AQUA News

August 1998

IWSA—International Water Services Association: **AISE**—Association Internationale des Services d'Eau

Maarten Schalekamp passes away

It with great sadness we must inform you of the passing of Dr H.C. Maarten Schalekamp on 28 June 1998. A full obituary will follow in the next issue of *AQUA News*.

New database for IWSA

In an effort serve you, our members better, the IWSA has undertaken to set up a completely new membership database. When completed it should mean faster correspondence, easier referencing of your fellow members and a more easily updated Year Book. The individual responsible for the design, construction and installation of the database is Mr Guy Dowman, a recent Cambridge graduate who has been drafted in on a 6-month contract to set up the database and provide technical expertise to the permanent staff of IWSA.

Trinidad and Tobago: private sector investment in water supply

Many developing countries have difficulty in supplying fresh drinking water to their populations for a wide variety of reasons. Lack of capital for new investment and lack of cash flow to maintain and operate existing systems are often at the root of the problem.

In the island nation of Trinidad and Tobago, water service was erratic and often poor. Some areas lacked basic connections; in others, the service was intermittent, with water being available for less than 7 h per day. In early 1996, a survey revealed that 20% of the electrical pumping and mechanical equipment was in urgent need of refurbishment or replacement, with nearly 25% of all plant unserviceable due to cannibalisation of equipment. The water system had been out of action an average of 54 days each year (16% of the time, or once every 6 days). Unaccounted-for water was excessively high and too much valuable and scarce fresh water was being lost to the ground.

Everyone recognised that new resources and better management were essential. The World Bank was reluctant to make new loans or guarantees without private sector involvement which would also establish specific 'service quality' objectives.

After extensive negotiations, the government of

In this issue...

Trinidad and Tobago and its Water and Sewerage Authority (WASA) entered into a three-year management agreement with a new joint venture company, Trinidad and Tobago Water Services (TTWS). The TTWS partners were Severn Trent Water International and Tarmac plc. Severn Trent supplied its water management skills, and Tarmac, the largest construction firm in Trinidad and Tobago, supplied the construction skills necessary to begin the upgrading of the entire system.

TTWS arranged for a loan of US$75m, funded by City Bank, to provide new operation funds over a 3-year period. The World Bank committed to lend US$60m for new longer-term capital investment. The leakage problems were tackled through the implementation of an extensive repair programme. The missing electrical and mechanical equipment was replaced and a regime of regular maintenance was instituted for all water service equipment. New work practices were instituted, including training for all service personnel.

Within one year the results were significant:

- The average system downtime plunged from 54 to only 4 days per year;
- In the core service areas, water delivery was increased significantly above the 7 h per day and certainty of supply increased.
- Additional water supply was extended to areas which had poor service.
- A 24-h customer service telephone line was added; complaints successfully resolved increased from 40% to 84%;
- Meter reading was augmented by 20% and payments for a service increased from 81% to 88% of billable amounts;
- A consumer survey indicated that 60% of the population thought water supply was 'definitely getting better'.

These improvements occurred without the long-term capital improvement programme.

The US$60m World Bank loan will finance:

- The design and replacement of over 100 km of pipes in the core water distribution system;
- The rehabilitation of 11 service reservoirs;
- The drilling of 9 new water wells and the rehabilitation of another 6 wells;
- The installation of ≈ 60 000 water meters throughout the country.

This last point is instructive. The World Bank, the government and service contractor all recognised that enormous amounts of water were being wasted, since individuals had no incentive to conserve water under existing schemes. After metering, individuals and firms will pay for the water they use, thereby providing an economic incentive to fix internal leaks and wasteful practices: use less, pay less.

The performance of WASA will be evaluated at the mid-term of the initial 3 year's service contract. If judged to have performed adequately, the contract could be renewed for a longer term. This provides an incentive for the private sector to deliver value, which justifies the cost of the service. The present contract with TTWS includes performance-based payments. Payments are contingent upon attaining specific service targets and goals.

Lessons learned

- There are significant opportunities for public–private sector cooperation; in this case the World Bank provided incentives to foster such cooperation.
- There are significant opportunities for service improvements through better management, maintenance and operating procedures.
- Private sector contracts can include built-in performance standards which ensure value for cost.
- Water metering and pricing can motivate conservation and wise use of fresh water.
- There are opportunities for local private sector companies to participate in joint ventures to provide water service.

Nominations for the Stockholm Water prize 1999

Nominations are now welcome for the Stockholm Water Prize 1999.

If you are aware of an institution, organisation or individual who you believe is worthy of this prestigious award, then consider nominating them for the 1999 award. The prize is presented annually in honour of outstanding achievements in science, engineering, technology, education or public policy related to protection of the world's water resources. It recognises the efforts that lead to increased knowledge, and respect for the water environment. The deadline for nominations is 31 October 1998.

To obtain a copy of the Invitation to Nominate, please contact: Stockholm Water Prize, c/o SIWI, tel.: +46 8736 2080; fax: +46 8736 2022, or e-mail: siwi@siwi.org

The Aral Sea crisis

Once the fourth largest lake on our planet, the Aral Sea, has been drying up for the last four decades. 33 km^3 of its sea bed is now exposed as a result of artificial bogging of irrigated lands and salinisation. This is having a negative impact on the fertility of surrounding agricultural lands and in glaciers such as those found in the Himalayas. In addition, the ecosystem and climate have been severely affected since the sea is no longer large enough to lower the air temperature in summer and to maintain the temperature in winter. The result is that there are drier shorter summers and longer colder winters, where the agricultural season has been reduced to 170 days. Inhabitants of the Aral region are suffering from water shortages, with rural inhabitants faring the worse—sometimes being deprived of water for several days.

The degradation of the Aral region has led to a socio-economic crisis, whose first victims are the most vulnerable strata of the population: children, women, poor urban and rural people. The region has one of the highest rates of child mortality and maternal mortality in the former Soviet Union.

In response to this ecological and socio-economic crisis the International Aral Sea Rehabilitation Fund was set up in 1993 by the governments of the Republics of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan, and Turkmenistan. A programme was set up under the auspices of the Fund which consists of National Programmes for each country to be run until the year 2015. They have the following objectives:

- Stabilisation and improvement of management of the Aral Sea Basin's environment;
- Rehabilitation of disaster zones surrounding the Aral Sea;
- Improvement of the management of scarce water resources in the region;
- Capacity building of local and State institutions on planning and implementation of regional programmes.

However, the programme was difficult to execute owing to a lack of funding—the financial resources of the countries were scarce. In 1994 a meeting of donor countries was set up in Paris, at which a number of prominent organisations including the World Bank, the European Union, the Global Environmental Fund, the UN Development Program, and number of developed countries committed to give a total of US$25 820 000.

The Aral Sea (photo courtesy of J. Kujdina)

As a direct result of this aid, the following tasks of Phase I of the programme have now been started and/or completed:

- The implementation of the project 'Strategy of water sharing, reasonable water use and preservation of water resources in the Aral Sea Basin'. In addition, the Terms of reference (TOF) for Phase II were prepared.
- Completion of Phase I of the project 'Regional Unified System for hydro-meteorological information, account and prognosis in water resources and monitoring or natural environment of the Aral Sea Basin';
- Completion of the project 'Evaluation and Management of Water Quality', with preparation for Phase II;
- Final report drafted on the project 'Water supply, Sanitation and Healthcare (Kazakhstan)' Also, the World Bank has lent the Republic of Kazakhstan US$7m to realise a pilot project on water supply for the populations in the Aral and Kazalinsk regions for the Kyzylorda Oblast (administrative district).

Ma children protesting (J. Kujdina).

In addition, the government of the republic of Kazakhstan, under its National Programme has already launched 800 large water-pipe systems and settlement water supplies to provide water for 29 settlements by a centralised system, the construction of a multi-profile hospital with 660 beds and has provided pensions and allowances for those who have suffered as a result of the ecological disaster

However, owing to some countries defaulting on the financial commitments made at the Paris meeting, many of the projects have yet to be realised and the Fund is continually looking for donations and support in order to continue its efforts for the maintenance of sustainable development and environmental protection in the Aral region.

Further information on the International Aral Sea Rehabilitation Fund can be obtained from: http://www.ifas-almaty.kz

How can leaks in water networks be reduced? Lyonnaise des Eaux' experience

Water resources management is of one the topics that was discussed at the world conference on 'Water and sustainable development' in Paris. Lyonnaise des Eaux, now operating as Suez Lyonnaise des Eaux group trademark in the water management sector, addresses this issue, and more specifically the issue of leaks in water distribution networks, on a daily basis.

There are two types of leaks—technical leaks, that have to be detected and then repaired, and 'business' leaks; in this case, the water is distributed and used, but is not billed as it is tapped via illegal connections.

The state of water distribution networks varies considerably according to their location. In France, where maintenance and repair are provided regularly, there are few leaks—9% in Paris and 11% in Dijon. In Argentina however, when Lyonnaise des Eaux was entrusted with the water management of the capital Buenos Aires, the percentage of leaks was brought down from 43% to 25%. The water thus saved is equivalent to that consumed by two million people. In Manila or Jakarta for instance, losses currently exceed 50%.

Detecting water leaks

Consequently, leak detection is essential. 80% of leaks occur at connections, the networks' 'weak points'. Lyonnaise des Eaux is constantly conducting detection campaigns using a variety of methods such as:

- The triphone, a listening device used to detect leaks in pipes.
- The acoustic correlator which locates leaks accurately by analysing sound variations inside pipes.
- In rural areas, aeroplanes equipped with infrared cameras are used to detect differences in water and ground temperatures, and therefore to locate leaks;
- In Paris, where the water distribution networks are located in the sewerage network galleries, leaks cannot be detected from above ground. On the left bank, Lyonnaise des Eaux has set up a computer system which collects information from water meters every 15 min, so that it can compare these readings with estimated consumption based on past figures. If there are any discrepancies, an emergency repair team can be dispatched to the site immediately.

Network management

Once a leak is detected, it has to be repaired. Several types of actions can be taken. It can be a one-off repair, in which case a sleeve is placed on the pipe like a rubber repair patch on a bicycle tyre. In the event of several leaks in one area, the entire pipe is removed and replaced. Facility rehabilitation programmes recommend the use of materials that improve network impermeability. Polyethylene is currently being used.

Although reducing leaks must remain an aim for sound water management, all leaks cannot conceivably be repaired for obvious, as well as economic, reasons. Indeed, there is a threshold beyond which it is more costly for consumers to repair the leak than to leave it. The threshold varies according to the scarcity of the resource and the environmental impact of the required works. If we compare areas served by the group's subsidiaries, the economic leak threshold in the Essex region (a drought-stricken area) in the UK is probably very close to the current technical threshold, assessed at 11%. On the other hand, in Northumberland (northern England), where resources are plentiful, when they are drawn from a large dam, the threshold is estimated at 17%.

In addition to measurements taken on the entire community network, installing meters appears to be a solution to the rationalisation of water consumption, and in many cases reduces water bills. It also provides

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an opportunity to check installations and to repair leaks inside homes.

New Members

The IWSA is pleased to introduce its new members, both Individual and Associate, as follows:

Individual:

Mrs H. Wamal (Cameroon)

Mr B. Khessaissia (Tunisia)

Mr W. Charlet (Germany)

Dr R.S. Rosich (Australia)

Mr F. Urban (Germany)
Mr Urban is a first planning engineer for water works in the engineers association 'Wetzel and Partners', Moers, Germany. His interests extend from the field of hydraulics in water works about particle removal by coagulation, flocculation or micro and ultrafiltration of surface waters, to chemical softening of groundwaters.

Mr J. P. Van der Hoek (Netherlands)

Mr J. Helisinki (USA)
Mr Helsinki is the supervisor of watershed Management/Biology and a member of a management team that controls water quality for a 210 MGD plant. He has helped to design and implement programmes to manage wastewater pollutants which affect a 94 square-mile watershed. His latest project concerns the characterisation of natural organic matter from point and nonpoint sources

Associate:

Bankers Trust Australia, Ltd (Australia)

South-east Water Ltd (Australia)

COWI Consulting Engineers & Planners AS (Denmark)

Samorka (Iceland)

Lusagua—Gestão de Aguas SA (Portugal)
Lusagua is a Portuguese private company which specialises in all types of activities related to urban water cycle management.

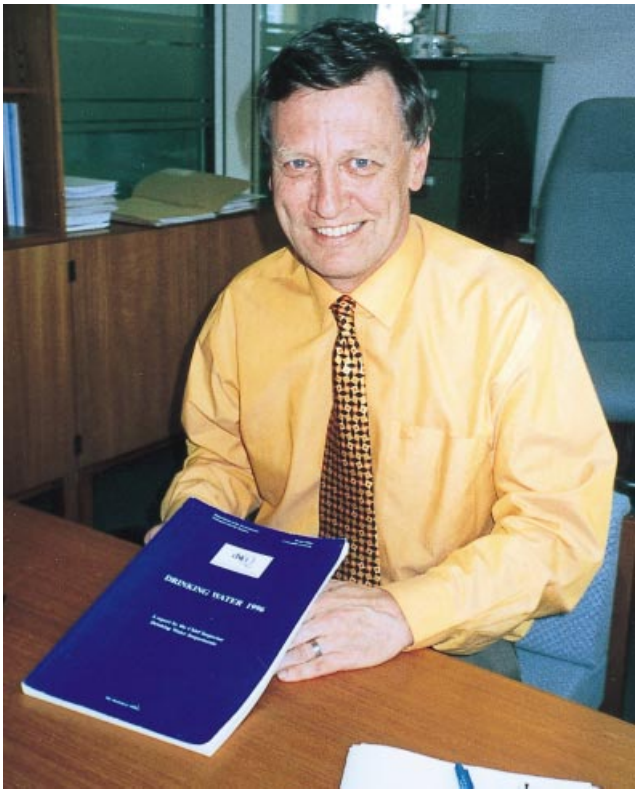
Deputy Chief Drinking Water Inspector explains how the DWI works

The Drinking Water Inspectorate (DWI) is responsible for checking that the drinking water supplied by privatised water companies in England and Wales conforms to the standards and regulations set by the government.

In an interview with the Deputy Chief Inspector, Mr Owen Hydes, it was explained that although the DWI is a branch of the government, (Department of Environment, Regions and Transport, DETR) it works at arms length from government ministers who effectively delegate their powers to the DWI to implement government regulations. Furthermore, the Secretary of State delegates the responsibility to the DWI for prosecuting water companies which commit an offence under the Water Industry Act 1991 of supplying water unfit for consumption. If found guilty the water company is fined.

The role of the Deputy Chief Inspector is to oversee the inspection of water companies, the assessment of water quality and to ensure the enforcement of the regulations should they not be met.

This means that DWI inspectors visit water compa-



Owen Hydes

nies and check that they are sampling and monitoring their water according to the regulations, that they are operating treatment and distribution systems properly, and that the results of the sampling and monitoring actually meet the standards that have been set. They subsequently report and make recommendations to Mr Hydes. If the drinking water is not up to standard, enforcement action is taken against the company. The company will normally give a legal undertaking to resolve the water problem by a specified date. This may require liaison with OFWAT (which regulates the economics and finances of the industry) who will allow the company, if it sees fit, to make amendments to its water charges in order to finance the improvements to the water supply.

If the DWI feels there is a need to introduce a new standard to resolve a recurrent problem in the water supply generally, it will put its case forward to the Water Supply and Regulation Division of the DETR. If the case is accepted and the ministers agree, the DETR prepares and issues a Public Consultation Paper. This document sets out proposals for the regulations for the water quality problem and invites a wide range of interested parties to comment on the proposals. At the end of the consultation period, the proposals (possibly amended by opinion) will then be presented to the ministers who will decide whether to make new regulations.

Lower lead levels

The standards in the regulations set by the government are based on an EC directive on the quality of water intended for human consumption, otherwise known as the Drinking Water Directive. In many cases these standards are higher than those set out in the Directive. Nevertheless, after two years of preparation, a new Drinking Water Directive is about to issued in the Autumn of this year, which will mean new regulations will have to be set out by the government. There are two that are of particular importance to consumers. The first is a more stringent standard for the levels of lead found in drinking water. The current level of lead allowed in drinking water will be reduced from 50 to 10 μg/L. The implication is that if the new standard is not met, water companies will be held responsible for replacing any lead piping that runs from the mains system up to the boundary of the consumer's land, and for giving the consumers advice about the replacement of their part of the piping. The second important regulation concerns disinfection by-products, in particular trihalomethanes (e.g. chloroform) and bromate. Under the existing Directive there are no standards at all for these by-products. The standard for trihalomethanes will be slightly stricter than the current national regulation and the bromate standard will be a new regulation, since at present there is no standard for bromate in government regulations.

Mr Hydes concluded by reminding us that the UK water industry operates an open policy on water quality information; each water company is required to maintain a public record detailing all information concerning the quality of the water it produces. As consumers, we are entitled to a free copy of the information relating to our water supply.

WaterAid's Munro+ challenge

On Saturday 6 June 1998, 301 mountains over 3000 feet high in Scotland were successfully conquered by fund-raising teams for the charity WaterAid.

WaterAid's director Jon Lane climbed A'Cchailleach above Newton Mor. He commented, 'The climb was a challenge but it felt very special to know that I was part of such a vast group of people demonstrating their commitment to all those people in developing countries who endure comparable daily walks just to obtain water to drink.' He added, 'I am delighted that the Munro+ Challenge has been successfully and safely completed. Many thanks to all the volunteers who organised and took part in the event.'

The event is expected to raise over £300 000 from sponsorship which will support WaterAid's water supply, sanitation and hygiene education work in some to the world's poorest countries. Sponsorship collection is now underway and the final sum is expected to be known by October.

RAI Hotel service—incorrect fax number

Please note: for those of you wishing to reserve hotel rooms in Amsterdam for AQUATECH '98, the fax number printed in the programme is incorrect—you need to dial +31 20 549 1925 or +31 20 549 1982. If you have already submitted your form and have not received confirmation, please re-submit to the above numbers.

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Feature Article

By Hamid Khalidov*

An alternative water resource project for the 21st century

The ancient adage 'water is life' will bear special significance in the 21st century. According to the experts, there will be little fresh water remaining on Earth. Yugoslavia, Algeria, Hong Kong and Singapore already rely on imported drinking water. By the end of the 20th century the states of northern Africa and the Middle East will have consumed all the ground water in their regions. Water shortages are today experienced by 250 million people, and UN experts have forecast that within only a few years there will be shortages in countries with total populations of up to 1bn. This will be a great challenge for the forthcoming century. For decades, the world of science has been searching for ways to supply water to needy regions and countries, but as yet nothing has been put forward. Many different devices, including nuclear and solar energy, have been used to create water resources but none of them, either separately or together, are capable of satisfactosThe water which is produced is not always of a high quality, and its cost is usually too high. It has become clear that a new solution to this global problem is necessary, in order to provide people with high-quality water in enough quantity at a low-cost price. The calculation of variants clearly indicates that stable resources of high quality water which are not dependent on climatic and political conditions, and which are capable of supplying millions of people, can only be found as ice in the colder latitudes of the globe such as Antarctica, Greenland and Alaska.

Since ancient times, the thawed water of icebergs has been called 'Alive Water'. The medicinal properties of the thawed water have been described in many scientific works, and its quality of taste is so high that it is unmistakable and unforgettable. 'Alive Water', has been a water supply option for some time. Periodic discussions about its transportation have frequently arisen in scientific and business circles. The transportation of icebergs weighing up to 100 million tonnes from Antarctica to (say) the coast of Saudi Arabia would have to take into account the following: storms and tropical typhoons, water at different depths of up to 500 m which affects the rate of thawing of the iceberg, loss of water on the way, etc.

Different possibilities for the collection of ice

It is interesting to note that an iceberg, six-sevenths of which remains submerged, and which floats 10–12 km a day, can overturn 5–6 times during its lifetime because of undercurrents. This can happen relatively quickly, and it is for this reason that vessels are currently forbidden from going too close to the icebergs. Besides the danger involved in towing them, after every overturning of an iceberg, each new installation of tow cables would require an unacceptable cost in time and labour to correct.

Example of a glacier (photo by Bob Odell).

During our research it became clear that ice could also be extracted *in-situ* in a liquid form and be delivered to the consumer. We would therefore have to seek new technologies to deliver this ice-water whilst main-

***Hamid Khalidov is the Senior Advisor to the Minister of Economics of the Republic of Dagestan.**

taining a competitive cost price.

The next step was to decide whether to transport ice or water. There are three methods of ice delivery available using today's technology:

1 *As a liquid*. This requires a large energy expenditure for the melting of ice and unacceptable terms of loading.
2 *As fine pieces of ice*. This requires a little less energy expenditure but considerably more capital expense for equipment; moreover the density of a load decreases as the work of loading increases.
3 *As large cut blocks of ice weighing many tonnes*. This would mean that the loading of vessels could take weeks, and the amount of towing and the use of crane equipment correspondingly increases.

The loading of any of the above forms of water would have to take place as quickly as possible so as not to increase the cost price unnecessarily, making the water uncompetitively priced. From this perspective, none of the options seemed viable, so all three were abandoned.

The transportation of small whole icebergs was investigated next. This would mean designing new tools for the loading of ice, and for its transportation, unloading and storage at the destination ports. The basic technology for the treatment and distribution of water for the countries requiring has already been developed. Moreover, the cost price of this high-quality, medicinal, 'Alive Water' would be lower than that produced by nuclear freshening plants.

I would like to reassure ecologists about the possible consequences of ice production activity in Antarctica, Greenland, Alaska, etc. On the basis that an individual requires 2.5 L of water for drinking and food preparation everyday, for 1bn people a total of 1bn tonnes of ice would be needed per year, which is only 1 km^3 of ice per year. If one considers that one shelf glacier in the Antarctic continent contains 20 000 km^3 of ice and that the stocks of ice do not decrease because of on-going natural circulation processes, the removal of 1 km^3 of ice is of little consequence—particularly if one considers the benefits to the life and health of millions of people.

To try out this new resource, we must enlist the help of a least one or more countries that require water and which are in a position to take on certain financial commitments.s

Let us choose, by way of example, the region of the Arabian peninsula, and simulate the delivery of icewater. The main consumer of water in the peninsula is Saudi Arabia—the most powerful and dynamically developing country of the region. Its population is growing fast and has already exceeded 20 million. On the basis of 2.5 L per day per person, the country needs 18 260 000 tonnes of water per year, ≈20 million tonnes of ice, i.e. 0.2 km^3 of a glacier.

Antarctica has trillions of tons of the purest ice, formed during the ice ages. It comes in all forms and sizes. There are ice plains and ice tops, ice floes and outflowing glaciers, shelf ice and ice tongues, icebergs and sea ice. The thickness of the ice over land exceeds 4 km and the underwater portion of the ice plain extends 2 km below the sea surface. As a result of our research, and in view of the short summers in this region, our choice of suitable ice was narrowed to a shelf glacier. It has a flat surface on top where the purest ice is, and the access to it is straightforward. The minus point is that large and small ice floes and icebergs floating around the edges of the glacier are a danger to navigation.

However, from an equipment and labour point of view, there is little difference between preparing the ice on the coast or out at sea, so we reconsidered the possibility of working on icebergs which had broken off from the glacier. Of all icebergs, 60–80% are formed from shelf glaciers, and they are the largest of all, having a surface area of hundreds of thousands of km^2. This facilitates the preparation of ice for transportation on the surface of the iceberg itself. Very conveniently, there is a direct route from Saudi Arabia, through the Indian Ocean to the Antarctic coast, where the shelf glacier Amery is located. Here, some of the largest icebergs break off from the glacier, which weigh billions of tonnes. It is thought that this area of the Antarctic coast is the most suitable place for organising the production of ice. In order to maintain a continuous flow of work throughout the year, selected icebergs can be kept in the shallower waters near Kergelen Island which are not frozen during the warmer months. The ice could then be loaded on to a vessel and transported to the Arabian peninsula and left to melt in the sun.

Let us imagine that once the ice had arrived at its port of destination, it is loaded on to a special trough with a transparent cover where it proceeds to flow down into a special 'ice-receiver' where it is then stored. By adjusting the access of the solar beams and hot external air we can regulate the quantity of cold water and cold air produced according to the needs of the city.

Fifty thousand tonnes of ice are capable of cooling 170 million m^3 of hot air down to 20 °C.

With a fleet of 10–15 vessels, 40 000 tonnes and more of ice could be transported. 10–12 people would be needed to work on each piece of ice. The loading of the vessels would take between one and two days. The complete operation, from leaving Saudi Arabia to returning with the ice should take between 25 and 30 days.

Costs

How much would this project cost? And what would be the cost price of a litre bottle of water? It would appear to be very low. Indeed, after four months of operation, and charging 30 US cents per bottle, all expenses would be recouped. The high profitability of the project is a result of the following factors:

- No payment for ice as a raw material;
- Relative cost efficiency during the preparation of ice;
- Ice is thawed under the sun at the port of destination and there are therefore no heating costs;
- No treatment processes are involved since the product is ecologically pure and suitable for direct consumption.

The most important expense of the project would be the construction of the vessels. Other expenses for the construction of a special mooring facility, stationary ice-receivers, the manufacture of containers and equipment for the production of the ice would account for only 10% of the total cost. To complete the project within 18 months to 2 years from start to finish would cost about $2bn. If the project were carried out over a longer period of time, the initial expenses would be proportionately reduced. Everything is dependent on what the priorities are as to how quickly the project is realised. It is certainly clear to the government of Saudi Arabia that the need for fresh water will grow and that there is no other available source of water equivalent to that in the Antarctic. This problem must be considered a priority.

With time we will be able to develop the project further and make it as ecologically sound as possible. Let us say that the States of the Arabian peninsula, by constructing a powerful transportation fleet for millions of tons of ice, begin to deliver it to stationary ice-receivers located on the perimeter of the peninsula. By creating and adjusting man-made reservoirs near to the ice-receivers it would be possible to substantially influence the micro-climate of the area and to improve sanitation. The surpluses of thawed water could be released underground and directed towards the creation of green zones and oases throughout the peninsula.

Alternative uses

It is my belief that multinational manufacturers of drinks such as Coca Cola and Pepsi Cola could benefit enormously from this project. It is not by chance that Scottish Whisky is made from the water of mountain glaciers and the snow tops of Scotland. By placing soft drink factories in an equatorial zone on islands and continents (for the hours of sun and climate) it will be possible to create a global production network and of soft drinks made with 'Alive Water'. For example, a vessel which is shipping ice from the Antarctic coast could unload its cargo at a factory located in Singapore and them be reloaded with ready-made drinks which it could subsequently transport to Australia. From Australia the ship could return to the Antarctic continent to ship more ice.

Conclusion

We are considering engaging the support of the UN, since the project should be realised under the aegis and with the active participation of an authoritative international organisation. Moreover, all questions linked to the Antarctic are adjusted by the conventions and agreements of the UN. With funding from one of the States of the Arabian Peninsula there, and given the low level of technology which would be required for the loading, transporting and storage processes, there is no reason why this project should not succeed.

If you would like to contribute to, or comment on the production of *AQUA News*, please contact: Miss Victoria Elena Paredes, Editor, *AQUA*, IWSA, 1 Queen Anne's Gate, London SW1H 9BT, UK. Tel: +44 (0)171 957 4567; Fax: +44 (0)171 222 7243; E-mail: AQUA@dial.pipex.com

17–18 June 1998, Prague, Czech Republic

IWSA Conference on Master Plans for Water Utilities

Further information: Mr Lubmomír Macek, Faculty of civil engineering, CTU Thákurova 7, CZ199 29 Praha 6, Czech Republic. Tel.: +42 2 2435 4608/4607; fax: +42 2 243 4607/10735; e-mail: Macek@fsv.cvut.cz

10–13 August 1998, Stockholm, Sweden

8th Stockholm Water Symposium on 'WATER: the key to socio-economic development and quality of life'

Further information: Stockholm Water Symposium, SE-10636 Stockholm, Sweden. fax: +46 8 736; e-mail: sympos@siwi.org

16–18 September 1998, Como, Italy

HYDROSOFT 98—7th International Conference on Hydraulic Engineering Software

Further information: Conference Secretariat, HYDROSOFT 98, Wessex Institute of Technology, Ashurst Lodge, Ashurst, southampton, SO40 7AA, UK. Tel.: +44 (0)1703 293223; fax: +44 (0)1703 292853; e-mail: liz@wessex.ac.uk

21–24 September 1998, Amsterdam, the Netherlands

AQUATECH 98: International conference on membranes in drinking water and industrial water production

Further information: Prof. Dr. ir. J. C. Schippers, IWSA, KIWA NV, PO Box 1072, 3430 BB Nieuwegein, the Netherlands. Tel.: +31 30 6069 532; fax: +31 30 6061 165; e-mail: jschippe@kiwaoa.nl or: *Prof. M. Balaban, European Desalination Society, International Science Services, Abruzzo Science and Technology park, Science and Industry Center, Via Antica arischia 1, L'Aquila 67100, Italy. Tel./fax: +39 862 311 411; e-mail: psta004@in.sgol*

23–24 September 1998, Amsterdam, the Netherlands

Trends in On-line Monitoring and Control of Water Supply—The point of view of manufacturers and suppliers (in conjunction with Aquatech '98)

Further information: ir. Egbert Roosma, N.V. PWN Waterleidingbedrijf Noord-Holland, PO Box 5, 2060 BA Bloemendaal, the Netherlands. Tel.: +31 23 5413727; fax +31 23 5413716.

28–30 September 1998, Mülheim, Germany

Specialised Conference on drinking water distribution with or without disinfectant

Further information; Prof. Rolf Gimbel, IWW, Moritzstrasse 26, Mülheim an der Ruhr, Germany. Tel.: +49 208 4030 3300; e-mail: iww@uni-duisburg.de

7–9 October 1998, Klaipeda, Lithuania

International Conference on the Development of Deep Aquifers and Problems in Drinking Water Treatment.

Further information: International Conference Organising Committee, Justiniskiu g.16, 2056 Vilnius, Lithuania

28–31 October 1998, Park City, Utah

USCID Conference on Shared Rivers—river basin management to meet competing needs.

Further information: Larry D. Stephens, US Committee on Irrigation and Drainage, 1616 Seventeenth street, Suite 483, Denver, CO 80202, USA. Tel.: +1 303 628 5430; fax: +1303 628 5431; e-mail: stephens@uscid.org

15–18 November 1998, Tokyo, Japan

International workshop on Anti Seismic Measures on Water Supply.

Further information: Japan Water Works Association, Tokyo Minami Shinjuku Building, 7–8, 2-chome Yoyogi, Shibuya-ku, Tokyo 151, Japan. Tel.: +81 3 (3379)7642; fax: +81 3 (3379) 8630.

19–20 November, 1998, Tokyo, Japan

International Water Supply Symposium in Tokyo '98, on 'Water supply systems and the urban environment; perspectives on the future.

Further information: Registration Secretariat for International Water Supply Syposium in Tokyo, '98, Congress Corporation, 7th Akiyama Bldg., 5–3 Kojimachi, Chiyoda-ku, Tokyo 10-2, Japan. Tel.: +81 3 3263 4031; fax: +81 3 3263 4032.

24–28 November 1998, Bad Elster, Germany
WABOLU/WHO International Conference on 'Water, Sanitation, and Health: resolving conflicts between drinking water demands and pressures frrom society's wastes'
Further information: Ms Gertrud Schlag, Inst. Wasser-, boden- und Lufthygiene, P.O. Box 330022, D-14191 Berlin, or Dr Ingrid Chorus, fax: +49 30 8903 1830; e-mail: gertrud.sclag@uba.de

18–19 January, 1999, Amsterdam, the Netherlands
IWSA Workshop on Drinking Water Tariffs: principles, structure and calculations.
Further information: Drs G. E. Achttienribbe, VEWIN, Postbus 70, 2290 AB Rijswijk, Netherlands. Tel.: +31 70 414 4750; fax: +31 70 414 20.

19–21 January 1999, Pragati Maidan, New Delhi, India
Water Asia 1999—International Conference and Exhibition on Asian Water Industry
Further information: Interads Ltd, A113, Shivalik, New Delhi 110017, India. Tel.: +91 11 628 3018/19, 628 5301, 628 5482; fax: +91 11 622 8928, 641 0216; e-mail: watersia@ndb.vsnl.net.in

23–24 February 1999, Manchester, UK
IWSA Specialised Conference on Rapid Microbiological Monitoring Methods.
Further information: IWSA Secretariat, 1 Queen Anne's Gate, London, SW1H 9BT, UK. Tel.: +44 171 957 4567; fax: +44 171 222 7243, e-mail: iwsa@dial.pipex

10–13 March, 1999, San Luis Obispo, California, USA
USCID conference on Benchmarking Irrigation System Performance Using Water Measurement and Water Balances
Further information: Larry D. Stephens, USCID, 1616 Seventeenth St, Suite 483, Denver, CO 80202, USA. Tel.: +1 303 628 5430; Fax: +1 303 628 5431; e-mail: stephens@uscid.org

11–14 April 1999, Adelaide, Australia
18th Federal Convention of the Australian Water and Wastewater Association—Water Solutions.
Further information: Convention Secretariat, PO Box 388, Artarmon, NSW 2064, Australia. Tel.: +61 2 9413 1288; e-mail: awwa@abol.net

22–27 August 1999, Graz, Austria
28th Biennial Congress of the International Association for Hydraulic Research (IAHR)
Further information: Heinz Bergmann, Technical University Graz, Mandellstrasse 9, A-8010 Graz, Austria. Tel.: +43 316 873 6260: fax: +43 316 873 6264; e-mail: bergamm@hydro.tu-graz.ac.at

11–19 September 1999, Granada, Spain
17th International Congress on 'Water and Agriculture in the Next Millennium', of the International Commission on Irrigation and Drainage
Further information: Ms Catherine Roy, Secretary of the 17th ICD International Congress, Confederación Hidrografíca del Guadalquivir, Avda de Madrid 7, 11th floor, 18012 Granada, Spain. Tel.: +34 58 29 59 84; fax: +34 58 27 06 41.

18–24 September 1999, Buenos Aires, Argentina
22nd World Congress and Exhibition.
Further information: IWSA Secretariat, 1 Queen Anne's Gate, London, SW1H 9BT, UK. Tel.: +44 171 957 4567; fax: +44 171 222 7243, e-mail: iwsa@dial.pipex

3–6 July 2000, Paris, France
IWSA Specialised Conference and IAWQ/IWSA Biennial Conference.
Further information: IWSA Secretariat, 1 Queen Anne's Gate, London, SW1H 9BT, UK. Tel.: +44 171 957 4567; fax: +44 171 222 7243, e-mail: iwsa@dial.pipex

11–13 September 2000, Helsinki, Finland
Helsinki DAF '2000 Conference.
Further information: Mr Eero Teerikangas, Finnish Water and Waste Water Works Association, Ratavartijankatu 2A, 00520 Helsinki, Finland. Tel.: +358 9 40 5606743; fax: +358 9 1 484750; e-mail: daf@vvy.fi

Groundwater Modelling: Calibration and the Use of Spreadsheets. By Theo N. Olsthoorn. Available from: Delft University Press, Mekekweg 4, 2628 CD Delft, The Netherlands. Tel.: +31 15 2783254; fax: +31 15 2781661; e-mail: DUP@DUP>TUDelft.NL 296 pp; paperback; 1998; ISBN: 90 407 1702 8/CIP

This book is based on a thesis which demonstrates the use of spreadsheets as a versatile tool in everyday hydrologic engineering and modelling. Today, almost every computer has a spreadsheet. It may well be the most widely spread and used means of carrying out calculations in the world.

One reason as to why hydrologists may want to use a spreadsheet instead of a dedicated model, could be their familiarity with the spreadsheet software that they use everyday. He or she may also wish to escape from the constraints that a dedicated model might pose. We may think of the need to post-process model results. For instance, we may have to feed lowerings from a groundwater model into a settlement model, or into a model which will compute the damage which is caused to agricultural production. Often, various models can be conveniently combined into a simple spreadsheet, providing the final results in a direct a simple way. The spreadsheet's formatting functionality will allow for a clear presentation of results.

From a scientific point of view, a good programmer, with enough time and the right tools can achieve any function that a spreadsheet performs. It is also true to say that high-quality models exist for most disciplines, so that given enough money to buy them and time to learn them, they can be employed. Combining different models is yet another very complicated matter. Given a spreadsheet, concentration is focused not on programming, but on data and the relations between them.

This book will be ideal for those who wish to facilitate their work with hydrological and engineering modelling and who have an interest in IT.

Technology Transfer in the Water Supply and Sanitation Sector: a Learning Experience From Colombia. By Jan Visscher. Available from wildeboe@irc.nL, 102 pp. $US20.

This publication presents consolidated experiences from a technology transfer programme implemented in Colombia between 1989 and 1996. The programme introduced multistage filtration, and environmentally friendly water treatment technology, in eight different regions. A human-centred approach has been taken, which adopts joint learning projects for capacity building at institutional and community levels. This approach breaks with the traditional top-down method of technology transfer and recognises that technologies are embedded in the society where they were developed. In order to be sustainable, technology sharing is needed to ensure that the technology matches the new setting. This publication illustrates that a holistic joint learning project approach, as has been used over the past several years in Colombia, serves to develop this match and strongly supports capacity building in the sector. The publication comprises four main themes; a description of the programme and its results, a review of key issues in sustainable sector interventions, a discussion of theory and practice in technology transfer, and an elaboration of the learning project approach.

Operation and Maintenance of Sanitation Systems in Urban Low-Income Areas in India and Thailand. Available from tjonkonjoe@irc.nl, 97 pp. $US10.50 (Reductions available for persons and organisations indigenous to developing countries).

This study intends to review the performance, use and operation and maintenance requirements of sanitation systems in low-income urban areas.

In India and Thailand, specific attention is given to user attitude and practices with regard to the operation and maintenance of the systems and to the role of the authorities, both in the provision of the systems and in their operation and maintenance. The outcome of the study includes an assessment of the requirements for the operation and maintenance and recommendations for the planning, design, implementation and management of future schemes. The research focuses particularly on the double pit pour-flush latrine in India, and in Thailand on the cesspool system, septic tank with anaerobic up-flow filter and two types of treatment plant, the aerated lagoon system and the activated sludge system-aeration tank. Other systems found in the research are also included in the analysis, such as public latrines in India, and septic tanks with soakaways in Thailand

WATER COMPANY COST SAVINGS COULD FUND A £10bn ENVIRONMENTAL IMPROVEMENT PROGRAMME

According to the Chairman of the Environment agency Lord De Ramsey, the money saved by the water companies by 1994, could be more than sufficient to pay for all the improvements needed to meet environmental obligations between the years 2000 and 2005 without increasing customer's bills in real terms.

In an open letter to the Secretaries of State for the Environment, Transport and the Regions (DETR) and for Wales, Lord de Ramsey described the Agency's priorities for protecting and improving the water environment, in line with European legislation and UK objectives. He urged the government to adopt in full the Agency's National Environmental Programme, set out in the document '*A Price Worth Paying*', as the obligations to be funded by water companies in the period 2000–2005.

Lord de Ramsey said:

> 'the 1999 Periodic Review of water company prices is currently the single most important opportunity to influence how far we can improve the water environment for future generations.
>
> 'In *A Price Worth Paying*, we clearly lay out for the water companies the continuing programme of work needed to correct past under-investment and provide an environment fit for the new millennium. We spell out in black and white not just what the nation will gain, an environment in which sewage no longer fouls river banks and beaches, clean rivers support healthy wildlife and water supplies, even in a changing climate, and our most precious river and wetland sites are protected for future generations—but also what we risk losing if investment is not made'.

Since water privatisation in 1989, more than a quarter of rivers in England and Wales have improved in quality, with only 10% of river length now classed as poor or bad. In 1997, 89% of bathing waters complied with European standards, compared to 66% in 1988.

Figures recently published by the Director General for Water Services indicate that by the end of the current investment period in 1999, the water industry as a whole could have made efficiency savings of between 15% and 20% on expectations at the last price review in 1994.

Lord de Ramsey said:

> 'During the last price review, the companies initial cost estimates were cut by 40%. As there may well be similar opportunities on this occasion, it its clear that, with the efficiency savings and reduced costs, there is scope for a substantial programme of environmental improvements without bills rising in real terms.'

HARRIS ACQUIRES FOSROC'S NORTH AMERICAN CONSTRUCTION CHEMICALS DIVISION

Harris Speciality Chemicals Inc., the North American speciality construction products manufacturer, has acquired Fosroc Inc. North American Construction Chemicals Division.

Fosroc—a subsidiary of Burmah Castrol—manufactures a wide range of products including concrete repair and protection materials for the highway and underwater management markets. This new addition will compliment Harris's existing core business in North America—supporting, in particular its THORO® concrete repair and protection materials for the highway and water management markets.

NEW OIL-ON-WATER MONITOR

Ionics UK Ltd have extended their range of continuous, on-line monitors for oil-on-water.

As well as their existing Slickwatch range of noncontact, infrared detectors, ionics now offer instruments which feature a floating sensor which not only can detect oil contamination, but can also measure its thickness and track the build-up of oil.

The new instruments use a proven electromagnetic absorption technique to measure the layers of oil, and other organic solvents, as small as 1 μm thick when floating on water. With this technique, the detector will continue to work, even when contaminated by oil. The monitors can be programmed to ignore traces and to provide alarms only when preset levels have been reached.

They have wide applications in situations where they can lowered on to the water, such as in continuous groundwater, wastewater and storm water monitoring. Leaks from oil pipelines and tanks, whether situated on the surface or underground, can be detected. They can also be used for the control of oil interceptors, skimmers, separators and pumps during remediation. Marine versions are available for use in ports and oil terminals.

BIWATER WINS $8m CONTRACT IN LEBANON TO SECURE WATER SUPPLIES FOR OVER 500 000 PEOPLE

Biwater Industries has won two major contracts worth $8m to supply 600 km of ductile iron pipes and fitting for use in two major new infrastructure projects in Lebanon. The projects are part of the overall reconstruction of Lebanon following the civil war that rocked this region in the 1970s, 1980s and early 1990s.

Funded by the World Bank and the European Investment Bank, the project will play a central role in the rehabilitation and expansion of the potable water system throughout Lebanon by the Lebanese Council for Development and Reconstruction (CDR). The improvements will provide reliable and regular supplies of clean drinking water to more than 350 000 people living in the Lebanese regions of Metn and Barouk and 250 000 people in the town of Batroun.

250 km of Biwater's iron pipes and fittings will be used in the £15m supply improvement project at Batroun, whilst 350 km of pipes will be supplied to the $15 Metn and Barouk project.

For further information contact: Clive Purcell, Red Brick Communications, tel.: +44 (0)155 910 1500; fax: +44 (0)155 910 1490.

EPAL INVITES WRc TO HOLD WATER QUALITY MANAGEMENT SEMINAR

Leading WRc, was recently invited to Lisbon to hold a 2-day series of seminars on 'the management of water quality from source to tap.' EPAL (Empresea Portuguesa dos Agues Livres) the largest water company in Portugal, commissioned the WRc to increase the awareness of delegates on a number of water quality issues.

Wrc, chosen for its water quality management expertise, was represented by Dr Ian Walker of microbiology and Dr Brian Crathorne, director of the National Centre for Environmental toxicology (NCET). Between them they made 12 presentations to 100 water supply managers and operators. The presentations included catchment management, quality control, water treatment processes, distribution, issues, testing and regulations. Tony Lloyd from the DWI (Drinking Water Inspectorate) was also invited to give a presentation on the regulation of the UK's privatised water industry.

Dr Ian Walker commented:

> 'The UK is considered to have a wealth of experience and expertise in coming to terms with EC regulations and the issues surrounding water quality management. It was an excellent opportunity to pass on our knowledge to another country

LIQUID DOSING IN SUNSHINE STATE

Portacel has secured a £0.5m contract with a Californian water company—a UK success story which came out of last year's AWWA exhibition in Atlanta.

While groundwater disinfection is not currently a legal requirement in the USA, several far-sighted US water companies are already switched on to its potential. These companies are becoming aware that while there is some popular opposition to the idea of chlorinating drinking water, the risks of putting undisinfected water into the supply are too great to ignore. However, the technology to carry out disinfection is not widely available at the present time in the USA.

Ahead of last year's AWWA, for example, the California water company, which was using sodium hypochlorite to disinfect its water supply, was experiencing a number of process and operational problems with its in-house designed pumping system. Primarily, the company was finding it difficult to pump sodium hypochlorite under the high pressures required for the

water supply. This made it very difficult to obtain accurate dosing control. Visiting the AWWA, the water company's Vice President was impressed with Portacel's pumpless dosing technology in action and, 4 weeks later, trial equipment (including Portacel's Medway residual chlorine analysers) was confirming this initial impression. The decision was subsequently taken to convert six sites to Portacel's sodium hypochlorite dosing systems.

The systems, which are designed to meter under a vacuum, not only overcame the problem of dosing at high pressures, but also solved the problems the water company was experiencing with calcification at the point of chlorine injection. The Portacel systems are able to neutralise the alkaline sodium hypochlorite by introducing carbon dioxide at the point of infection. They also provided the fine control which is required.

For further information contact: Dave Grant, Portacel Disinfection Systems, tel.: +44 (0)1962 705200.

STAR WARS TECHNOLOGY MAY BE ANSWER TO DETECTING WATER POLLUTION PROBLEMS

Laser beams aimed at the surface of water could replace a Victorian method of checking for pollution problems as a result of research now being carried out at the University of Hertfordshire. The system means that water quality can be measured remotely by light scattering.

Researcher Dr Darren Reynolds said 'The potential of this technology is enormous. The 'Star Wars' monitoring of water quality will be a reality pushing back the frontiers of detection, monitoring and control technologies well into the millennium.'

In the UK, the current methods for measuring important chemical and biochemical parameters are expensive, time consuming and off-line, performed archaically by ineffective mobile testing units which make the continuous monitoring of remote sites extremely difficult.

Dr Reynolds added 'As the knowledge of the effects of all forms of pollution increases, so does the need for improved legislation, monitoring and control. The intensification of global environmental awareness has resulted in strategic national and European legislation in an attempt to try to reduce pollution and improve the quality of water.

> 'The light scattering properties of surface and water wastes have provided useful information.'
>
> 'Recent research has demonstrated that certain inorganic species and gross organic pollution can be detected and waste waters using the scattering properties.'
>
> 'If such a system were to prove successful, sensors could be located at key water supply points in the areas covered by the water companies and water-using industries.'

For further information contact: Mr Brian Emsley, tel.: +44 (0)1707 284022.

NEW TWIN CHANNEL CONTROLLER FROM PROMINENT

The D2Cm a new low cost, two channel controller has been announced by ProMinent Fluid Controls (UK) Ltd. It is available in pH/chlorine and pH/redox combinations, and is designed primarily for water treatment applications.

Many application such as waste water treatment, potable water treatment and dosing into scrubbing towers require the independent monitoring and control of two parameters. The D2C will accept two independent 4–20 mA variable inputs and provides two independent control outputs compatible with ProMinent's range of metering pumps. Optional valve control and servomotor control outputs are also available.

The new D2Cm