. To

try and improve this unhealthy situation the Valley Trust in 1980 embarked upon a water protection programme.

A feature of these water projects is the involvement of members of the community. As Dr Irwin Friedman, Deputy Director and Community Medical Officer, points out: "Before a spring is protected it is important that the necessary organisation should exist to build, maintain and regulate the exploitation of the spring. It may be necessary to raise funds, collect local materials or organise labour, and it is therefore usually a sound practise for a local committee to be formed from a voluntary association of local residents. Ideally this committee should be formally constituted with all the regulations pertaining to joining and membership carefully laid down. Registration with the local authority (Tribal Authority or a Government Department) protects the association from abuse by unscrupulous members and helps to keep the Government informed about local programmes."

The liaison work for such a project can often be more complex and time consuming than the technical work itself, says Mr Franz Diener, a construction engineer employed by World Vision and presently working with the Valley Trust construction team on the spring protection project. Once the necessary infra-structure exists in the community, the next step is to estimate materials and costs and assess the spring. In assessing a spring for protection purposes, Mr Diener says, three conditions have to be met: a) the spring must have a reasonable yield, not less than half a litre per minute, b) there must be reasonable flow and c) the spring must be a perennial one.

The construction work in harnessing the flow of the spring is simple. Loose soil, stones and plant material around the eye of the spring is carefully removed to improve the flow to a maximum and reduce any restriction to the flow, while a diversion ditch is constructed above the spring to prevent any surface water entering the spring area.

The eye is then packed with

(To page 16)

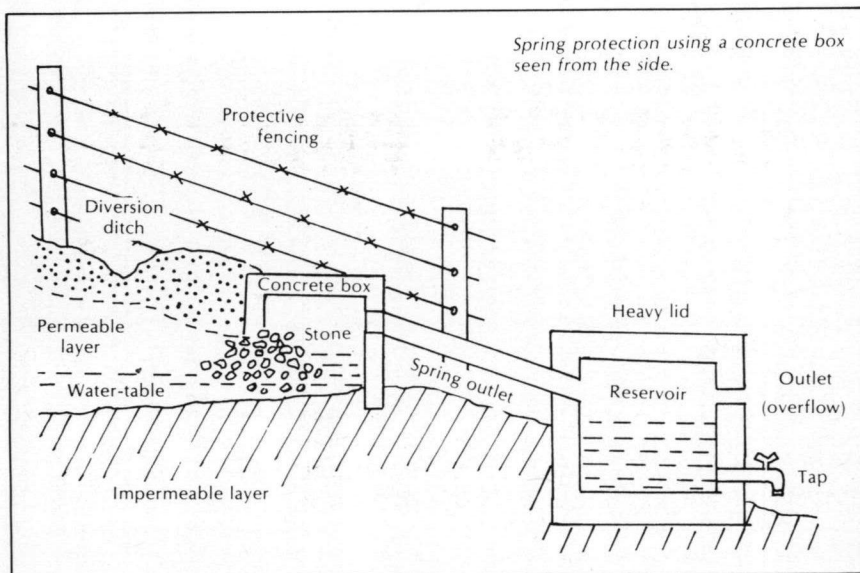
A typical unprotected spring (right) in the Valley of a Thousand Hills. Some of these water sources have an E. coli count of more than 1 000 per 100 ml.



(Below) A close-up view of the protected eye of the spring within the concrete box as described in the article.



(Right) Mr Franz Diener, a construction engineer from World Vision, sampling some clean water from a protected spring.



Spring protection

(From page 15)

stones to ensure unimpeded movement of water. A layer of coarse sand can also be introduced in the path of the water to act as a filter. A shower rose is a refinement that prevents sand and stone entering the pipe.

The same effect can be achieved by punching multiple holes at the end of the blocked pipe.

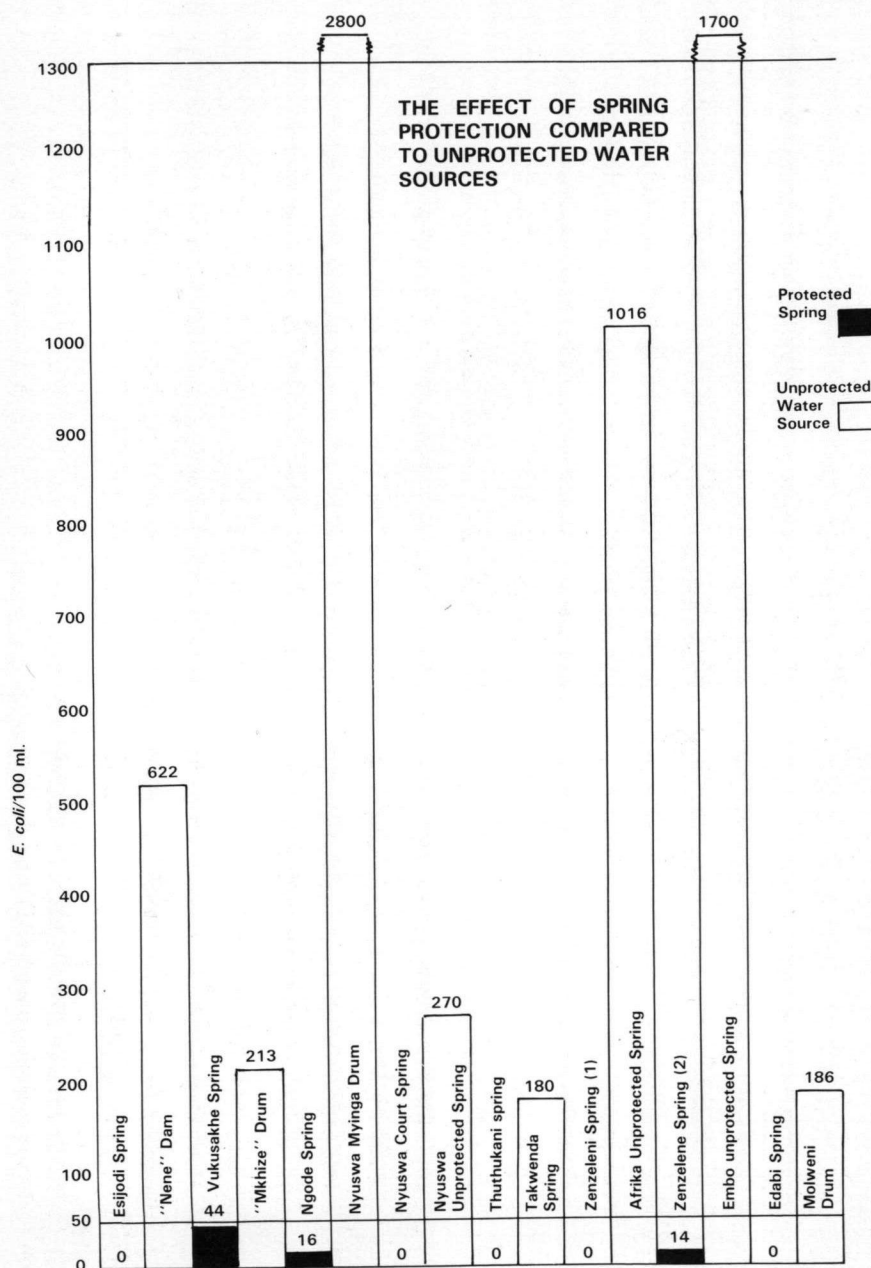
Next piping is inserted and a mould introduced to form the V-retaining wall or a concrete box that is built over the eye. A ditch draining the water away is usually necessary during this stage. The concrete is then poured and left to set. By the time the concrete has set water is already flowing out of the pipe which is led to a point below the eye where the reservoir will be constructed.

The volume flowing out of the end of the pipe is measured and the amount of water likely to accumulate over 12 hours is calculated. Each 1 000 litres will need approximately one cubic metre of storage space. Once the water requirement for the community has been decided, the reservoir is built using concrete blocks, cement and chicken wire, or some other method.

The spring is then completely covered and grassed over to prevent any interference, while the area around the spring is fenced off to protect the eye from contamination by animals or people. No latrine construction is allowed in the vicinity of the spring and certainly not less than 30 metres from it.

The reservoir outside the fenced off area may have a tap concreted into the structure but no tap is used directly from the retaining wall in the spring as this will restrict the flow and may damage the spring. A heavy lid on top of the reservoir ensures that the water inside stays clean.

With this fairly easy and inexpensive method of harnessing a spring the Valley Trust has had considerable success and their techniques are now being adapted and applied further afield, particularly in Kwazulu.



Besproeiing en die toekoms:

GELD DALK GROTER PROBLEEM

"Die Suid-Afrikaanse besproeiingsbedryf kompeteer vandag nie net meer om water met die ander ekonomiese sektore nie, maar eweseer om kapitaal wat op die kort- en middeltermyn selfs groter struikelblokke vir ons besproeiingsontwikkelings- en rehabilitasieprogramme daarstel as waterbeskikbaarheid," het dr AD Nieuwoudt, Direkteur van Besproeiing, van die Departement van Landbou, onlangs gesê toe hy 'n besproeiingswerksessie van die Waternavorsingskommissie in Pretoria oor grondkundige aspekte van besproeiing geopen het.

"My vrees is dat dit in die voor-sienbare toekoms nie grond of water of tegnologie of mannekrag gaan wees wat ons strewe vir 'n voortgesette gebalanseerde groei in besproeiing mag dwarsboom nie, maar wel die landbou se vermoë om vir beskikbare kapitaal te kompeteer. Hiermee word die uitdaging aan ons net groter want waar kan wetenskaplikes, ingenieurs en tegnoloë as mense wat tradisioneel beter presteer hoe groter die uitdaging is, 'n beter aansporing kry as juis die situasie waarin ons tans verkeer," het dr Nieuwoudt gesê. Hy het gesê daar is net een uitweg en dit is groter doeltreffendheid wat beteken 'n groter uitset per eenheid inset aan grond, water en kapitaal.

Met verwysing na die toekomstige Staatsbeleid vir besproeiing het dr Nieuwoudt daarop gewys dat finansiële dissipline altyd hard spreek tot beleidmakers in hulle finale besluitneming en dat hulle hulle hierin grootliks laat lei deur die harde feite van voordeel, naamlik koste-ontledings.

"As ons 'n slag in die verlede moet delf om die pad vorentoe, wat staatsbeleid betref, beter te kan verken, val dit op dat ons tydperk beleef het waartydens landboubeleid en besproeiingsbeleid onder dieselfde owerheid los van mekaar in twee aparte kamers geformuleer was met die resultaat dat verbandhou-

dendheid, wat eintlik as vanselfsprekend in sake van hierdie aard en omvang aanvaar word, dikwels ontbreek het. Ons het ook daardie tydperk beleef, wat gelukkig nou beëindig is, toe populêre slagspreuke oor lushofskepping as gevolg van die "vrugbaarheid" van besproeiingsgrond, aangevul en aangevuur deur die eer wat die bou van strukture soos damme en



Dr AD Nieuwoudt.

ander sodanige werke as simbole van vooruitgang verleen aan diegene wat vir hulle oprigting verantwoordelik was, baie sterk in beleid en besluitneming gefigureer het. Besproeiingsontwikkeling by name Staatsbesproeiingskema-ontwikkeling, is ook tot betreklik onlangs nog as uitvloeisel van breë landsbeleid, op nasionale skaal aangewend vir die bereiking van bepaalde maatskaplike oogmerke. Dit is 'n beleid wat goed gewerk het en goeie resultate gelever het in 'n tydperk van volop grond, water en mensemateriaal en weinig kompetisie van die ander sektore van die ekonomie", het dr Nieuwoudt gesê.

Hy het gesê 'n vraag wat ons onself met vrug kan afvra en beantwoord is hoe Suid-Afrika se huidige inventaris van bates, geleenthede en probleme op besproeiingsterrein lyk insoverre dit sy beleid, prioriteite en handelinge vorentoe mag beïnvloed? "Ener-syds het ons 'n aantal voltooide

groot damme met onbenutte water wat vir die landbou geoormerk is agter hulle walle wat 'n Nabotswingerd vir baie ander sektore van die ekonomie geword het. Op die kort en selfs kort-middeltermyn is daar egter nóg die dringendheid van geïdentifiseerde behoeftes aan noodsaaklike landbouprodukte, nóg die finansiële vermoë om dié bates op betekenisvolle skaal — sê 'n kwart van die potensiaal binne 25 jaar — vir die landbou te benut. Andersyds is daar die alombekende knellings van ontoereikende watervoorsiening, verouderde besproeiingsinfrastrukture, onekonomiese boerderyeenhede, gebrekkige dreinerings en dies meer op talle van ons ouer skemas wat nou en in die toekoms baie sterk sal kompeteer om fondse wat die Staat vir besproeiing kan of mag bewillig."

Geheel

Dr Nieuwoudt het verduidelik dat op 'n internasionale kongres verlede jaar buitengewone klem gelê is op die verbetering of rehabilitasie van die ouer besproeiingskemas. Die verbetering van plaasbesproeiings- en dreineringsstelsels moet egter gepaard gaan met hoofskemaverbeterings sodat vernuwings en verbetering 'n geïntegreerde geheel kan vorm.

Die probleme wat kan ontstaan indien dit nie gebeur nie het duidelik op die kongres geblyk. So het 'n spreker van die Wêreldbank volgens dr Nieuwoudt verwys na "die ernstige graad van ondoeltreffendheid van wateraanvoer en — distribusie in Suid-oos Asië waar derduisende boere op 'n totale oppervlakte van sowat 250 000 ha eenvoudig aangewese is om hulle besproeiingswater te neem wanneer dit beskikbaar kom. Die spreker het daarop gewys dat boere onder daardie omstandighede net so min op besproeiingswater kan staatmaak soos op die reën, met die gevolg dat hulle uitsluitlik laerisiko-gewasse plant

(Na bladsy 18)

BESPROEING

(Vanaf bladsy 17)

hoewel hulle heeltemal bewus is van die bestaan van meer lonende gewasse . . ."

In Kanada weer is die probleem dat die boere van besproeiingskemas soms baie meer gevorderd is as die owerheid in die sin dat die boere 'n gevorderde tegnologie op hulle plase beoefen terwyl die owerheid se wateraanvoer en -afvoerstelsels dikwels nog aan die primitiewe grens.

Dr Nieuwoudt het ten slotte in antwoord op die vraag: *Besproeiing quo vadis?* gesê dat die aanwesigheid van ongunstige produksie-ekonomiese faktore op baie van die ouer Staats- en Besproeiingsraads-kemas en die feit dat dié faktore alleen koste-effektief opgehef kan word deur substansiële investering in skemaherbepanning en die invoer van duur nuwe besproeiingstegnologie op plaasvlak, sal meebring dat in die voorsienbare toekoms hierdeur so 'n groot druk geplaas word op fondse wat vir besproeiing beskikbaar gestel kan word dat weinig sal oorbly vir totaal nuwe ontwikkelings.

"Die feit dat huidige besproeiingsopbrengspeile as gevolg hiervan in meeste gevalle dramaties gaan styg en Suid-Afrika op die korttermyn geen betekenisvolle tekort aan besproeiingsgeproduceerde produkte in die vooruitsig het nie, onderskraag verder die logiese gevolgtrekking dat staatsbesteding ten behoeve van besproeiing oor die kort termyn gerig sal wees op konsolidasie en rehabilitasie.

"So 'n verposing sal dan ook aan die betrokke owerheidsinstansies die broodnodige geleentheid bied om indringend en sistematies voor te berei en te beplan vir die reeks nuwe skemas wat na die verposing noodwendig sal moet kom ten einde die noodsaaklike balans, enersyds binne die landbouhuishouding as sodanig, en andersyds tussen die landbou en res van die dinamies ontwikkelende landseconomie, te kan bly handhaaf", het dr Nieuwoudt gesê.

Runoff modelling:

'OPTIMUM WATER YIELD SOUGHT'

One of the most eminent agricultural engineers in the USA, Professor J Kent Mitchell, recently spent a few months in South Africa as a guest of the Department of Agricultural Engineering at the University of Natal.

Professor Mitchell, who is an expert in the fields of sediment yield and runoff modelling, visited various research centres and catchments in the Republic where the Water Research Commission is sponsoring hydrological projects.

Asked about his impressions of South Africa's water resources Professor Mitchell said that "water resources problems in the Republic appear to be no different from those in any other sub-continent that ranges from sub-humid to arid. Continuous long-term supply is of concern and therefore, climatic, geologic and land use conditions that provide the optimum water yield must be discovered for future application.

"On the other hand information is also needed that leads to effective control and, perhaps, storage of large rainfall-runoff events. It appears that with the personnel

resources available, much worthwhile data collection is being conducted that will eventually provide information for effective water resources planning and design for South Africa. However, it also appears that only a small portion of runoff data collected is easily available to researchers that may wish to test hypotheses.

About future research needs Professor Mitchell said that two main research thrusts are important in water resources research.

"Parameters, coefficients, variables, etc. must continually be evaluated for various hydrological conditions for design procedures currently in use by planners and designers. Concurrently researchers must be encouraged to develop new models of hydrological processes which will eventually become the more accurate design procedures of the future. In other words, there should be a reasonable balance between applied studies that satisfy immediate gaps in knowledge and basic research that will improve our understanding of hydrological processes," Professor Mitchell said.



Prof Mitchell (centre), pictured with (left) Mr C Schultz, a hydrologist of the Dept of Environment Affairs, and Prof R Schulze, Head, ACRU, University of Natal.

Contribution to climatological data:

Report on SA storm rainfall

A report entitled *Southern African storm rainfall*, by PT Adamson was published late in 1982 by the Directorate of Water Affairs (Branch of Scientific Services).

The primary objective of the report is to present tabulated estimates of extreme n -day rainfalls for South Africa and South West Africa/Namibia with their associated risk. In addition, a means is presented for the computation of short duration storm depths.

The statistical procedure employed is, according to the author, relatively untried in the field of hydrometeorological extreme value analysis but provides creditable results in the statistical and physical sense.

Purpose

In an introduction Mr Adamson states that it is not the purpose of the report to replace or censure any existing analytical techniques, but rather to present the results of a particular statistical procedure on a scale hitherto unavailable in South Africa. For some 2 400 sites within South Africa and South West Africa/Namibia the n -day ($n = 1, 2, 3$, and 7) estimated storm rainfall depth is tabulated for selected recurrence intervals. No attempt has been made to generalize the results, except in map form for geographical interest. The tables provide the primary purpose of the report although additionally a method is proposed for the estimation of storm depths and their associated risk for events of less than one day in duration. It is important to emphasize at the outset that all of the results presented herein refer to *one day* rainfalls, that is between gauge observation times of 08h00 to 08h00. Corrected storm depths for any 24 hour period are achieved by multiplying the one day estimate by 1.11.

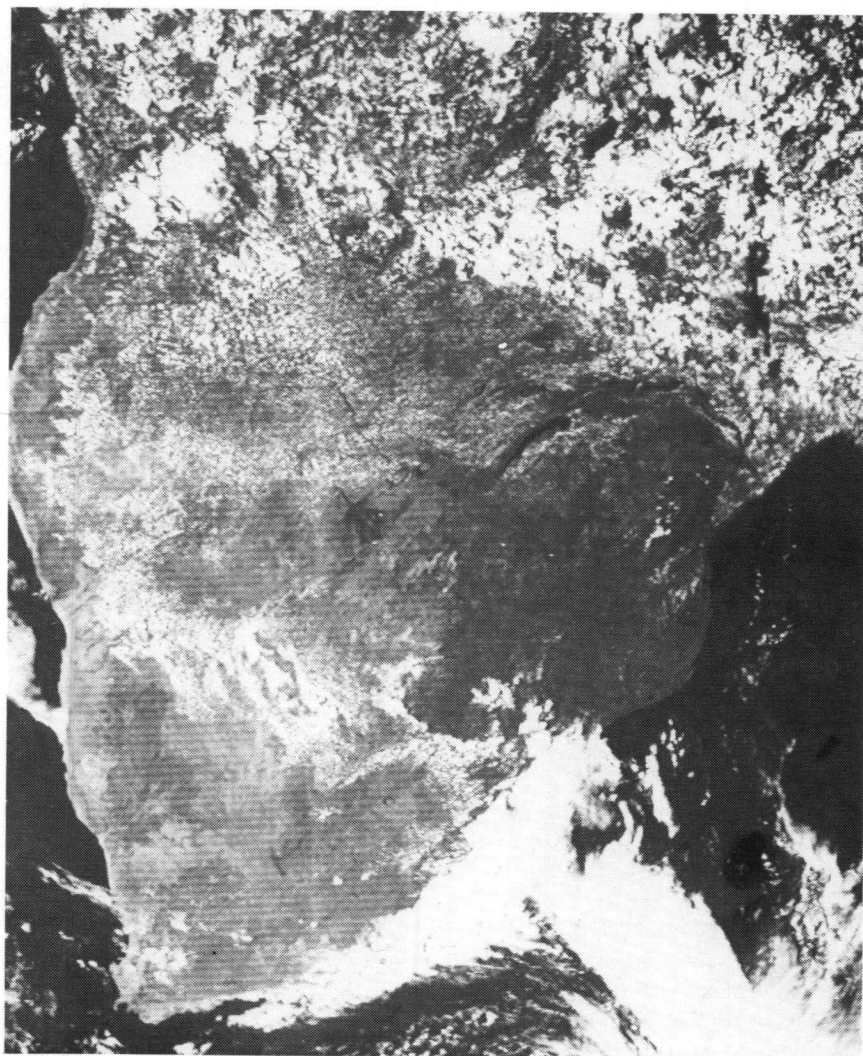
The satellite picture appearing on the front cover of Mr Adamson's report on storm rainfall in Southern Africa.

Daily rainfall totals for some 8 000 stations over South Africa and South West Africa with some additional records for Swaziland and Lesotho were made available by the South African Weather Bureau. The data tapes had been previously checked and edited, although sample ratification of the data was carried out throughout the analysis. Gaps within the records were coded and where these reached an intolerable level the station record was rejected.

Preliminary analysis of the data revealed that a record length of forty years or more would provide generous coverage for all but a few areas of South Africa whilst for South West Africa the criterion had to be reduced to twenty years.

The coverage of this report is intended to allow numerous point estimates of storm risk for any particular region or catchment. These estimates can then be analysed jointly for homogeneity and perhaps weighed or averaged at the discretion of the user. Similarly estimates of storm risk for durations shorter than one day may be made employing the procedure recommended herein and assessed through comparative plots of the results.

Finally it is hoped that these results will find use not only in the determination of design storm criteria but will further contribute to the material available for the study of the climatology of Southern Africa.



Bevorder & Verkies



Mnr DS van der Merwe is onlangs bevorder tot hoofadviseur van die Waternavorsingskommissie (WNK). Inmiddels is ook berig ontvang dat hy verkies is as president van die SA Instituut van Landbou-ingenieurs (SAILI) vir die tydperk 1983/84.

David Schalk van der Merwe is op 2 Januarie 1940 op Devon, Transvaal, gebore en ontvang sy hoërskoolopleiding aan die Hoërskool Jan van Riebeeck in Kaapstad. In 1962 behaal hy die graad B Sc (Ing) (Landbou) aan die Universiteit van Pretoria en in 1966 die M Sc (Ing) (Landbou) (met lof).

In 1963 aanvaar hy diens by die destydse Departement van Landbou-tegniese Dienste. In 1964 aanvaar hy 'n pos as lektor in die Departement Landbou-ingenieurswese aan die Universiteit van Pretoria, waar hy ook in 1968 tot senior lektor bevorder word.

In 1976 tree hy in diens van die WNK as hoof-projekontwikkelings-beampte. In 1979 word hy bevorder tot senior adviseur.

Mnr. Van der Merwe is 'n genoot van die SAILI en ook lid van die ASAE (die American Society of Agricultural Engineers), en sy stokperdjie is houtwerk.

In 1964 is hy getroud met mej Gezina Venter van Potchefstroom en drie kinders is uit die huwelik gebore.



**Institute of Water Pollution Control
(S.A. Branch)**

**Instituut vir die Bestryding van Waterbesoedeling
(Tak S.A)**

BIENNIAL CONFERENCE AND EXHIBITION TWEE-JAARLIKSE KONFERENSIE EN UITSTALLING

EAST LONDON / OOS-LONDEN 14 — 19 MAY / MEI 1983

PROPOSED PROGRAMME/VOORGESTELDE PROGRAM

PAPERS/REFERATE

Monday/Maandag

Welcome by Mayor of East London and official opening by Minister of Environment Affairs & Fisheries.

President's address.

1. *Eastern Cape Water Supplies. Dept. Environment Affairs & Fisheries.*
2. *The organic & inorganic quality of raw & treated drinking water supplies in the PWV area.*
Theron, S.J. Hassett, A.J Smith, R. & Siebert, M.L.
3. *Pilot evaluation of algae removal from drinking water by micro-screening.*
van den Broeck, J. & Cravens, J.
4. *The ground water pollution hazards in the Cape Flats.*
Tredoux, G.
5. *Water quality in the Buffalo River catchment & its reservoirs.*
Hart, Dr R.C.
6. *The control of activated sludge bulking.*
Jenkins, Prof D.

Tuesday/Dinsdag

7. *Denitrification of trickling filter effluents using external carbon sources; studies & pilot plant experiences.*
Brodisch, K. Gerber, A. & Scheepers, J.A.
8. *Continuation of work on biological phosphorus removal.*
Kerdachi, D.
9. *Operating experience with biological nutrient removal plants in Zimbabwe.*
Barnard, Dr. J.L.
10. *Tannery & Fellmongery wastewater disposal in S. Africa.*
LIRI.
11. *Water & effluent management in the fruit & vegetable processing industry.*
Squires, R.C. & Faber J.E.
12. *The effluent plant at Karbochem's synthetic rubber factory in Newcastle.*
13. *The use of ultrafiltration for the closed loop recycle & treatment of industrial effluents with chemical recovery.*
Buckley, C. Groves, G.R.
14. *Has reverse osmosis a role in trade effluent treatment?*
Abbott, J. & Cowan, J.
15. *Protein recovery from abattoir effluent.*
Scott, P.D. & Squires, R.
16. *The use of reclaimed water in the textile industry.*
Tworeck, W.C., Ross, W.R. & van Rensburg, N.J.J.

Wednesday/Woensdag

17. *An overview of the performance of waste stabilisation lagoons in the East African Highlands in relation to current design criteria.*
Meadows, B.
18. *Urban sanitation in Lesotho using low cost alternatives to conventional sewage treatment.*
Jackson, B.
19. *Use of heat treated sludge for grass land improvement.*
Vail, J. & Devey, D.G.
20. *The use of oxygen to control H₂S generation in the Benoni sewerage system.*
Forrest, R.D., Smith, J., Bredenhann, Miss S., Marais, J.P.
21. *Legislation on works & operator certification & registration.*
Barnard, Dr. J.J.

OTHER EVENTS/ANDER AKTIWITEITE

Registration commences/Registrasie begin	Sunday/Sondag 11h00-16h30
Cocktail party/Skemerklonkthaal	Sunday/Sondag 17h30
Civic reception/Burgemeesterlike ontvangs	Monday/Maandag 17h30
Banquet/Banket	Tuesday/Dinsdag 19h30
Optional post conference tour 19 May/ Na-Konferensie toer 19 Mei	Thursday Donderdag
Ladies programme/Damesprogram	Monday – Wednesday Maandag – Woensdag

EXHIBITION/UITSTALLING

An exhibition of manufacturers' equipment will be on show from Monday – Wednesday in the Windsor Bowl.

'n Uitstalling van toerusting deur verskeie vervaardigers sal vanaf Maandag tot Woensdag in die Windsor Bowl te sien wees.

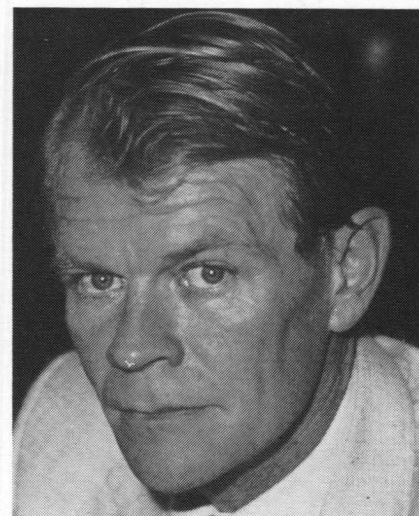
POSTER SESSIONS/PLAKKAATSESSIES

Poster sessions are to be presented in the Windsor Bowl, Monday – Wednesday. Plakkaatsessies sal in die Windsor Bowl vertoon word. Maandag – Woensdag.

FOR MORE INFORMATION/VIR MEER INLIGTING

Contact the Secretary, P.O. Box 81249, Parkhurst, 2120.
Skakel die Sekretaresse, Posbus 81249, Parkhurst, 2120.

BREDELL AAN HOOF VAN NISSV



Laat verlede jaar is aangekondig dat dr Gawie Bredell aangestel is as die nuwe direkteur van die Navorsingsinstituut vir Sitrus en Subtropiese Vrugte op Nelspruit in Oos-Transvaal. Hy volg dr Johan Grobler op wat vanaf 1 Oktober verlede jaar hoof geword het van die Republiek se Landbouraad (Tegnies) in die Verenigde Koninkryk.

Dr Bredell het die grade B Sc (Agric) en M Sc (Agric) aan die Universiteit van Pretoria behaal, en die Ph D (Grondkunde) aan die Universiteit van Kalifornië in 1966.

Bekend

Hy is 'n produktiewe navorser en skrywer van wie reeds 51 publikasies verskyn het. Hy is ook internasionaal in sitruskringe bekend en is onder meer lid van die International Society for Citriculture en voorsitter van UPOV ('n internasionale vereniging vir die beskerming van nuwe plantvariëteite) se Vrugtewerksgroep vir die tydperk 1982/84.

Nader tuis is ook onlangs aangekondig dat hy ampshalwe in die Advieskomitee van die beoogde Landboukollege Laeveld sal dien.

SA Waterbulletin dra graag op hierdie wyse ook namens sy lesers die beste wense aan dr Bredell in sy nuwe pos oor.

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 SWIMMING POOL FILTER

Poolquip Industries (Pty) Ltd which today enjoys the largest chunk of the South African domestic swimming pool filtration market, has once again turned up trumps with its new Permaflo swimming pool filter.

Representing the latest in South African swimming pool filtration technology, the Permaflo is the end product of highly sophisticated production techniques.

It boasts a simple, compact design with

two heavy gauge, semi-circular domes joined by a clamp ring.

Pressed out of superior quality, non-corrosive stainless steel and coated with attractively coloured, impact-resistant enamel, this latest addition to the Poolquip stable boasts a unique ABS plastic underdrain that is an innovation in underdrain technology.

Says Fabio Linda, Poolquip's managing director: "Unlike all other underdrains on the South African market, our new product has a sturdy, one-piece construction that makes it resistant to any possible mechanical damage. In addition it ensures an even distribution of backwash water throughout the filter bed."

Another feature is the filter's convenient, screw-on inspection port through which the sand is fed.

The multiport valve is connected directly to the tank. This, together with the reduced amount of pipework within the tank – there's only one central pipe running from the multiport valve to the underdrain – improves the flow through the filter.

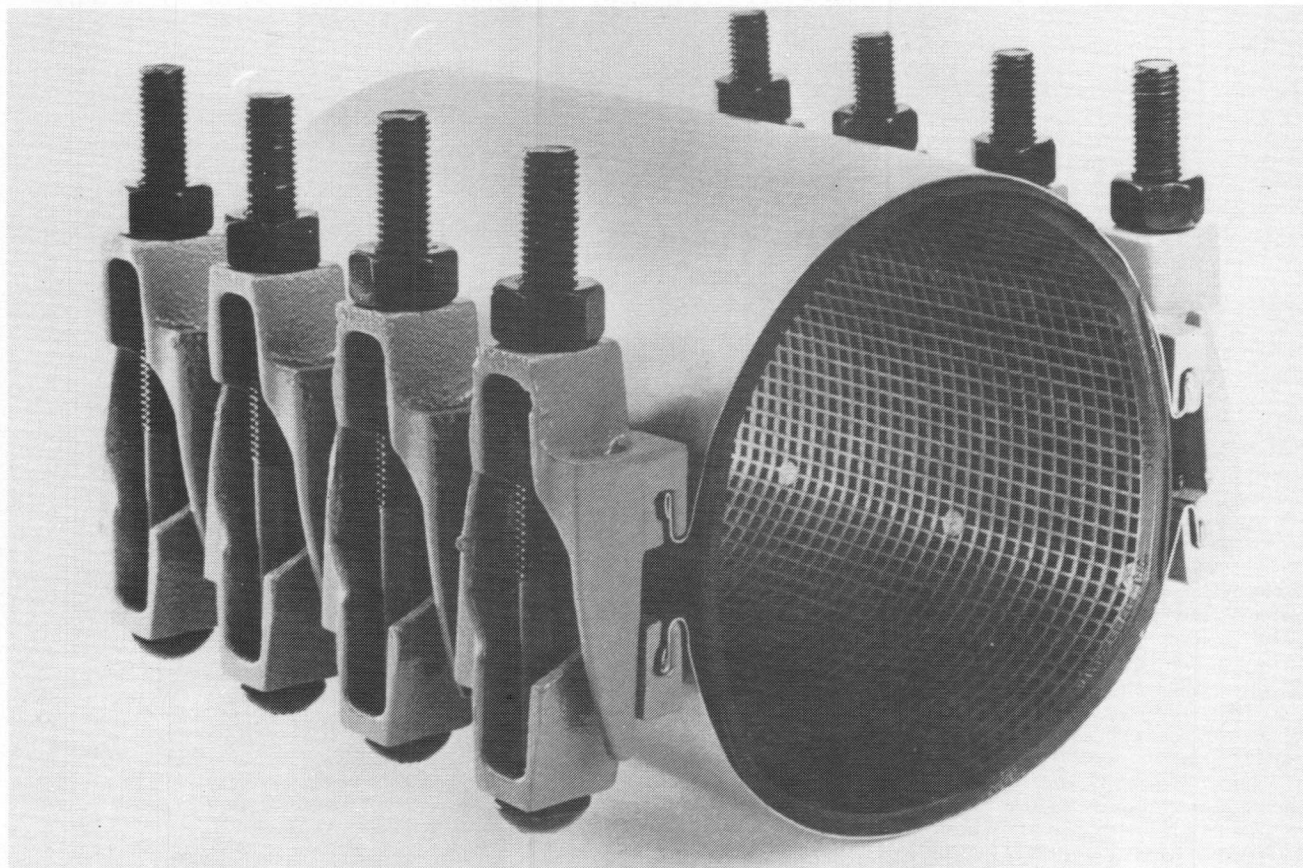
In the unlikely event that any components need replacing, they are all easily accessible by removal of the central clamp ring. In addition each unit will be factory tested and sealed prior to delivery, making for easy installation.

The new filter is available in two carefully selected sizes: the 500 and 600 Series. Ease of installation and operation make it ideal for the D-I-Y market.



Enquiries:
Poolquip Industries (Pty) Ltd
PO Box 39637
BRAMLEY 2018
Tel (011) 786-5883

CLAMPS FOR REPAIRING PIPES



E.M. Arnot (Pty) Ltd of Johannesburg is distributing a new, full range of Rockwell clamps and saddles for repairing and tapping all types and sizes of pipe — steel, cast iron, asbestos, cement or plastic.

When pin holes, cracks, holes or breaks occur in pipes, the cost of repair materials is usually less than 10% of the repair cost. This justifies the use of the highest quality product to effect the repair speedily, easily and reliably.

Rockwell repair clamps require less excavation than other pipe repair equipment. No special tools or skills are needed nor is it necessary to close down the line and possibly risk contamination.

Two types of Rockwell repair clamps are available:

- Redi-clamps provide a quick inexpensive method of repair for minor leaks not requiring a full circumferential gasket. They are available for diameters from 13 to 305 mm and in four different lengths and consist of a stainless steel band fitted with a simple design of lug. A rubber gasket is bonded inside the band and galvanised steel nuts and bolts are used to tighten the band around the pipe with the rubber gasket located over the leak. The gasket is suitable for water, gas and many chemicals and has a temperature range of up to 100°C.
- Full circle clamps can be used to join new pipes or for permanent repair to major leaks and broken pipes. They are

available in single or multiple band designs, for gas or water, from 51 mm diameter up to any size, and in 6 different lengths. While the principle is the same as for Redi-clamps, the Full Circle clamp is much more sophisticated in design and construction. It consists of a stainless steel band of the required lengths fitted with ductile iron alloy lugs which accommodate bolts and nuts to pull the band tight over the pipe. The inside of the band is bonded to a high quality rubber gasket. This is overlapping and tapered at the two ends to ensure a snug fit and leakproof seal.

A stainless steel bridge plate is bonded flush into a recess in the gasket to span the band opening between the lugs. This ensures a full circumferential seal with uniform gasket pressure and no possible leakage path.

The newly Rockwell-designed lugs are lighter, stronger and more corrosion resistant to provide easier installation and greater durability. The bolts are of a drop in, self-securing design to facilitate fitting and tightening and to eliminate loose parts that could get lost. These bolts are the same size for all clamps. Full Circle clamps are also available in all-stainless steel construction.

In addition, E.M. Arnot has Tapped Full Circle clamps for installing new service connections or repairing damaged connections, with the same design and construction features as the regular Full Circle clamp.

A Rockwell full circle repair clamp (double band) from EM Arnot.

Rockwell Service Saddles handle any size of tap or branch in any size of pipe. They are available with single or double strap, designed to provide balanced pressure around the pipe and the taper-seal gasket. The gasket fits into a tapered recess in the saddle body in a design that provides both mechanical and hydrostatic sealing which prevents any possibility of the gasket being blown out. The wide skirt of the body wraps around the pipe and prevents the saddle from rocking or creeping along the pipe which can happen when vibration or pressure changes occur.

With service saddles, the installer can lay long runs of any type of pipe and then go back later to fit branch lines wherever needed. Installation is thus speeded up and the service saddle often costs less than a conventional tee-piece.

On empty lines the hole can be cut before the saddle is installed, and on pressurised lines the pipe is tapped through the saddle after installation with standard tapping equipment.

Enquiries;
EM Arnot (Pty) Ltd
PO Box 31761
Braamfontein 2017
Tel.: 724-9414

CEMENT MORTAR PIPE LINING

The most common water pipe materials used in municipal systems up to World War One were cast iron and steel; both of which materials corrode when conveying corrosive waters, unless suitably protected.

Cement mortar has been continuously used as an anti-corrosion pipe protection material for over 150 years. One of the oldest applications known in this country, namely the Second Steenbras Pipeline from Gordons Bay to Cape Town was constructed in 1928 and is still rendering satisfactory services.

In 1934/1935 two systems of placing cement mortar linings *in situ* as a method of reconditioning corroded watermain were invented. One system was invented by an Australian W.T. Tate and proved most suitable for small bore piping and the other was invented by a Briton called Fitzpatrick and was initially only suitable for pipes of man-entry size or larger.

Tate sold his patented system throughout the English-speaking world, resulting in the establishment of specialist pipelining companies in, inter alia, the U.K. and R.S.A. in 1936.

The centrifugal cement mortar lining system (as Fitzpatrick's became known) was eventually extended by means of remote controlled pumping down to 75 mm diameters and used since 1961/1966 for all pipelines cement mortar lined in-situ in this country.

New piping is generally spun-lined either at the factory where the piping is fabricated or on site if the job is large enough and for potential damage to the lining in transit to be avoided.

The centrifugal cement mortar lining systems also lend itself to the placing of cement mortar linings in-situ in new very big bore piping or even for small bore all-welded pipelines thus reducing the joint reinstatement problem by 90% or more.

The principal attraction of cement mortar as a pipelining material is the fact that it passivates steel or iron in the contact zone due to the highly alkaline environment created and minor defects such as pin holes, shrinkage or strain cracks are sealed within weeks of immersion by the process of autogenous healing.

Furthermore the successful application of a cement mortar lining does not depend on a perfectly clean metal surface and the substantial thickness of the lining makes it capable of bridging sizeable local defects in the pipewalls – caused, for example, by external corrosion.

This cement mortar lining system has been used by almost every city and town in this country and one contract for reconditioning watermain in-situ and another for reconditioning salvaged piping has been awarded by our Capital City, Pretoria for commencement in January 1983.

Cement mortar has even been used successfully for reconditioning oil pipelines, some of which suffered only external corrosion.



The steel pipeline on the left has recently been reconditioned by cement mortar lining in situ.

In many pipelines, e.g. sewers, the fluid conveyed may be corrosive to ordinary Portland Cement in which instance acid-resistant cement such as High Alumina has proven successful.

Tate (R.S.A.) have now, however, extended their pipelining services to incorporate a unique patented system known as IN-SITUFORM with which a reinforced, resin-

impregnated lining is placed by means of an inversion process in piping in-situ; more of which will be dealt with in a later bulletin.

Enquiries:

Tate Associated Pipe (Pty) Ltd
PO Box 227
Eppindurst 7475
Tel (021) 54-4251

POLLUTION CONTROL

Murray & Roberts Engineering (Tvl) has been awarded two contracts by ESCOM for the establishment of water pollution control systems at the power station at Komati, near Middelburg in the Transvaal, and at the Highveld and Taaibos power stations near Sasolburg. The work at the Highveld and Taaibos stations, although comprising two separate projects, form part of one contract.

"The objective of the two ESCOM contracts is to prevent pollution of the natural water supplies by chemical waste products produced by the plants. At the completion of the contracts all waste matters will be diverted to a central point," explained a spokesman for M & R Engineering.

Work on the Komati power station, a tendered contract with a value of R2,5 million, has recently commenced and completion of the project – which has a 12 month contract period – is scheduled for June 1983.

Work on the contract involves the installation of stormwater drains and accompanying civils work, stream diversion earthworks and the construction of a 120m² capacity effluent dam and the installation of pumping and oil skimmer equipment. The contract also involves the installation of pipe work from the effluent dam into the power sta-

tion system and the installation of an ash water return pipe line.

The contract also involves in-plant work comprising the installation of carbonation and re-carbonation sections. This includes the installation of mechanical equipment and steel and polypropylene piping, and the construction of two sub-stations. Consulting engineers for the project are Cohen, Bahr, Lindsell & Partners Inc.

The second contract awarded to M&R Engineering (Tvl) by ESCOM involves the installation of water pollution control systems at the Highveld and Taaibos power stations near Sasolburg, with the two projects having a combined total value of R1,7 million.

The nine month contract is scheduled for completion in March 1983 and the work involves construction of canals and a pump station and the installation of pumping and oil skimmer equipment.

Consulting engineers are Watermeyer, Legge, Piesold and Uhlmann.

Enquiries:

PRO
Murray & Roberts Ltd
PO Box 1000
BEDFORDVIEW 2008
Tel (011) 53-9450

Today every means must be exploited for making the best use of the available energy, and this includes recovering energy from processes. As a result of the oil crisis of 1974 the penalties for poor efficiency in turbo machines have risen 15% on the average. Since energy costs have increased faster than the cost of machines, interest in energy recovery equipment is bound to grow in the future. Now in processes where a fluid flow has to be throttled, the conventional valve may be replaced by a turbine. In this way, useful energy can be recovered in addition to the throttling action.

Any centrifugal pump may be used as a turbine in principle. Running in reverse, the pump reaches almost the same efficiency at its best turbinizing point as in the pumping mode. Depending on specific speed and flow rate, efficiencies up to 90% are attained.

Standard pumps offer the following advantages for energy recovery:

- Wide, closely graded performance range
- Low first cost (standard products)
- Low runaway speed
- Lower absolute flow velocity (compared with Pelton turbine)
- Similar machines for generating pressure and recovery (fewer spare parts need be stocked)

For flow regulation over a wider range the Pelton turbine (jet controlled by the nozzle) or the Francis turbine (with adjustable diffuser vanes) offers substantial advantages. However this is not true of Pelton turbines working with higher back pressure. Here the windage losses may become so high that the efficiency drops below that of a standard pump running in reverse.

ENERGY RECOVERY

Applications

- Chemical processes (gas scrubbing plants, ammonia synthesis, coal liquification and gasification).
- Petrochemical processes (gas scrubbing plants, Benfield, Vetricoke, MEA, Selexol and Sulfinol processes, hydrocracking plants).
- Reverse osmosis
- Cooling water recycling (dry cooling towers, platforms, driving cooling tower fans).
- Mine cooling
- Oil supply systems (exploiting the difference between control and lubricating oil pressures).

- Back pressure in pipeline systems (to avoid vacuum).
- By using the heads of small streams.

For the recovery of energy, Sulzer Escher Wyss, represented by Sulzer Bros (South Africa) Ltd of Johannesburg, supply both turbines and reverse-running pumps.

Enquiries.

Sulzer Bros (South Africa) Ltd
PO Box 930
JOHANNESBURG 2000
Tel (011) 618-4125

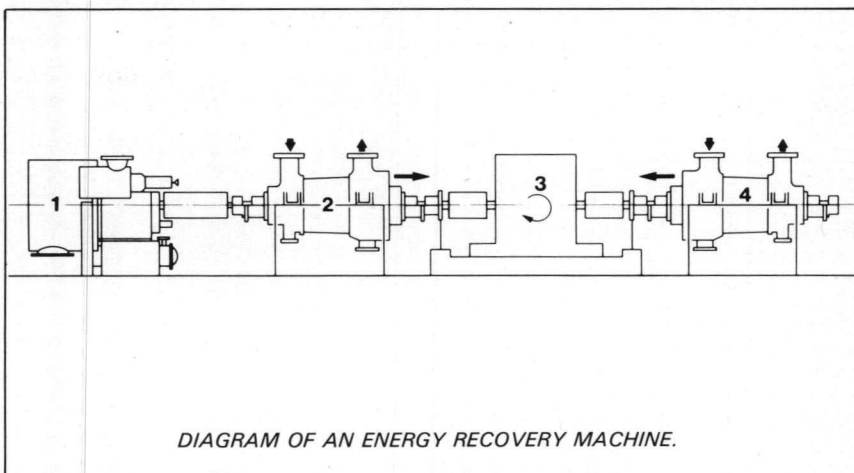


DIAGRAM OF AN ENERGY RECOVERY MACHINE.

TRACE ELEMENT ANALYSER

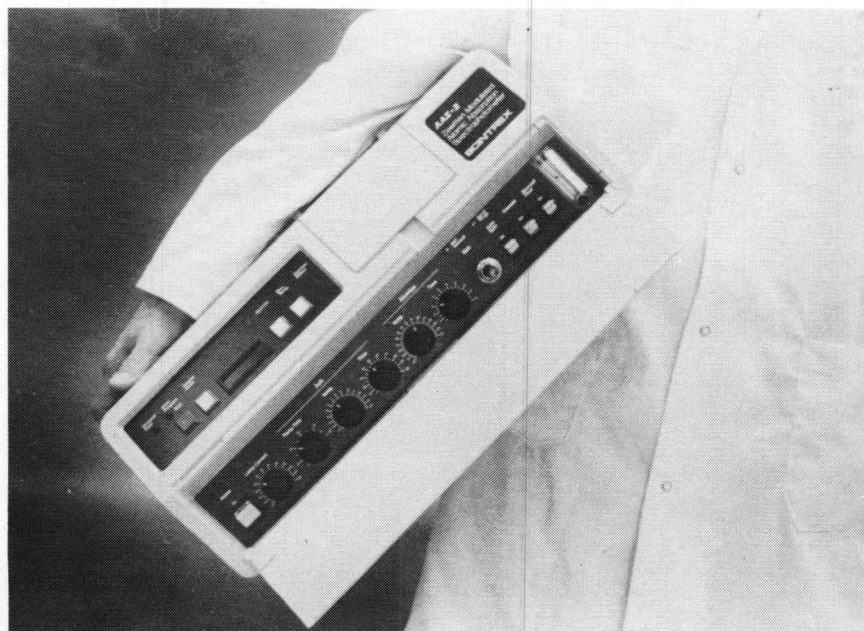
Lower capital and operating costs, coupled with complete mobility are offered by Scintrex for a new portable analyser, known as the Scintrex AAZ-2. This is the first trace

element analyser equally at home in the field or laboratory, capable of producing first order analytical results even when space and power are at a premium.

With a minimum detectable concentration limit commonly less than 1ppb (g/ml) for many elements, the AAZ-2 is as sensitive as any flameless AA spectrophotometer. Its modulated Zeeman technique corrects for background absorption much better than deuterium lamp methods.

If necessary, the analyser can be hooked in directly to a microprocessor for analysis of absorptivity-time curve, etc and process, store, and present data. The instrument weighs only 26 kg, and is about the same size as an office typewriter. It consumes only 15% of the electrical energy, and 50% of the argon required by most flameless AA units, built-in voltage regulation ensures that results are unaffected by line voltage fluctuations, and gas cooling eliminates the need for water and plumbing.

The tungsten filament atomiser offers the same advantages as a graphite furnace over that of a flame. Replacement of filaments, depending on use, is every 600 firings. Filaments are inexpensive and easily changed.



Enquiries:

Consultek (Pty) Ltd
PO Box 50609
Randburg 2125
Tel (011) 789-1002

Water Control:

NEW INSTRUMENTS AVAILABLE

Ideal investments are Signet Scientific's MK 810 Conductivity and MK 820 Resistivity Controllers available from Liquid Metronics (Pty) Ltd. These accurate and economical microprocessor-based instruments are designed to measure, control, and record water quality in a wide range of industrial and commercial applications.

The MK 810 measures a wide band of contaminants and ionic concentration in aqueous solutions. The MK 820 is designed to measure ionic concentration in the higher purity range of the conductivity/resistivity spectrum (a typical Mk 820 span would be from a point slightly more conductive than Natural Water up to and including Ultra-Pure Water).

The Mk 810's built-in microprocessor combines operational simplicity, with precision measurement circuitry. Measurement functions are presented on a large, 3-digit LCD display in one of three broad scale ranges that are easily accessed through pressure sensitive front panel switches. These measurement ranges include 0-250, 0-2500 and 0-25000 micromhos/cm.

Precision temperature readings are ensured by the unit's micro-processor which contains the exact temperature curve to normalize readings for a specific conductivity. A "Temperature Coefficient" switch on the unit's front panel is used to adjust the temperature curve for solutions other than water. Temperature readings are presented on the unit's clear viewing LCD display. The microprocessor controlled "sensor diagnostic mode" further ensures accurate measurements by alerting the operator to a possible sensor malfunction.

The MK 810 utilizes adjustable high and low set points in the alarm circuit for greater flexibility. Alarm relays can be connected to external circuitry for audible alarms or process control. In addition, a unique "acknowledge" switch allows the relays to

be disengaged during an alarm condition, while corrective action is taken. A 4-20 mA current output is also available to drive a recorder or other equipment.

The compact size and square case styling of the Mk 810 make it easy to position in a panel layout. The unit's front panel is

completely waterproof while an optional waterproof back cover is also available for "stand alone" installations. The case is moulded of durable plastic.

For added reliability, an external battery can be connected to the MK 810 to ensure that the microprocessor memory will not be erased if there is a loss of electrical power. Because the microprocessor features fewer internal components, it requires minimal maintenance.

The MK 820 Resistivity Controller offers all the high performance features of the MK 810 in addition to two unique resistivity functions.

The MK 820 provides accurate resistivity measurements in three independent scale ranges, including: 0-.250, 0-2.50 and 0-25.0 Megohms-cm. These ranges are touch switch selectable and are presented on the unit's LCD display.

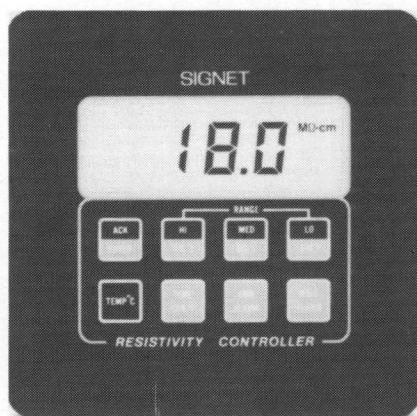
In addition, this unique Resistivity Controller provides the ultimate in precision temperature readings. An exact temperature curve is pre-programmed into the unit's microprocessor memory - for accurate and automatic temperature compensation. A "Temperature Coefficient" switch on the front panel provides access to direct display of the temperature coefficient. The temperature curve is based on the resistivity versus the temperature for water.

New also on the market is Signet's ingenious range of patented paddlewheel flow sensors to be marketed by Liquid Metronics (Pty) Ltd. Constituting the heart of the flow system these flow sensors are an inexpensive yet exceptionally reliable vehicle for flow measurement.

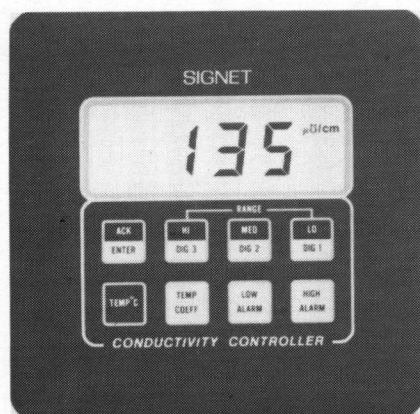
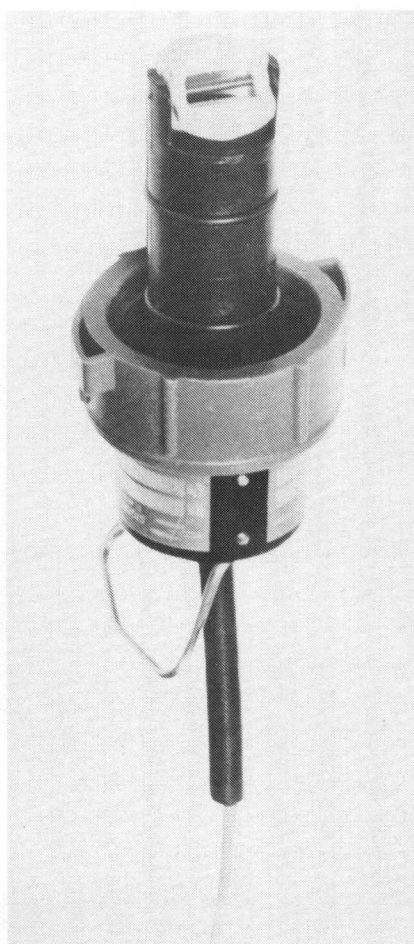
They are highly versatile. Not only can they meet virtually any flow requirement from complex batching and mixing to simple flow monitoring, but in addition can be used with a variety of pipe sizes and a wide range of liquids.

Featuring a unique open-cell that provides a repeatable, linear output over the range, the Signet flow sensors are designed for use with the Signet range of flow instrumentation.

As the flow of liquid moves past the flow sensor it rotates the paddlewheel. This moves the magnets encapsulated in the vanes past a coil in the transducer body. An AC voltage is induced in the coil, the frequency and amplitude of the coil's output being directly proportional to the velocity of the fluid flow in the pipe. This signal is then fed to the indicator to display actual flows.



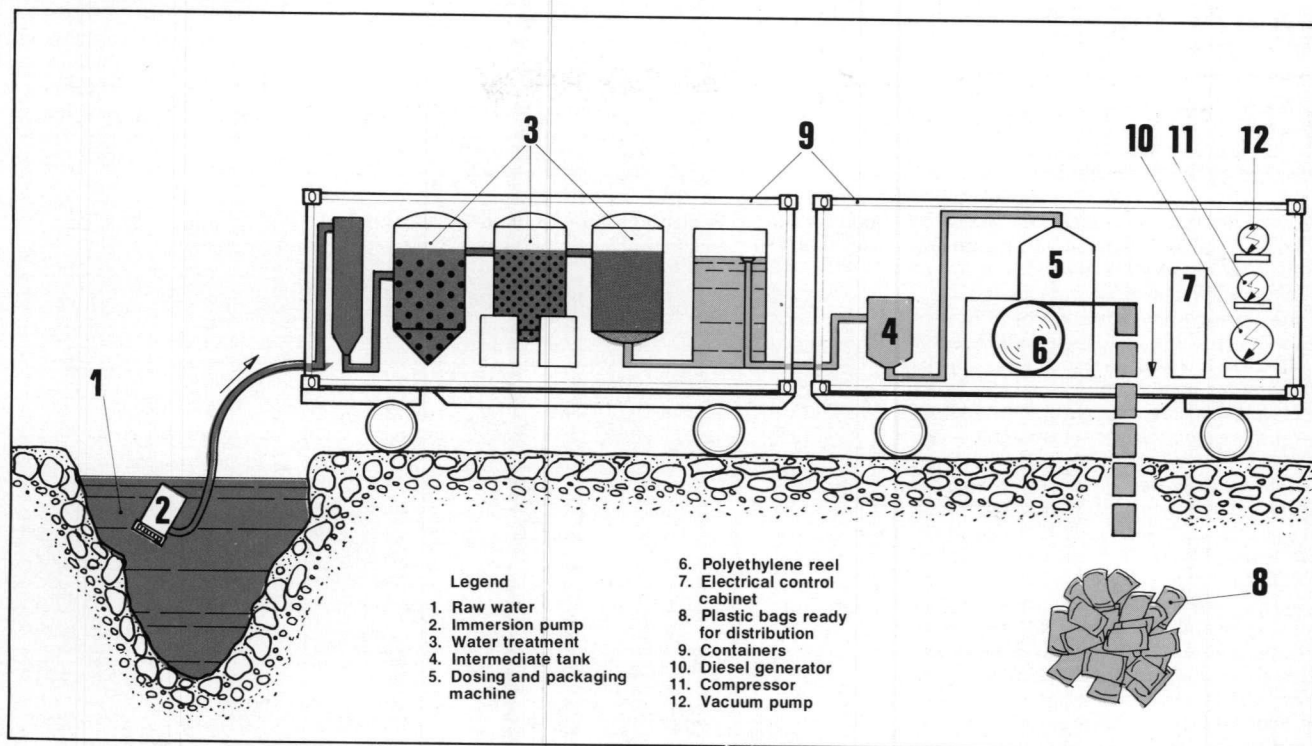
(Above) This resistivity controller inter alia measures, records and controls water quality. (Below) A paddlewheel flow sensor for flow measurements.



(Above) A MK810 conductivity controller used in a wide range of industrial and commercial applications to control water quality.

EQUIPMENT

Enquiries:
Liquid Metronics (Pty) Ltd
PO Box 388
Rivonia 2128
Tel (011) 609-2154



MOBILE WATER PURIFICATION

"WATERLINE" have created a new concept, which revolutionises the provision of drinking water in emergency situations.

The WATERLINE Systems offer a guaranteed supply of safe, pleasant tasting, potable water, combined with mobility and ease of transportation to the area in which it is to be used.

They are indispensable in cases of:

- Natural catastrophe, disasters, earthquakes, floods, drought, epidemics, etc., etc
- In case of breakdown or during repair of a drinking water distribution network
- For enterprises on work-sites where no drinking water is available
- For troop movements and field hospitals

If, for geographical or other reasons it is impossible to take the plant to the site – then water which is supplied packaged by the unit, in sterilized polythene bags, can be delivered by whatever transport is available.

The plastic bags which might seem fragile are in fact extremely robust, and their impact strength level is much superior to the more traditional liquid containers.

The drinking water in plastic bags can be stored for 5 years without detriment to its quality, if protected from the sun. Furthermore, – WATERLINE is not limited to the purification and packaging of drinking water. It also produces and packages reconstituted milk, from milk powder and purified water.

Various countries already use mobile water purification plants for emergency relief. It is however, evident, that having drinking water, but not being able to distribute it, is of little value. WATERLINE have filled that gap. The mobile transportable installations incorporate a Diesel-Electric Unit, which generates its own electricity for the equipment, and also for lighting and heating.

These electrical units are made for continuous performance and have a reserve margin of 30% at full load.

The construction programme is mainly based on 3 types of plant, of which two are transportable and one is mobile:

Fresh water: 410-450/m (transportable);
Sea water: 510-550/m (transportable);
WL: 910-950/m (mobile).

Each type of plant is followed by the letter "M" which means "MILK". It represents the optional equipment which may be incorporated with the plant, in order to produce reconstituted milk.

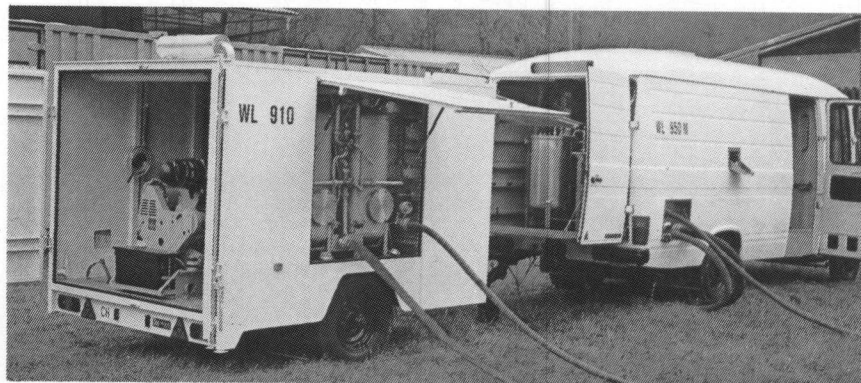
Technical information:

Erecting time . . . 2 hours; Continuous performance . . . 24 hours a day; max. daily output . . . water-milk: 75000 bags of 1 litre; Diesel oil consumption for generator . . . 5,5 litres per hour; Transportable . . . by truck, trailer, train or ship; External measurement per container . . . length: 6,055 x 2,435 x H2,600 m; Gross weight per container . . . 7000kg; Total weight . . . 14000 kg.

WATERLINE Systems have been used by members of the League of Red Cross Societies in Europe after major earthquakes since 1976 to ensure a supply of unpolluted drinking water where reservoirs and reticulation systems have been destroyed.

Realising the absolute necessity for such plant, – many Arab States and under developed countries have purchased one or more units.

Angola alone, has three plants in operation, continuously.



Enquiries:
Technocentre (Pty) Ltd
PO Box 28221
KENSINGTON 2101
Tel (011) 614-7041

WATER FILTERS

Filtrasep (Pty) Ltd, a subsidiary of the quoted company Sinclair Holding Ltd, recently extended its range with the introduction of package water and effluent treatment equipment. Designed to meet the most stringent requirements, this addition has added a new dimension to Filtrasep's exciting range of filtration equipment.

The pièce de résistance of the range is its extensive selection of pressure leaf filters including horizontal tank/vertical leaf filters, vertical tanks, vertical tanks/horizontal leaf filters and the more specialised tilting filters. The latter have the unique advantage of being able to filter with the leaves in the horizontal position. In addition, effective and efficient cake washing is possible together with recovery and filtering of the liquid heel.

Sand and anthracite (dual media) filters have also come to occupy a prominent position in the Filtrasep stable. One of their major applications is industrial water cooling filtration where they control the suspended solids levels in the recirculating water.

Filtrasep's liquid bag filters although also ideal for specialised recirculating water cooling filtration, can be used in product filtration, recovery of solids and catalyst filtration and polish filtration.

Other troubleshooters which are marketed by Filtrasep and which have come to be relied on by industry is the Filtertech range of vacuum and gravity belt filters. Together with its extensive range of oil recovery equipment, they provide a most interesting solution to many of the problems encountered in the bulk use of industrial coolants. The Wickham Pressure Belt filters, on the other hand, has proved to be an ideal solution for the dewatering of various sludges such as sewerage and cool washing.

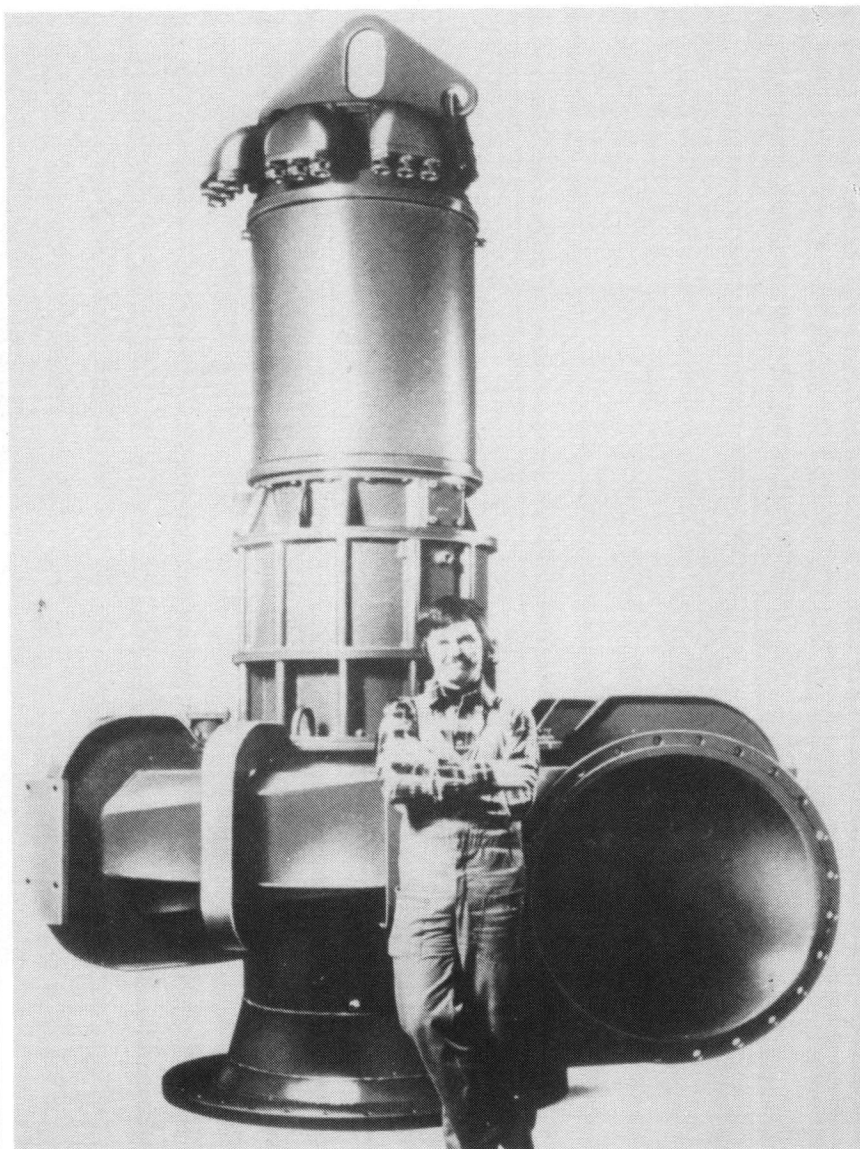
Another important service rendered by Filtrasep is the fabrication and reconditioning of filter leaves in a wide variety of shapes, sizes and materials.

Filtrasep has also established an electronic division which produces a wide range of instrumentation and control systems. Typical are the automatic pH and conductivity control systems designed locally and manufactured for applications like industrial cooling systems, effluent control and water processing as well as fully automatic control systems for filtration and water treatment.

Two major benefits offered by Filtrasep to the South African filtration market include an on-going research and development programme as well as a laboratory service in which filtration problems can be evaluated.

Enquiries:
Filtrasep (Pty) Ltd
PO Box 388
RIVONIA 2128
Tel (011) 609-2154

EQUIPMENT



LARGEST PUMPS

It all started in a small southern Swedish town called Lindsås, the home of Flygt who, during 1981, reported a turnover of over 250 million dollars, making them the leading manufacturer of heavy duty submersible pumps.

Flygt have now developed what is claimed to be the biggest submersible pump in the world. Designated the CT3900, it measures 2965 x 2270 x 3470 mm, and weighs 8500 kgs. Power is provided by a 425 kW, 380 V 60-pole motor with a gearbox giving an impeller speed of 370 rpm. The optimum operating point is 2500l/sec

at 15 m. Pump efficiency is quoted as 83%, and total efficiency 75%.

The first four pumps will be delivered to Yugoslavia in January 1983 for a storm-water installation, and several engineers in both the mining and municipal sectors in South Africa have shown great interest in this latest Flygt development.

Enquiries:
Hugh Mellor & Co Ltd
PO Box 700
EDENVALE 1610

LINING OF DAMS

EMPRO (CAPE) (PTY) LIMITED (formerly Emailit Prodorite) has been awarded the contract to line approximately 44 000 m² of earth dams for Sappi Limited at their Ngodwana Mill Expansion near Nelspruit in the Eastern Transvaal. The contract is worth approximately R500 000,00.

The dams are for collecting purified effluent arising from the Mill, prior to its disposal by irrigating pasture land with it

under carefully controlled conditions, and will ensure that there is no risk of pollution to the Elands River.

"The type of lining put forward by EMPRO is 100% safe," said Mr. Abe Chalef, EMPRO (Cape)'s Marketing Manager. EMPRO provides Schlegel Lining Technology through a know-how agreement with the European firm of that name. The dams will be lined with 2,5 mm HDPE sheeting. This will be applied in widths of 10,2 m and lengths of at least 150 m and joined by the extrusion welding method. The use of such large

sheets effectively reduces the number of welds required, which further increases the safety of the product. The weld system provides a "true weld", and does not rely on glues or mechanical fastening. The sheet is resistant to UV, rodent and termite attack, root penetration and hail. "Site weld samples have been independently tested for Sappi and proved to be totally dependable," said Mr. Chalef.

The conditions at the dam will be harsh, as the liner will be subject to intensive sunshine and periodic effluent load. However,

due to the thickness, composition and the method of manufacture, coupled with the know-how of EMPRO, the liner will provide decades of environmental protection.

Enquiries:

PRO

Empro (Cape) (Pty) Ltd

PO Box 4854

CAPE TOWN 8000

Tel (021) 21-6500

WATER DATA ACQUISITION

The most important aspect of water research, quality control etc., is reliable acquisition of DATA. For this purpose apparatus with the following features are required: Minimum moving parts; robustness; preferably no paper or magnetic tape loggers; long recording time in field conditions; data extraction and processing must be fast and preferably directly in a main frame or desk top computer; and easy to use by unskilled personnel.

The LEKTRATEK range of hydrological equipment offers the following: All equipment completely solid state. Moving parts are limited to a few pulleys and axles; robust cast aluminium or mild steel casings; Two types of data loggers are available: one with built-in solid state memory block and one with removable memory block fitted on the outside of the logger; Recording time on various types ranges from 21 days to two months; data extraction typically one minute for 21 days' data if not printed out; loggers with built-in memory developed for use by unskilled personnel.

Other unique features of the LEKTRATEK equipment are: Probe assembly: Contains vital electronics to convert measuring signal into a pulse frequency. This conversion minimises; noise, loss factor, distortion, ground loops. The 3 core cable between the probe and data logger can be up to 100 meters long.

Interfacing to the data logger: All signals are optically coupled to minimize the effect of: Static discharge (lightning); and bad electrical connections.

Data logger: Data is stored in a solid state memory block; no moving parts; insensitive to dust and high humidity; robust and easy to handle.

All the apparatus listed below have been tested over a period of time and are in use at various institutions where they were found accurate and reliable.

The range of equipment includes:
RV 824 Water level recorder (complete) R908,00
RG 812 Conductivity and temperature meter (complete) R2278,00
RT 812 Turbidity meter (complete) R6858,00
TP 8206 Tipping Bucket Precipitation Recorder (with pedestal) R1518,00
SK 8101 Sediment Concentration Meter (complete) R6210,00.
GST and transport excluded. Designed and manufactured in South Africa.

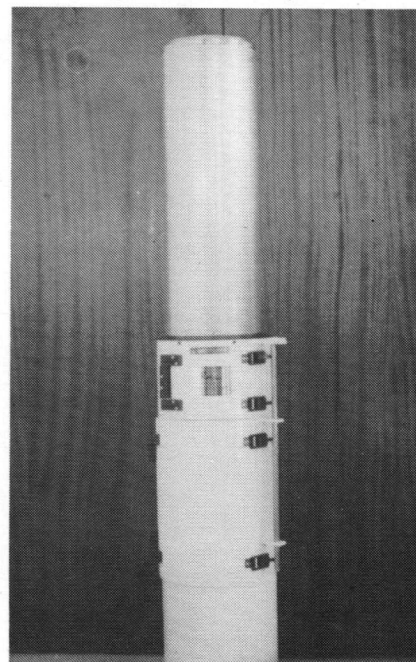
Enquiries:

Retnic (Pty) Ltd

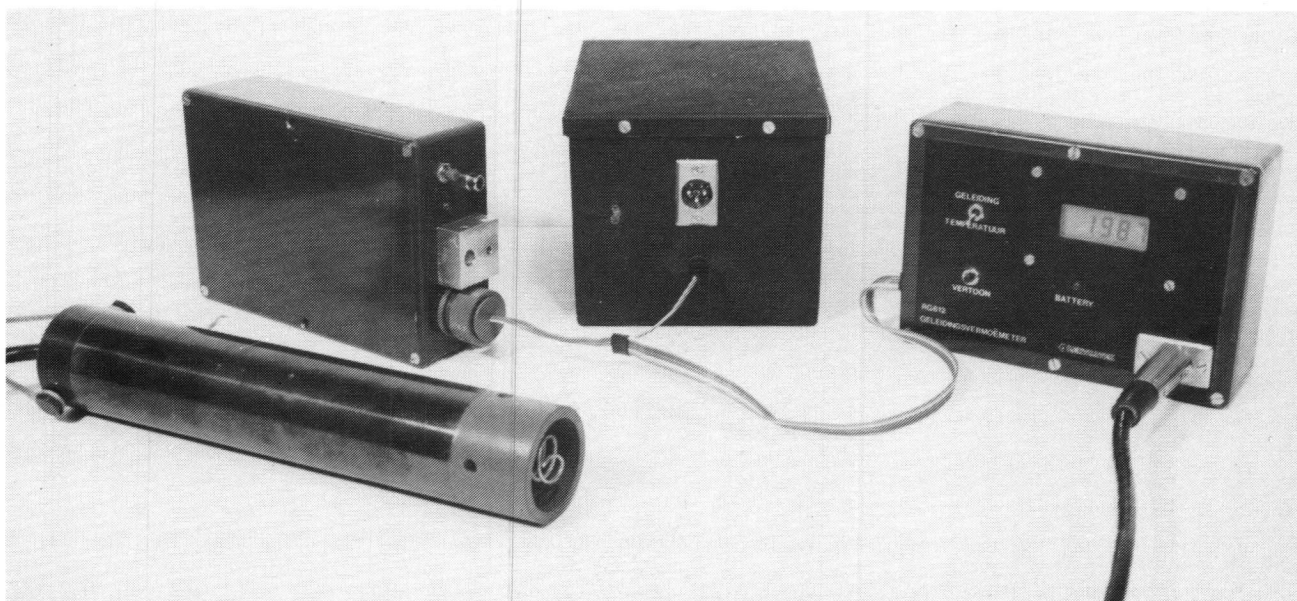
PO Box 1454

Potchefstroom 2520

Tel (01481) 7308



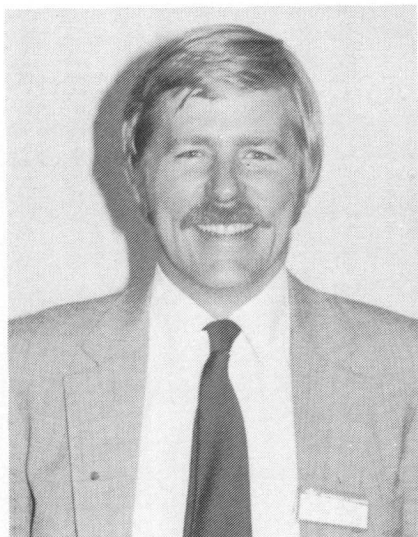
The tipping bucket precipitation recorder complete with pedestal containing the data logger, battery and water bottle.



The conductivity and temperature meter, complete with probe, logger, battery and read-out.

Water quality:

COURSE ON MONITORING NETWORKS



Prof Thomas G Sanders, director of the course, who was Visiting Fellow at Wits University until recently.

A short course (June 13-17, 1983) on the *Design of Water Quality Monitoring Networks* will be held at Colorado State University in the USA and will develop, in detail, a systematic procedure for designing a water quality monitoring network with the objectives of determining ambient water quality and assessing trends. This year the short course is placing greater emphasis on groundwater monitoring, automatic sampling and analysis procedures than the previous courses given in the United States in 1979, 1980 and 1981.

The new monitoring requirements specified in the Resource Conservation and Recovery Act (RCRA) will be summarized and discussed, emphasizing application of the regulations. The network

design is developed by delineating the water quality variables to be observed and establishing the criteria used to determine sampling station location, sampling frequency and data analyses in such a manner that representative and quantitative data are obtained.

The short course is directed to persons actively involved with the design, operation and/or management of a water quality monitoring network for both surface and subsurface monitoring. It assumes that attendees have little or no background in statistics. For additional information, please contact: Thomas G. Sanders, Program Leader, Environmental Engineering, Department of Civil Engineering, Colorado State University, Fort Collins, Colorado 80523.

Rynbesoedeling:

Kaliummyne weer in kalklig

Die nuwe Nederlandse regering het onlangs bekend gemaak dat hy weer met Frankryk wil onderhandel oor 'n oplossing vir die Rynbesoedelingsprobleem. Volgens *Europe Environment* kom die aankondiging te midde van bewerings deur twee lede van die Nederlandse parlement dat die geld wat Nederland in 1976 aan Frankryk oorbetal het vir die skoonmaak van die Ryn deur die Elsassiese kaliummyne aan ander projekte gespandeer is.

In 'n toespraak in die Nederlandse parlement het die Eerste Minister van Nederland, mnr Ruud Lubbers, gesê dat as die besoedelingsprobleem langer geïgnoreer word dit ernstige gevolge vir Nederland se waterbronne sal hê. Die besoedeling van die Ryn wat grotendeels veroorsaak word deur Franse nywerhede wat besoedelstowwe en soute in die rivier stort, is onaanvaarbaar en die tyd het aangebreek om ooreenkomste aan te gaan én uit te voer, het die Minister gesê.

Die besoedeling bedreig tans drinkwatervoorrade uit die Ryn en ooste op plase in die suidweste van Holland.

Intussen het die direksie van die die Elsassiese kaliummyngroep ten sterkste die bewerings van die twee Nederlandse parlamentslede ontken dat hulle enige geld uit Nederland vir nuwe mynbou-ontwikkelingsprojekte gebruik het. Nederland het in 1976 na die Bonnkonvensie oor die suiwering van die Ryn 48-miljoen Franse frank aan Frankryk gegee. Die Franse moes die geld gebruik het om die besoedelende soute in die Elsasgebied onder die grond weg te pomp eerder as om dit in die Ryn te stort.

Die direksie van die myne sê in 'n verklaring dat die betrokke fondse onder 'n aparte afdeling in die maatskappy se boeke geplaas is en gevolglik nie as deel van die groep se bedryfsuitgawes aangewend kon word nie.

Deskundiges wat die Franse Minister van Omgewingsake, mnr

M Crépeau, aangestel het om die uitwerking van die soute op die Elsassies ondergrond te ondersoek, het intussen ook aanbeveel dat dié ondersoek voortgesit word.

Verslag

Volgens hulle verslag is meer inligting nodig, veral oor die Chalampe-gebied in die Bo-Ryn om te bepaal waar die beste plek is om van die 25-miljoen kubieke meter sout (700 000 ton per jaar vir tien jaar) van die Elsassiese kaliummyne ontslae te raak.

Die deskundiges meen dat die sout wat nagenoeg 2 000 meter onder die grondoppervlakte ingepomp sal word, geen gevaar vir grondwaterbronne inhou nie, mits die nodige voorsorgmaatreëls getref word.

Die Internasionale Komitee oor die Ryn sal eersdaags die verslag bespreek en daar is aanduidings dat Frankryk dit mag oorweeg om die Bonn-konvensie te bekragtig wat daarop gemik is om soutstortings in die rivier te verminder.

Briewe/Letters

HARDE WATER EN HARTSIEKTES

Geagte redakteur — Ek verwys na u kort berig in die Novemberuitgawe van *SA Waterbulletin* waarin u op bladsy 33 rapporteer dat die Nederlanders nie 'n verwantskap tussen die hardheid van water en hartsiektes kon vasstel nie. Dit is 'n baie interessante aspek van watergehalte en ek wil graag die volgende toeligting oor dié aspek verskaf:

Die moontlike verwantskap tussen die hardheid van 'n water en die voorkoms van hartsiektes in die bevolking word vir die eerste keer deur 'n Japanner met die naam van Kobayashi in 1957 onder die aandag gebring. Die waarneming is gou opgevolg deur ander werkers en 'n hele paar referate oor dié aspek het reeds verskyn, waarvan die een wat deur u aangehaal is, maar nog net een is.

Ongelukkig is dit so dat daar nie 'n klinkklare bewys is of die verwantskap geldig is al dan nie, en word daar dus heelwat verwarring geskep. Die feite lyk tans as volg:

- Daar is 'n verwantskap tussen die hardheid van water en die voorkoms van hartsiektes in die gemeenskap.
- Die verwantskap is negatief — hoe harder die water hoe laer die voorkoms van hartsiektes.
- Die probleem oor die geldigheid van die verwantskap sentreer om die definisie van die hardheid van die water. Normaalweg word die hardheid van die water in terme van CaCO_3 uitgedruk en daar is verskeie definisies vir die hardheid van 'n water. Die verwantskap wat deur byvoorbeeld Shaper in Engeland gevind is, was in gebiede waar die water 'n hardheid van ongeveer 25 mg CaCO_3/l gehad het en waar die sterfte aan hartsiektes ongeveer 10 tot 15% hoër was as in gebiede waar die hardheid ongeveer 200 mg CaCO_3/l was.

Zoeteman rapporteer in 1981 dat aangesien daar min gebiede in

die Nederlande is waar die water so sag is dit geen wonder is dat die Nederlanders nie die verwantskap sien nie. Gedurende 1981 rapporteer Zielhuis van die Nederlande dat daar tog 'n verband is, maar dat die verband baie obskuur is en dat sulke epidemiologiese ondersoeke bemoeilik word deur 'n aantal ander faktore. Hy meld dan ook dat daar binne afsienbare tyd 'n verslag oor die saak aan hulle Minister van Gesondheid voorgelê sou word.

Maar is dit die finale woord oor die saak? Ek glo van nee, want gedurende November 1981 publiseer die Water Research Centre in Engeland hulle bevindings waarin hulle die vorige bevindings van Crawford, Gardner en Morris in 1971 weer hersien het in die lig van die jongste kennis en waarin hulle tot die slotsom kom dat die oorspronklike bevindings nog geldig is.

Dit is egter opvallend dat die verwantskap tussen die hardheid van die water en die mens tot die manlike geslag beperk is. Die afname in die voorkoms van hartsiektes onder die mans beloop ongeveer 8% per 100 mg/l hardheid in die gebied tot 170 mg/l.

Die laaste woord is dus nog nie gespreek nie — ons moet ook maar versigtig wees met die gehalte van die water wat gebruik word om sekere alkoholiese drankte te verdun!

PIANOFORTE

(Dankie vir die toeligting — ons sal in die toekoms meer *andante* loop met hierdie onderwerp! — Red).

LSSA

The '83 conference of the Limnological Society of Southern Africa will be held from 3 to 10 July 1983 at the University of Natal, Durban.

Enquiries: Colin Archibald (Registration officer), Natal Regional Laboratory, PO Box 17001, Congella 4013.

CONFERENCES

(From page 32)

RIVER BASIN

The 3rd IAWPRC river basin conference will be held from 4 to 7 July 1983 in York, UK.

Enquiries: DH Newsome, 7th Floor, Reading Bridge House, Reading, Berks RG1 8Ps, England.

AEROBIC DIGESTION

The 3rd International Symposium on Aerobic Digestion (organised by IAWPRC) will be held from 14 to 20 August 1983 in Boston, Massachusetts, USA.

Enquiries: RL Wentworth, Dynatech R/D co, 99 Erie St, Cambridge, Massachusetts 02139, USA.

RAINFALL, RUNOFF

A specialised IAWPRC seminar on rainfall and urban runoff design and analysis (delegates limited to 60) will be held from 24 to 26 August 1983 in Copenhagen, Denmark.

Enquiries: Prof Poul Harremoës, Building 115C, Technical University of Denmark, DK-2800 Lyngby, Denmark.

GROUND WATER

An international symposium on underground water in water resource planning will be held from 28 August to 3 September 1983 in Coblenz, West Germany.

Enquiries: IHP/OHP Secretariat, c/o Bundesanstalt für Gewässerkunde, Postfach 309, D-5400 Coblenz, West Germany.

HYDROLOGY

The first National Hydrological Symposium will be held from 8 to 9 September 1983 in Pretoria.

Enquiries: E Braune, Director: Hydrological Research Institute, Private Bag X313, Pretoria 0001, or DH Cousens, Water Research Commission, PO Box 824, Pretoria 0001.

CONFERENCES AND SYMPOSIA

SEWAGE SLUDGE

A conference on the stabilisation and disinfection of sewage sludge will be held from 12 to 15 April 1983 in Manchester, England. Enquiries: Water Research Centre, Communications Group, PO Box 16, Marlow Bucks SL7 2HD, England.

IMIESA

The Technical Meeting of the Institution of Municipal Engineers of Southern Africa will be held from 27 to 28 April 1983 in Pietermaritzburg. Enquiries: The Honorary Secretary, PO Box 726, Boksburg 1460.

CHANGE OF DATES

Interested parties are requested to note that the dates for the SA National Hydrological Symposium, first announced in the November 1982 issue of *SA Waterbulletin*, have been changed to 8, 9th SEPTEMBER 1983.

Unfortunately a suitable venue could not be obtained for the originally announced dates. The symposium has therefore been postponed by two days and will be held at the CSIR Conference Centre, Pretoria, on 8 and 9 September 1983..

In March, 1983, Second Announcements are to be circulated to responders of First Announcement.

IWPC

The conference of the Institute of Water Pollution Control (Southern African branch) will be held in East London from 16 to 19 May 1983. Enquiries: The Secretary, IWPC, PO Box 81249, Parkhurst 2120.

DESALINATION

The 1st World Congress on Desalination and Water Reuse will be held from 23 to 27 May 1983 in Florence, Italy. Enquiries: DECHEMA, Attention: Mrs L Schubel, PO Box 970146, D-6000 Frankfurt-am-Main 97, West Germany.

AWWA

The annual conference and exhibition of the American Water Works Association will be held from 5 to 9 June 1983 in Las Vegas, USA. Enquiries: AWWA, 6666 West Quincy Ave, Denver, Colorado 80235, USA.

WATER, AIR POLLUTION

A conference on environmental and pollution control techniques, entitled Pro Aqua — Pro Vita 83, will be held from 7 to 10 June 1983 in Basle, Switzerland. Enquiries: Swiss Industries Fair, Pro Aqua-Pro Vita 83, PO Box, CH-4021 Basle, Switzerland.

(To page 31)

SA WATERBULLETIN

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

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

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

Redakteur: Anton Prinsloo
Asst-redakteur: Jan du Plessis.

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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.

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

Editor: Anton Prinsloo
Asst editor: Jan du Plessis.

finally . . .

TO CONFER OR NOT . . .

Was your last conference, congress or workshop characterised by cheery, beery after-dinner drinking, with music, dancing (if not belly) girls, and witty, sparkling conversation? If not, you have nothing to worry your palaeolithic little mind over; if yes, you wuz robbed: somebody sold you a symposium masquerading as a conference.

The Greeks, bless their Hellenic little hearts, called that raucous, after-dinner bout of imbibement a symposium (*syn*: together; *posis*: drink) and you can be sure that the conversation did not centre around the philosophy of phosphate removal. Rumour has it that even the late, great Archimedes staggered from a symposium, shouting at his host (sated with a sour, sly Tuscan wine) in Peloponnesian English: 'You reek-a!'

Scanning the great lexicons of the modern age, we find a distinction being made between a congress (a formal meeting of people from a particular institution for discussion), and a conference (a meeting between people from a number of organizations for discussion). One example: if your wife attacks you for your lack of courtesy, money or sobriety (or, in extreme cases, for no reason at all), that constitutes a congress. However, if your mother-in-law decides to enter the fray (in a mild, medium or grandiose way) you are said to be in conference (also, in fact, in extreme danger).

In modern parlance a symposium may be regarded as a philosophical or friendly discussion on one subject. That it is important to know where you are is borne out by the following ditty (sung to the air: 'Don't go harvesting my corn, Mrs Maloney, 'cause its firmly attached to my toe'):

*A delegate found at a meeting
Quite remarkable electrical
heating;*

*To his friend he said: 'Pat,
Foind out where we're at:
'Cause the shocking arrangement
is seating . . .'*