September 2012 / Vol. XXXVI Issue 9

Arab Water World
عالم المياه العربي
www.awwmag.com

Advances in Seawater Desalination Using Nuclear Power (P.16)

Aspects of Salt-Affected Soils in Some Arab Countries (P.35)

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Arab Water World

Serving the Water, Wastewater, Desalination & Energy Sectors in MENA - Since 1977

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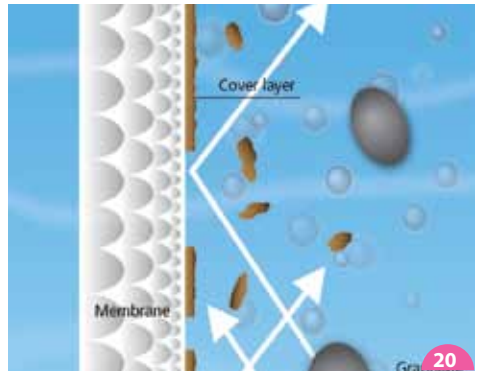
INTRODUCTION

WATER TREATMENT

WASTEWATER TREATMENT

DESALINATION TECHNOLOGY



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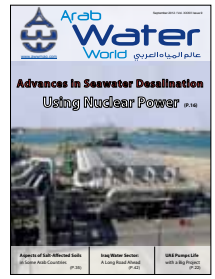
COVER STORY

Seawater desalination using nuclear energy is nowadays an inevitable option for the production of potable water. It is a reliable and economical way to alleviate global concerns on climate change and water scarcity issues.



Cover Photo Courtesy of:
Hitachi Zosen Corporation

Opening Letter

الرسالة الإفتتاحية

A Race with Time

سباق مع الزمن

Water scarcity has always been a major disadvantage for Gulf Co-operation Council (GCC) economies, and with increasing demographics, this problem will only grow. With widely available energy sources, desalination technology remains the main hope for solving drought problems. In fact, spurred by a buoyant economy and population growth, over USD 300 billion will be invested in the GCC water and desalination projects, between 2012 and 2022.

Moreover, GCC governments are deploying efforts to enforce legislation to conserve water with a special focus on desalination and waste water treatment to meet the increasing water demand. They are also educating the masses on conserving this valuable. Regional governments are also increasing their dependence on renewable energy in preparation for the post-oil era; they are expected to invest over USD100 billion in the water sector between 2011 and 2016, to improve desalination technologies involving solar energy, and maximize reliance on wastewater treatments and recycling.

The September 2012 issue of Arab Water World follows GCC's relentless efforts in their race against water scarcity and the latest projects and technology used to win this race. From covering aspects of salt-affected soils in some Arab countries on page 35 to the long road ahead of Iraq's water sector on page 42 and Turkey's growth and its influence on local water and energy projects. All major regional water projects and trends are also highlighted in this issue so enjoy reading it and send us your comments and remarks to content@cphworldmedia.com

لطالما شكلت ندرة المياه عائقاً كبيراً لاقتصادات دول مجلس التعاون الخليجي ونظراً لتزايد عدد السكان، ستستمرّ هذه المشكلة بالتفاقم. لذا، وبفضل توفر مصادر الطاقة الهائلة، تبقى تقنية التحلية الأمل الأساسي لحلّ مشاكل الجفاف. في الواقع، سيتم استثمار حوالي ٣٠٠ مليار دولار أمريكي في مشاريع المياه وتحليتها في منطقة الخليج بين عامي ٢٠١٢ و ٢٠٢٢ يدعمه اقتصاد منتعش ونموّ سكاني.

بالإضافة الى ذلك، تبذل حكومات الخليج جهوداً لتطبيق تشريعات للحفاظ على الماء مع تركيز خاص على تحلية المياه ومعالجة المياه المبتذلة لتلبية الطلب المتزايد على المياه. كما تقوم هذه الحكومات بتثقيف الجماهير من أجل المحافظة على المياه. وتزيد الحكومات الإقليمية اعتمادها على الطاقة المتجددة تحضيراً لمرحلة ما بعد النفط. ومن المتوقع أن يتم استثمار حوالي ١٠٠ مليار دولار أميركي في قطاع المياه بين عامي ٢٠١١ و٢٠١٦ لتحسين تقنيات تحلية المياه بما فيها الطاقة الشمسية وزيادة الاعتماد على معالجة مياه الصرف الصحي وعلى إعادة التدوير.

يتابع عدد أيلول (سبتمبر) ٢٠١٢ من مجلة عالم المياه العربي جهود منطقة مجلس التعاون الخليجي المتواصلة من أجل محاربة ندرة المياه بالإضافة إلى آخر المشاريع والتقنيات المستعملة من أجل الفوز بهذا السباق بدءا من تغطية أوجه زيادة ملوحة التربة في بعض الدول العربية في الصفحة ٣٥ إلى الطريق الطويلة التي تنتظر القطاع المائي في العراق في الصفحة ٤٢ ثمّ نموّ تركيا وتأثيره على مشاريع المياه والطاقة المحلية. كما يضيء العدد على أهم مشاريع المياه الإقليمية وآخر توجّهات السوق فاستمتعوا بقراءته وأرسلوا لنا تعليقاتكم وتصريحاتكم على content@cphworldmedia.com

Fathi Chatila
Editor-in-Chief

فتحي شاتيلا
رئيس التحرير

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Bahrain

Bahrain Adopts Novel Sewage Plant Technology

Bahrain has deployed micro-tunneling technology to ensure the creation of USD292 million sewage treatment plant that does not disrupt residents or traffic. The technique, which is being used in the country for the first time, is a sign of its progress as a modern nation, according to former Swiss president *Moritz Leuenberger*. 'It is a vital process for the health of people and reflects the ambitious modern approach by Bahrain in attracting the best technology,' he said as he attended the official launch of the project. 'Using tunnels in the collection and transportation of wastewater to treatment plants is the most up-to-date technology. It is safe, has a long operation life, lower cost of operation and maintenance and it should reduce the use of pumping stations. 'The three-year project involves creating a tunnel of up to 15km that will have a capacity of up to 160,000 cubic meters of sewage a day and cover the areas of Busaiteen, Arad and Hidd. Leuenberger is head of the Swiss federal department for the environment, transport, energy and communications and a director of Swiss company **Implenia**, which is carrying out the project. He said the construction of sewers by tunneling was faster, less of a nuisance for residents and more economical.

Egypt

EU Grants USD 565 Million for Infrastructure in Egypt

The Egyptian European Partnership Program will provide soft loans of up to USD565 million to finance power, water and road projects in Egypt in 2013, a senior official has recently announced. "The funding is distributed over several vital sectors essential for the rehabilitating of Egyptian infrastructure," said Ambassador *Gamal Bayoumi*, secretary general of the Egyptian European Partnership at the ministry of international cooperation. The sectors include renewable energy, comprising solar and wind power projects near the Red Sea. Furthermore, the construction of new roads, including the Cairo-Alexandria desert road, and the restructuring of the water and sewerage sector are also included in the financing package, he said. Egypt, which is facing internal funding shortfalls after economic growth was negatively affected by more than a year of internal strife that overthrew the dictatorship of Hosni Mubarak, has requested loans from the Gulf region as well as the International Monetary Fund. Central bank reserves have dropped from USD 36 billion at the start of January 2011 to USD 14.4 billion at the end of June 2012.

Jordan

Jordan Ends Decision on Oil Prices Increase

Jordan King Abdullah II has recently ordered to halt the government's decision to raise fuel prices after protests against the decision in the country. A statement by the King's office said that King Abdullah II ordered the Prime Minister, *Fayez Tarawneh* to halt Friday's decision. Furthermore, the decision was to increase of prices on all oil produced types and diesel, a seven to 10 percent increase which ignited protest in Jordanian cities, including demands on members of parliament, 89 out of 120 members, to call for a vote of confidence on government. Based on official Jordanian records, the country imports 97 percent of its energy needs, reaching the first half of 2012 USD 3.5 billion in oil government purchases.

Oman

Oman to Invest over USD100 billion in Energy Sector

Investments in Oman's mainstay oil and gas industry are projected to exceed USD100 billion over the next ten years, underscoring the sector's preeminent role in fuelling the country's long-term socio-economic development. According to a top official of the Ministry of Oil and Gas,

the outlay -- the biggest ever in the Sultanate's modern history -- is central to the government's goal of sustaining oil and gas output over long-term. "Investments in the oil sector over the 2013-2022 timeframe will be in excess of USD60 -- 70 billion," said *Shaikh Ali bin Thabit al Battashi*, Adviser to the Ministry of Oil and Gas. "In the gas sector alone, Oman will invest more than USD40 billion in exploration and production activities. Thus, over the next 10 years, we will see a gross investment in oil and gas of over USD100 billion -- 110 billion," he added. Shaikh Ali said the allocations underscore long-term confidence in Oman's pivotal oil and gas industry.

Iran

Iran Increases Power Generation Capacity by 4GW

Iran's power electricity generation capacity has been increased by four gig watts (GW) since the beginning of the current Iranian year (March 20) compared to the same period last year, the deputy energy minister has recently said. The national power generation capacity currently stands at 65.2 GW, *Mohammad Behzad* announced. Furthermore, Iran will roll out 12 new power projects by the end of the sixth calendar month of Shahrivar (September 21), which will boost the national electricity generation capacity by around 2000 megawatts (MW). Behzad noted that over USD1.4 billion has been invested in the projects. Furthermore, the Energy Ministry plans to increase the electricity generation capacity by five gig watts (GW) this calendar year, which began on March 20, Behzad added. By the end of the Fifth Five-Year Economic Development Plan (March 2016), Iran will boost its electricity generation capacity by 25GW to reach 73GW, Energy Minister *Majid Namjou* said on February 7. Iran currently trades power with Turkey, Armenia, Turkmenistan, Azerbaijan, Pakistan, Afghanistan, and Iraq.

Saudi Arabia

Saudi Inks Water, Sewer Contracts

Contracts worth USD151 million for 26 water and sewage projects across the Kingdom were signed by the Saudi Ministry of Water and Electricity. *Abdullah bin Abdulrahman*, Minister of Water and Electricity said the contracts include completion and upgrading of water networks in Hail city totaling USD25 million within a 30 month deadline; implementation of sewage networks in Jouf region totaling USD17 million with completion in 36 months; and implementation of a water transportation line from the purification plant at Wadi Bish Dam to Raith. Construction of water projects and storage tanks in the Eastern Province will cost USD15 million and be complete in 24 months; phase two of the sewage networks in Hail City will cost USD15 million with completion in 24 months; treated sewage water transportation lines and inter-city networks in Najran city will cost USD12 million with a 30 month deadline; and a water purification plant in Ghat will cost USD7 million with completion in 24 months.

Water Treatment
Filtration and Separation

Wastewater Treatment
Recycling & Water Use

Desalination Technology
Multistage Flash

Photo Courtesy of Membrane (Italy)

Watering a World of Opportunities

With increasing efforts by end-use industries to curtail use of water and minimize costs on waste disposal, the global market for membrane separation technologies is forecast to reach USD16 billion by the year 2017. At the same time, RO membranes remain the largest technology and are set for fast growth. Reaching USD1.3 billion in 2020, they will continue to be the biggest segment of the market.

Global membrane separation technologies continued growth

The global market for Membrane Separation Technologies is forecast to reach USD16 billion by the year,2017 driven by the increasing adoption of the technology across various end-use markets as reported by **Global Industry Analysts) GIA .(**Growth in the market would be spurred by increasing efforts by end-use industries to curtail use of water and minimize costs on waste disposal .Additional factors fuelling market growth include increasing concerns over water quality ,stringent regulations with respect to the quality of food and beverages ,and a shift towards replacing conventional filtration equipment with membrane based technologies.

" The global market for Membrane Separation Technologies is forecast to reach USD16 billion by the year 2017"

According to GIA ,increasing global population is exerting an unprecedented pressure on the sustainability of supply of clean water to the people .As the global population increases from the current 7.0 billion to a projected 9.0 billion by ,2050 demand for clean and potable water is expected to increase in tandem .Although water is in abundance in the world ,it is the availability that becomes an issue .Across several countries worldwide ,accessibility to clean water is reducing alarmingly .One of the solutions for addressing this issue is the reuse of water but this requires the use of advanced technologies ,such as membranes technologies.

GIA adds that the market for membrane separation technologies is expected to exhibit significant growth in demand ,attributed to the wide adoption by key end-use segments ,such as wastewater and water treatment ,and food and beverage industry ;replacement of traditional filtration equipment ;and increased focus on the purity levels of process fluids.

As stated by the new market research report on Membrane Separation Technologies by GIA ,the US continues to remain the largest regional market .Asia-Pacific represents the fastest growing regional market ,displaying a CAGR of about 8.3% over the analysis period .Microfiltration membrane systems continue to be the largest segment in the market .Owing to the wide adoption ,microfiltration market is relatively more mature than other membranes.

Reverse osmosis leads water filtration membranes market

Reka Sumangali, a research associate at **Lux Research** and the lead author of the report "Filtering out growth prospects in the USD1.5 billion membrane market", said: "Despite the groundswell of growth opportunities beyond Reverse Osmosis (RO) desalination, entrepreneurs and investors contemplating a leap into the membrane market can expect some challenges ahead. A lack of differentiation is driving down product prices, while development of more efficient, longer lasting membranes will keep margins low."

According to the same report, RO membranes are the largest technology, but ultrafiltration is set for fast growth. Reaching USD1.3 billion in 2020, RO membranes will continue to be the biggest segment of the market. However, fueled in part by their promise in treating municipal wastewater, industrial process water, and other types of water, ultrafiltration membranes should see a healthy 6.5% compound annual growth rate, expanding from USD0.4 billion in 2009 to nearly USD0.7 billion in 2020.

The report adds that although market size grows for RO, profits become more elusive. RO membrane prices have been eroded by a lack of differentiation, and undercut by competition from Chinese manufacturers. Providers have fought back by bundling value-added services and chemicals with their membranes, or tapping new technologies to improve membrane performance. But the limited number of solutions has forced most providers to pursue similar paths, and the lack of differentiation – and cost erosion – will persist. ■

Prepared by:

Rodrigue El Balaa
Managing Editor & Researcher

مع زيادة الجهود المبذولة من قبل صناعات الإستخدام النهائي للحدّ من استهلاك المياه وتخفيض تكاليف التخلّص من النفايات، تتوجه سوق تقنيات الفصل بالأغشية العالمية للإرتفاع، لتصل إلى حوالي ١٦ مليار دولار أميركي بحلول عام ٢٠١٧. في نفس الوقت، تبقى أغشية التناضح العكسي التكنولوجيا الأوسع وهي تستعدّ للنموّ السريع. مع التوقّع بوصول قيمتها إلى حوالي ١،٣ مليار دولار أميركي، بحلول عام ٢٠٢٠، ستبقى تشكّل الجزء الأكبر من السوق.

Schroeder Introduces AMFS

Schroeder Industries, a recognized company in filtration and fluid conditioning products, introduces its Asset Management Filtration Station® (AMFS). Schroeder's new technology provides ultra-efficient, cost-effective filtration with complete fluid quality monitoring, tracking and reporting capability via Schroeder's enhanced Asset Management software program, in one unit. The AMFS is equipped with an on-board PC and controller that log all of the data, while flushing, filtering and monitoring to ISO cleanliness all at the same time. The data is summarized into a simple Microsoft® Excel report tracked by the equipment ID number for easy import into most maintenance programs. AMFS is completely automatic, and can be programed to run until the desired cleanliness codes are achieved. The touch screen display provides real-time graphics for easy monitoring of the filtering progress.
Schroeder Industries, an ISO 9001: 2008 certified company, designs, manufactures and markets filtration products for the hydraulic and lubrication, filter systems and process and fuel industries. Their expertise in filtration technology, superior filter and element technology capabilities, dedication to customer service and

product support are the reasons Schroeder specializes in Advanced Fluid Conditioning Solutions™. For more than half a century, the company's innovative efforts to develop value-engineered products have been recognized with 33 patent awards. Nine of those have been issued in the past 4 years, indicating that Schroeder remains at the forefront in the fields of fluid conditioning, diagnostics, and specialized energy products. ■

The H2O Solution

With 12 years of experience developing high-performance water treatment solutions, **H2O Innovation** is a key player in the global market of clean technologies and membrane filtration. As a complete membrane filtration solution provider, the company provides integrated technological water treatment solutions based on membrane filtration technology and focuses on three main target markets: municipalities, energy and mining. It designs, manufactures, and assembles

H2O's RO System

state-of-the-art custom-built water treatment systems for the production of drinking water and industrial process water. H2O Innovation has also developed expertise for the reclamation and reuse of water, and the treatment of wastewater. H2O Innovation uses its unique expertise in membrane technology to develop superior solutions. The company offers solutions that use microfiltration (MF), ultrafiltration (UF), nanofiltration (NF), and reverse osmosis (RO) for an optimal performance. It also provides products and services for maintaining and operating municipal, industrial, and commercial RO systems. H2O Innovation offers a unique line of patent-pending sustainable specialty chemicals for membrane systems, marketed under the Professional Water Technologies™ brand. With over 550 systems in operation around the world, H2O Innovation has built itself a solid list of references and ranks as the 17th largest global supplier of membrane desalination systems, according to data provided by **Global Water Intelligence**. An independent solution provider with no commercial ties to specific component manufacturers, H2O Innovation uses the best products and technologies available to design, build, and deliver custom solutions—ensuring clients optimal design and operational efficiencies. ■

Cost-Effectiveness Guaranteed

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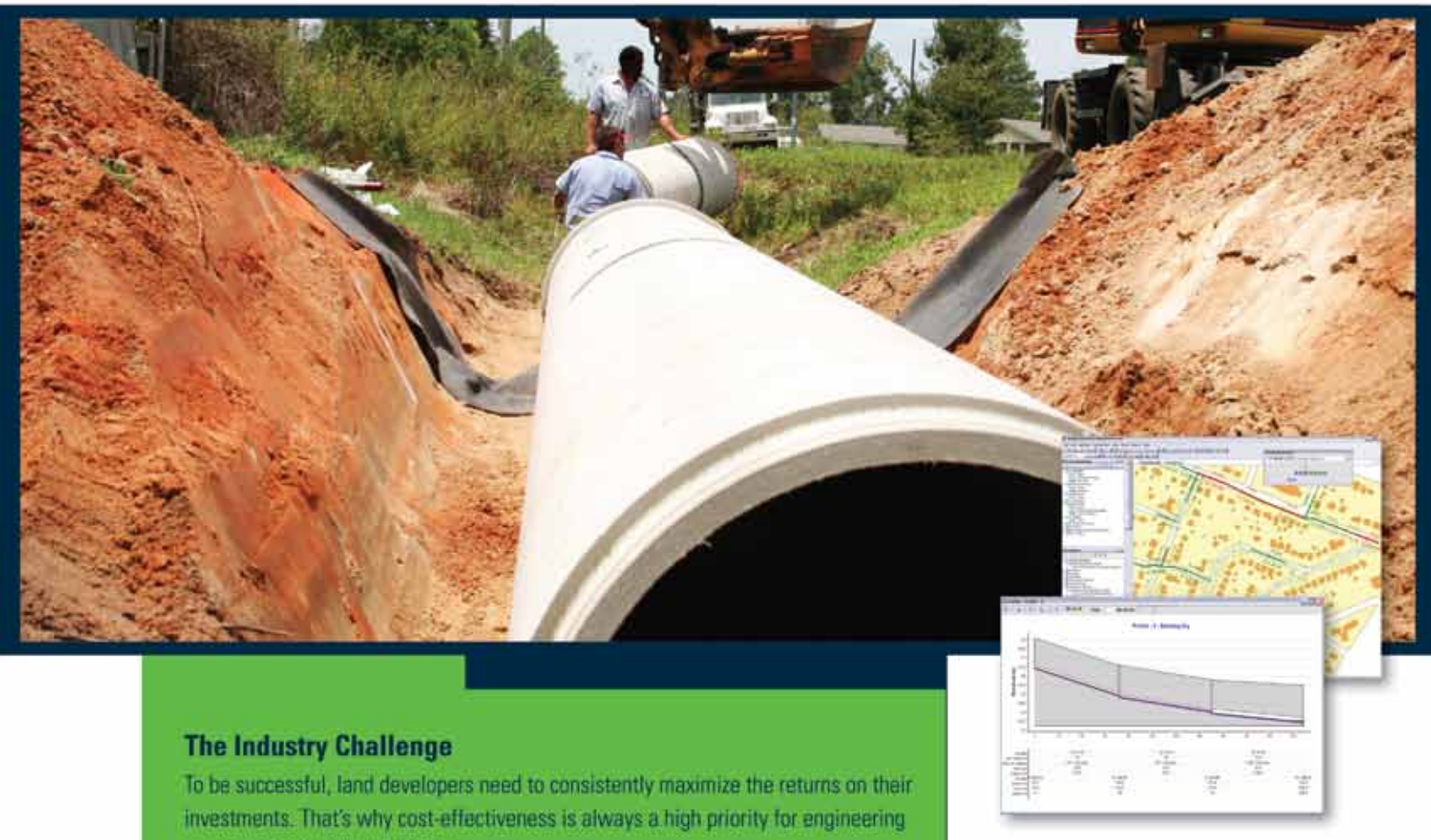

The Industry Challenge

To be successful, land developers need to consistently maximize the returns on their investments. That's why cost-effectiveness is always a high priority for engineering teams delivering these projects.

The Solution

With Bentley's easy-to-use hydraulics and hydrology software, water professionals are ensured the ability to cost-effectively deliver quality land development projects – through advanced functionality providing:

- Accurate analysis and automated design for high quality design projects
- Customizable model outputs for streamlined regulatory approval process
- CAD- and GIS-platform support to reduce project design time

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"We have applied Bentley's SewerCAD® software on several important projects with great success.

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– Ryan Johnson, program manager
Veolia Water

Bentley
Sustaining Infrastructure

The FILTER Series© for Brine Filtration

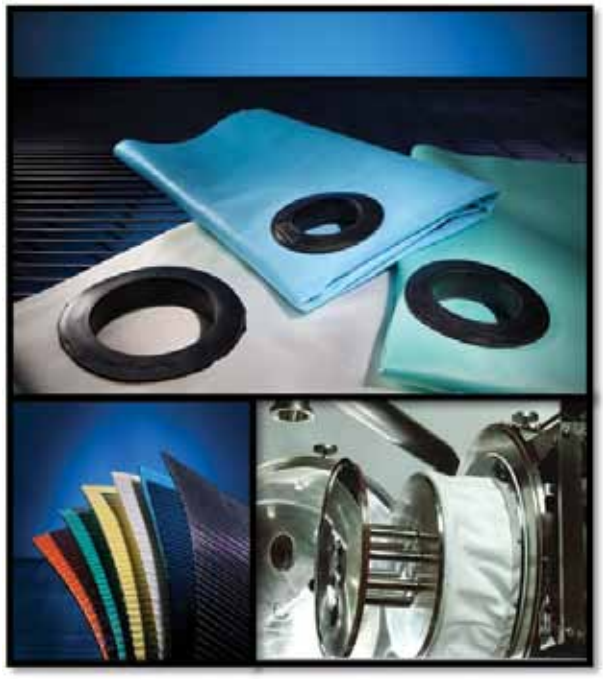
The FILTER Series© units for Brine Filtration employ top notch technology to produce ultra-low suspended solids content in briny waters. The systems' compact size, low power requirement and high reliability offer easiness of use and industrial ruggedness. The systems come pre-assembled with standard instrumentation that allow for immediate use. **Membrane SRL**'s Brine Filtration units come standard with SS 316L and two back-washable polymeric cartridge sets. The package units are designed and assembled for inshore and offshore installations. This highly efficient filtration system (down 0.5 micron) has typical product flow rates ranging from 10 to 500 m3/h in the single skid configuration. Multiple skids allow for achieving any flow rate. On request, the technology features a bag filter installed upstream to minimize backwash cycles. The selection of bag filters along with the special cartridges used, achieve very efficient removals of particles and traces of oil. Raw water is filtered outside-in by cartridges, while backwashes use water and/or air thus optimizing the removal of suspended solids and oil. All Brine Filter© units are skid-mounted, preassembled, pretested and are easily transported. Standard

The package units are designed for inshore and offshore installations

or customized, the Brine Filter Series© size is compact and requires small volumes for installation and very few connections. Being standard or ASME UStamp, the series is built with SS 316L or higher alloys (Duplex, Superduplex, CuNi 90/10 and Marine Alloys) for strong resistance to chemicals and environmental conditions. ■

The "Clear Edge" of Filtration

Clear Edge Filtration is proud to supply an extensive range of filter media products to meet the demands of new developing technologies in water recycling processes. Its filter belts and filter fabrics go into a number of waste water and water recovery applications including waste water recycling, Municipal sewage waste recycling, industrial waste water recycling, third stage filtration and effluent treatment. Within these applications, Clear edge is a market specialist supplying a variety of filter media including; de-watering belts for gravity belt thickeners, filter belts for sludge thickening belt presses in tertiary filtration widely used in municipal sewage and effluent treatment, filter cloths for filter presses in mud and sand removal – Primary and Secondary filtration processes, filter belts for rotary vacuum drum filters and horizontal vacuum belt filters, as well as spiral belts used in various waste water treatment applications. The Clear Edge group has over many years of combined experience in filtration textile manufacturing techniques with roots from previous its companies such as **P&S Filtration**, **Scapa filter media**, **Scandiafelt**, **Verseidag**, and **Madison Filter**. This long line of experience coupled with a state of the art filter media development lab has led to becoming a global specialist in industrial process filtration solutions. Clear Edge works together with OEM's, end users and filtration professionals across the globe so the technical team of experts understands all factors involved in waste water applications. ■



Clear edge supplies a variety of filter media

Great Prospects
for the Water Recycling Market

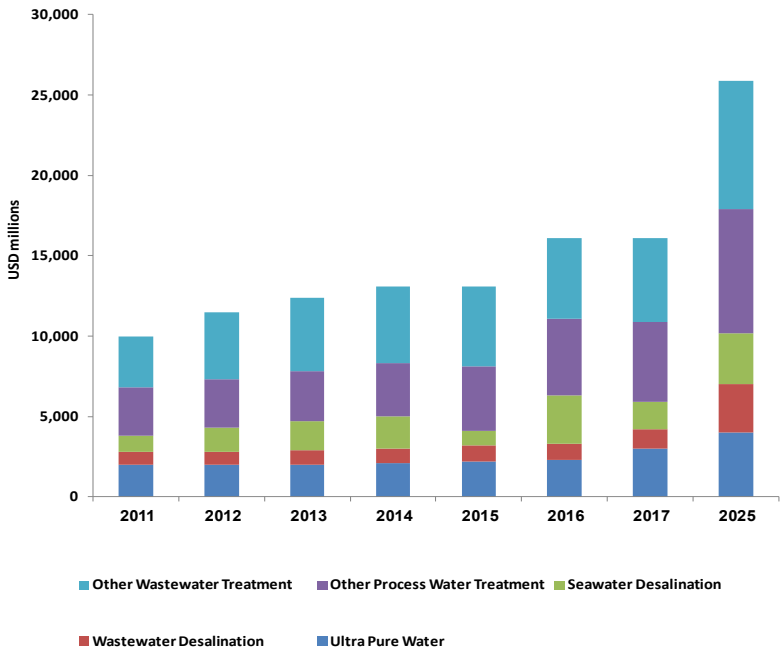
The economic importance of water is expected to increase sharply with the growing imbalance in water demand and supply, and a steady rise in water prices. Water is no longer a low-cost commodity that was previously taken for granted; global water crisis is likely to worsen in the coming years due to population explosion, increasing industrialization and overexploitation of resources. According to some experts, the solution lies within the USD 29 billion water recycling and reuse (WRR) technologies market. Driven by the depletion of water resources, the public's awareness of water conservation products, government incentives and decreased implementation costs, this market is projected to experience a 16% growth rate to reach USD 57 billion in 2015.

"Terms such as 'peak water' and 'blue gold' are becoming more commonplace"

Pushing water reuse forward

The demand for water recycling and reuse technologies continues to increase across all market sectors: municipalities are installing water recycling systems for cities and towns dealing with water shortages; the industry is looking to recycle its wastewater to abide by ever increasingly stringent regulations and codes; commercial buildings are going 'green' and implementing large recycling schemes as part of a 'whole systems' approach; residential mechanisms are being put in place to reduce consumers' water bills and to counteract inhibitory water restrictions. Global trends like water scarcity and natural resource constraints are driving expenditure on advanced water technologies which go beyond what is commonly accepted to be desalination. The world is facing weather changes that are dramatically affecting water resources. Glaciers are melting faster than they can be recreated and aquifers are being drained faster than they can be replenished. Much of the world's surface water has already become depleted and polluted. Population growth and water demand are outpacing water resources. Many regions of the globe are experiencing increases in both physical and economic water scarcity. Terms such as "peak water" and "blue gold" are becoming more commonplace. The bottom line: water is becoming more and more valuable.According to **SBI Energy**'s study "Global Market for Water Recycling & Reuse: Filtration Systems", the value of the membrane filtration systems sector of the water recycling and reuse market increased by USD4 billion in the three-year period from 2006 to 2009. The sector is expected to continue its exceptional growth. Wastewater reuse can help conserve the supply of freshwater, and this presents clear advantages with respect to environmental protection. In countries where industrial wastewater reuse is important, it is not only because of the lack of water but also because of government enforcement through legislation. In mainly developing countries, water reuse is practiced for other purposes, mainly agriculture, while industry focuses more on reducing water consumption.

Graph 1: The growth in industrial desalination & water reuse over the coming years



Source: Global Water Intelligence

It's all about the "need"

Many factors around the world are fertilizing growth in the WRR market, while some major hurdles seem to be slowly disappearing. The greatest driving factor is simply the "need". It is often - not always - the case that the greater the need for WRR systems in a region, the greater the market. The future of the WRR market is promising. With an increase in the number of large projects and an increase in the number of involved companies, the market is expected to nearly double by 2015. ■

Prepared by:
Rawand Fakih
Assistant Editor & Researcher

تزداد الأهمية الاقتصادية للمياه مع زيادة اختلال التوازن في العرض والطلب عليها والإرتفاع المطرد للأسعار. لم تعد المياه سلعة قليلة الكلفة أو دائمة الوجود، إذ من المتوقع أن تزداد أزمة المياه العالمية سوءًا في السنوات المقبلة بسبب الإنفجار السكاني وزيادة التصنيع والإستغلال المفرط للموارد. بحسب بعض الخبراء، فإن الحل يكمن في سوق إعادة تدوير المياه واستخدامها، التي يبلغ حجمها ٢٩ مليار دولار. من المتوقع أن تشهد هذه السوق معدل نمو بنسبة ١٦٪ لتصل إلى ٥٧ مليار دولار في العام ٢٠١٥، باعتبار أن الأسباب الرئيسية لهذا النمو هي استنزاف الموارد المائية، والوعي المتزايد لمنتجات معالجة المياه، والحوافز الحكومية وانخفاض تكاليف التنفيذ.

Innovative Biological Treatment and Sludge Management

By Allison Blodig & James A. Bell

How often does the topic of wastewater treatment come up in general conversations? From **Bio-Microbics** social media conversations, the topic of wastewater is brought up quite a bit complete with linking articles and touting yet another expansion at a municipal plant to keep up with demand. However, it seems that the general population is unaware of the possible water crisis looming in their city and that the concerns of their city's infrastructure should be made a higher priority than other concerns, like the economy.

The possibility of using Decentralized Sewage Treatment Plants (STP) in place of expanding existing centralized plants makes more sense when focusing on pretreatment or water reuse opportunities. Several considerations, including operation and maintenance and sludge management, need to be taken into account with Innovative, decentralized sewage treatment technologies; and Bio-Microbics has done this with systems such as the MyFAST® HS-STP™ High Strength-Sewage Treatment Plant.

Frost & Sullivan's research has found that the FAST® Fixed Integrated Treatment Technology, with its new advancements in decentralized wastewater systems, have made these systems easy to install, reliable, effective and affordable. "Bio-Microbics' FAST technology has successfully met stringent treatment standards, thus causing a major headache for the competition who's systems are not able to offer these reuse options." Frost & Sullivan believes that this reuse feature will open up a number of application opportunities for the FAST technology, especially with commercial outlets where the ability to generate large quantities of recycled water is possible.

Decentralized sewage treatment technology is ideal for projects with land constraints and flows of up to 160,000 gallons per day or more. An important advantage to onsite wastewater systems is the ability to design systems to treat wastewater and develop 'reuse opportunities'. As most of the treatment occurs inside the tank, the effluent is more than 95% free from solid and waste. The treated wastewater is then available to replenish groundwater and aquifers, or in some cases, it could be made available for grey water reuse. Water reuse opportunities include use in toilets for flushing, lawn and landscape irrigation, firefighting, and more. Frost & Sullivan's unbiased report compares the FAST technology verses competitors in its marketplace and recognized the FAST system with its consistent performance, easy installation, and minimal maintenance requirements. "In addition, the FAST systems boast long-term reliability; while complying with global

regulations. These factors, in concert with the cost/time saved on maintenance and install [when compared to competing systems], will provide customers with unmatched value and optimal ROI," according to the Report.

Conclusion

Whether the project is to help defer plant expansion, promote pretreatment, post secondary upgrade options, or to develop the entire treatment scheme, decentralized technologies can help to reduce costs and greatly contribute to the health and well-being of the community. Cities cannot ignore the infrastructure issues they are facing today or those that may be coming in the next few years. As water-related issues escalate in major cities across the world, the important role of water must be recognized and smartly managed to improve conditions for people, the environment and job growth. Poor management or a gap in infrastructure means a community is vulnerable to higher water rates, greater long-term debt and future economic challenges. ■

TETRA Denite Denitrification for China

TETRA Denite acts as a bioreactor to achieve denitrification

Severn Trent Services recently signed a contract with the Yangtaizi Wastewater Treatment Plant in the city of Bengbu in China's Anhui Province, to provide a TETRA® Denite® denitrification system for its Phase II project - a water pollution control development with a USD 41 million investment. The system is capable of simultaneously removing total phosphorus (TP), nitrate-nitrogen (NO3-N) and total suspended solids (TSS) to meet the stringent Level 1 A standard for effluent discharge. The TETRA Denite denitrification filter technology has more than 30 years of experience in secondary, tertiary and advanced wastewater treatment applications throughout the world. TETRA Denite acts as a bioreactor to achieve denitrification; the technology allows the growth of microorganisms on the gravel surface and filter layer. Such biological treatment processes can also achieve Level 1 A standard quality of effluent discharge through secondary wastewater treatment. The TETRA Denite system is both a fixed-biofilm bioreactor and a deep bed filter, whose main function is to remove NO3-N and TSS. TP is reduced by adding flocculant to meet a high standard of effluent discharge. The Denite denitrification filter is capable of simultaneously removing NO3-N, TP and SS to meet the extremely stringent discharge requirements in a single step, which greatly reduces the floor space, capital investment costs and operating costs while ensuring space for future upgrade and transformation. ■

Orival Filters: Superior Performance

Orival, Inc. provides a wide array of automatic self-cleaning filtration equipment to prepare wastewater treatment plant (WWTP) effluent for reuse. The company's products also remove suspended solids from effluent for landscape and athletic field irrigation, flush water for toilet and urinal flushing in public buildings, cooling tower make-up water, industrial cooling and aquifer recharge. Whatever the reuse application, Orival filters will meet the required water quality standards for suspended solids. They come in hydraulic or electric operated models with single filters capable of handling flow rates from 6 m3/hr. to 2,700 m3/hr. Multiple units can be mounted in parallel on Orival manifolds to maximize screen area for difficult applications or very high flow rates. ■

Letting the Cloud Smell the Waste Water

Displaying real time odor plumes overlaid on a local map

The world does not necessarily need more smartphone games. But it could use more solutions that address the needs of business people with specialized needs, such as Like Waste Water Treatment Plants (WWTP). That's why, **Odotech** offers its OdoWatch, a software accessed via a Web browser that embodies the latest in Odor monitoring and tracking technology. The software, connected to an electronic nose network which is also connected to a weather station, displays real time odor plumes overlaid on a local map. The WWTP can now see, track and monitor odor 24/7, all year long. In essence, Odotech has built the technology to allow any WWTP to benefit from Odor data science. The value of the data provides operational and capital savings, helps operators meet regulatory/permitting compliance, be proactive and be a good neighbor while defending against false accusations and overall better plant management by being alerted in advance. Odotech, founded by a young man who earned a Masters in Applied Science (Odor), has created new hardware and software technology for Odor monitoring, tracking and analysis. Named OdoWatch, it allows WWTP's to control odor emissions far more cost-effectively than before, says *Thierry Pagé*, the founder. Waste Water Treatment Plants are waking up to the fact that odor is a nuisance and there is a solution to tracking, monitoring and controlling odors based on existing technology and science. ■

Reclaimed Water Reuse: Opportunities in the Middle East

*By Robert Maliva**

Drip irrigation utilizing reclaimed water at a commercial aloe vera plantation

Developing a safe and reliable water supply is a major challenge in the Middle East and will be increasingly difficult in the future. It is widely understood that reclaimed water (also referred to as treated sewage effluent) is a valuable resource rather than just a disposal problem. Reuse of wastewater will inevitably play an increasing role in water supply development throughout the Middle East, particularly for non-potable uses, such as irrigation. An important issue facing water managers in the Middle East, though, is obtaining maximum water resources and socioeconomic value from reclaimed water. Evaluation of reclaimed water reuse and storage schemes must also consider protection of public health, the environment and local groundwater resources. Although both direct and indirect potable reuse of reclaimed water can be safely performed, these options typically elicit strong public opposition. A key element for reclaimed water reuse schemes is a risk assessment to determine potential threat to public health through either the water or the food supply. Where reclaimed water enters the groundwater environment, it is critical to determine the direction and rate of its movement over time.

In many cities in the Middle East, the supply of reclaimed water currently exceeds demand, and excess water is disposed of by discharge to valleys, lakes and seas. Opportunities exist to store currently available excess reclaimed water underground in aquifer storage and recovery (ASR) systems for later beneficial use. Aquifers that currently contain either brackish or saline water, and are thus not potential potable water sources, exist in many areas of the Middle East and can safely be used for underground storage of reclaimed water. Reclaimed water ASR systems could also be geographically separated from potable water supply wells in order to provide very long travel times.

The attenuation of many contaminants is well documented during the transport and storage of reclaimed water underground. Contaminants include pathogens, which are the primary health concern associated with reuse systems. Storage of water in ASR or other types of managed aquifer recharge systems is strategic for some systems as a wastewater treatment (polishing) element. The reuse of reclaimed water should not be considered in isolation. Reuse of reclaimed water is fundamental to integrated water resources management. All available water supplies and demands need to be considered, and integrated solutions should be developed to most effectively meet the needs of Middle Eastern countries while protecting public health and the environment. ■

Robert Maliva is a principal hydrogeologist with Schlumberger Water Services. He has a Ph.D. in geology from Harvard University and has held research positions at the University of Cambridge, England, and the Rosenstiel School of Marine and Atmospheric Science at the University of Miami. He has been a consulting hydrogeologist for the past 20 years and specializes in alternative water supply, injection well, and aquifer recharge projects. Dr. Maliva has published two books and numerous technical papers on water supply issues.

Advances in Seawater Desalination Using Nuclear Power

By Aiman E. Al-Rawajfeh & Ibrahim Khamis

*Water experts agree on the importance of seawater desalination using nuclear energy, as desalination became an inevitable option for the production of potable water. It is a reliable and economical way to alleviate global concerns on climate change and water scarcity issues. In its way to shed the light on this subject, the **International Atomic Energy Agency's (IAEA)** held a technical meeting (TM) on "Advances in Seawater Desalination using Nuclear Power" in the agency's headquarter in Vienna, Austria from 2-4 July, 2012. The following report is a summary of the meeting, with some recommendations put to help promote nuclear desalination.*

Photo Courtesy of Hitachi Zosen Corporation

Background

With the increased challenges to meet global water scarcity, seawater desalination (among other alternatives such as water reclamation, water conservation; improved infrastructure; and rational polices on integrated water management) is becoming an alternative choice in many countries. Yet, despite major advancements in desalination technologies, seawater desalination is still an energy intensive process which causes major concerns about potential environmental impacts. Desalination, in general, uses electricity and a variety of heat sources. The selection of a suitable desalination process depends typically on several factors including fuels used and the location of the plant. Currently available nuclear power reactors can generate both the heat and electricity needed to drive any desalination process. Moreover, nuclear power plants offer additional incentives such as availability of large quantity of steam (compared to thermal power plants) and in some cases large amount of waste heat that could be used for desalination.

"MSF and RO technologies, dominate the desalination market for large-scale production"

Interest in seawater desalination has risen during the last years due to major improvements in the efficiency of the equipment and energy recovery devices. Plants with a cumulative capacity of more than 5 million m3/day are installed each year. There have been also discussions for novel technologies that can substitute the current ones and improve dramatically the performance and the economics of such plants. As a result interests in seawater desalination using nuclear energy has expanded. Desalination projects have continued to advance in India, Pakistan, Republic of Korea, and nuclear seawater desalination initiatives are now underway in several developing countries. However, developing the most appropriate plant configuration of nuclear reactor and desalination process is indeed the crucial factor that affects the feasibility of 'Nuclear Desalination'. It is expected that this meeting would help catalyze current activities in some Member States and discuss prospects of nuclear desalination, its econom-

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ics and experiences from recently demonstrated projects in India and Pakistan.

Importance of desalination

Desalination has become a promising alternative and viable way to bridge the gap between water demands and the deficit in fresh water supply and has been adopted by 120 countries in the world. Luckily, the Middle East and North Africa (MENA) enjoy a relatively high intensity renewable (RE), such as solar and wind energies and nuclear energy (NE) resources. Matching RE and NE with desalination systems present a real challenge. Widely available methods for desalting are the multi-stage flashing (MSF), multi-effect distillation (MED), vapor compression (VC), reverse osmosis (RO), electrodialysis (ED), etc. However, only two of the aforementioned desalination technologies namely, MSF and RO technologies, dominate the desalination market for large-scale production. The MSF plants are widely used in the MENA regions, and this can be attributed to two factors: (i) the higher seawater salinity in the regions and the frequent surface contamination from bacteria blooms (algae/red tides); (ii) the availability of low cost fossil fuels in the regions presents an easy integration of thermal desalination methods with the steam or gas turbine power plants.

"Seawater desalination using nuclear energy is an inevitable option for the production of potable water"

According to *Ibrahim Khamis* and *Kavvadias* from the **International Atomic Energy Agency (IAEA)**, seawater desalination using nuclear energy is an inevitable option for the production of potable water. It is a reliable and economical way to alleviate global concerns on climate change and water scarcity issues. However, producing potable water from a co-located nuclear power plant raises some concerns regarding pathways of contamination of radioactivity to the final water. In order to eliminate all contamination pathways, the standard practices and innovative measures have to be taken during design and operation which are sufficient to prevent such contamination. Measures such as design of intermediate loop, implementation of pressure reversal, innovative measures like heat pipes and online or batch water monitoring during operation are proven to be sufficient to prevent radioactive contamination and drop it even to lower levels than conventional desalination plants. Yet, it cannot be predicted with sufficient certainty that nuclear desalination will be accepted by the public in every case. Therefore, proper communication based on facts must be estab-

lished with the public in order to demonstrate the safety of this technology based on current experience. The dissemination of data from existing facilities in many countries could alleviate the concerns and improve the public perception for the nuclear desalination plants.

Summary of the work done and results achieved

The Technical Meeting was opened officially by *T. Koshy*, Head of the Nuclear Power Technology Development Section (NPTDS) of the IAEA's Department of Nuclear Energy. The Scientific Secretary, Ibrahim Khamis of NPTDS, opened the meeting with words of welcome and thanks to the participants. After an introductory overview of nuclear desalination status worldwide and relevant IAEA activities, Khamis provided the background and expectations for the work throughout the meeting.

The meeting program was agreed by the participants and *J. Martinez* Sanchez was appointed as Chairman. The first and second sessions were devoted to the presentations of the participants. Highlights of each presentation are presented below:

1. E. Muralev (Kazakhstan) talked about "Lessons Learned from Aktau Nuclear Desalination Plant Aktau complex".
2. M. Majumdar (India) delivered a lecture on "Demineralized Water Production with Waste Heat from Nuclear Plant".
3. Meenai (Pakistan) presented "Experiences and Prospects of Nuclear Desalination: Pakistan Perspective".
4. S.S.E. Motyaser (Egypt) presented "Simulation of PWR Power Plant Coupled with MED Desalination Plant".
5. A. Al-Rawajfeh (Jordan) presented his experiences on "Prevention of Scale Formation in Desalination Plants".
6. J. Martinez Sanchez (Spain) emphasized on "Nuclear Desalination as an Alternative to Water Scarcity in Spain"
7. S. Shen (China) presented a lecture on "Performance Analysis of Desalination Plant Coupled with NPP".

Objectives of the TM

The purpose of the meeting was to exchange information on:

- Potential advances that could improve the performance of nuclear desalination
- Use of waste heat to improve the economics of nuclear desalination
- Use of off-peak electricity/steam for seawater desalination
- Status and maturity of novel low temperature desalination processes
- Potential of coupling new state-of-the-art desalination technologies with nuclear reactors
- The effect of the above on the economics of seawater desalination both for single purpose desalination and for the cogeneration of electricity and water

"Compared to RO, thermal desalination processes are a preferable option for water production when waste heat is available"

Conclusions and Recommendations

The following points were concluded:
- Security of water supply is a very important dimension of nuclear desalination for NPPs.
- Low temperature desalination process could make nuclear desalination more economical, hence, more viable option.
- Compared to RO, thermal desalination processes are a preferable option for water production when waste heat is available.
- Cogeneration option (i.e. electricity and water production) is more suitable for many MSs.
- Lack of sufficient communication and social awareness of nuclear desalination are limiting factors for its expansion.
- Participants appreciate IAEA Tools (DEEP, DE-TOP and Desalination Toolkit) demonstrated during the meeting and encourage continuation of such development.

The TM went out with the following recommendations:
- IAEA to establish a CRP on low temperature nuclear desalination vs. conventional or other advanced methods to satisfy water needs in NPPs. Technical feasibility, cost comparison, safety, reliability, risk management, risk analysis, and water supply security should be analyzed under this CRP. Try to involve nuclear and desalination industries, and to produce reports for decision makers.
- Develop a technical guideline on systematic approach and standardized technical solutions for the application of nuclear desalination.
- ToC could include the following: Technology evaluation (nuclear designs and desalination processes), citing, coupling and safety issues, environmental aspects, economics, legislation; regulation; and licensing aspects.
- Organize a workshop on the use of IAEA tools on nuclear desalination. Sessions on nuclear desalination could also be established as an integral part of EDS or IDA activities.
- Publish highlights of technical meeting in some regional or international journals.

Enhance information exchange between MSs on Nuclear Desalination. ■

Source:
Aiman Eid Al-Rawajfeh, Jordan Atomic Energy Commission (JAEC)
Ibrahim Khamis, International Atomic Energy Agency (IAEA)

يتفق خبراء المياه على أهمية تحلية مياه البحر بواسطة الطاقة النووية، باعتبار إن تقنية تحلية المياه أصبحت خيار لا مفر منه لإنتاج المياه الصالحة للشرب. أصبحت وسيلة فعّالة واقتصادية للتخفيف من حدة المخاوف العالمية بشأن تغير المناخ وندرة المياه. وللإلقاء الضوء على هذا الموضوع، تم عقد اجتماع فنّي تقني للوكالة الدولية للطاقة الذريّة حول "التقدم في تحلية مياه البحر باستخدام الطاقة النووية" في مقر الوكالة في فيينا، النمسا من ٢–٤ تموز (يوليو)، ٢٠١٢. هذا التقرير هو ملخص الإجتماع، مع بعض التوصيات التي وُضعت لتساعد على تعزيز التحلية بواسطة الطاقة النووية.

Hitachi Zosen's MSF Technology

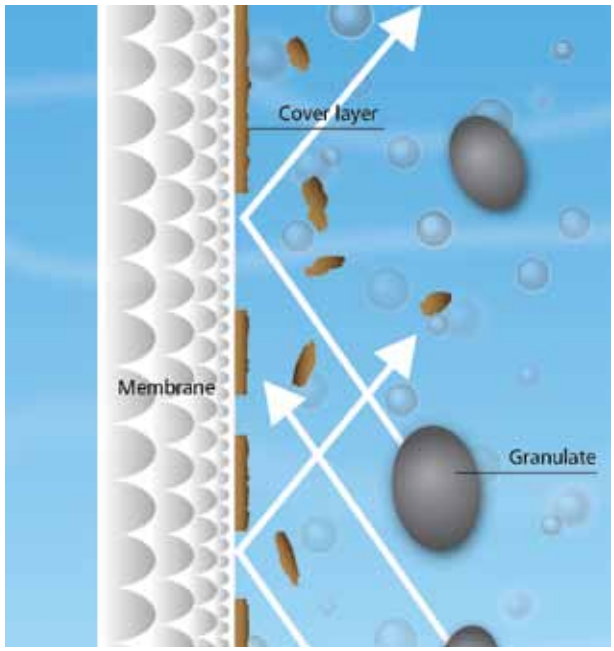
Since 1965, **Hitachi Zosen Corporation**, one of the world's engineering companies in the global market, has played an important role in the desalination market and has developed its unique high technology of desalination, producing a wide range of different kinds of desalination plants. From large plant, such the Multi Stage Flash (MSF) system now in use in the Middle East, to small-capacity units, Hitachi Zosen meets all needs with the proven technology in desalination plants. The process technology developed by Hitachi Zosen for the seawater desalination is divided into: Thermal process which produces fresh water from seawater by applying MSF technology; Thermal process which produces fresh water form seawater by applying Multiple Effect Distillation (MED) technology and Mechanical process which produces fresh water from saline solution by Reverse Osmosis (RO) technology. MSF technology has been widely used for large desalination, this method produces distillates water by using steam provided by the power plant to heat the sea water. Backed up by abundant records of successful operation which have been established in the

Hitachi Zosen meets all needs with the proven technology in desalination plants

field of large capacity desalination plants throughout the world, MSF is suitable to an extra large capacity plant. Hitachi Zosen has constructed 40 MSF Evaporators, producing a total of 1,120,000 m3/day of distillate water in 14 projects since 1978 and will continue to contribute to the world. ■

Challenging the Status Quo in MBR

MBR technology has already become the new status quo for municipal waste water treatment plants. The possibilities of using membrane technology for trace substance elimination, biological purification of substances such as pharmaceuticals as well as industrial chemicals, and the optimization of the overall biological process in MBR technology are now being investigated on a broad front. The newly developed mechanical cleaning process (MCP) for membrane bioreactors (MBR) is the latest innovation of waste water treatment processes. One of the biggest challenges of membrane bioreactors compared to conventional waste water treatment plants is the relatively high energy demand of MBR systems.



The MCP process also allows for an almost chemical free operation

In order to optimize MBR systems regarding the energy demand specifically, the BIO-CEL®-MCP process utilizing granulates to mechanically clean the membranes has been developed. Offered by Microdyn-Nadir, the MCP process also allows for an almost chemical free operation and even more importantly a significant enhancement of flux. In turn, not only the membrane area required can be reduced (or the output of an existing BIO-CEL® installation increased) but also the required volume of the filtration tanks will be significantly smaller. Hence, the overall energy consumption can be reduced substantially. Studies show that the mechanical cleaning process can result in savings in energy and chemicals of up to 27%. In addition, when using an MBR with MCP, the process stability as well as the operational safety is increased. ■

Feature

Centrifugal Pumps

Photo Courtesy of Gorman-Rupp

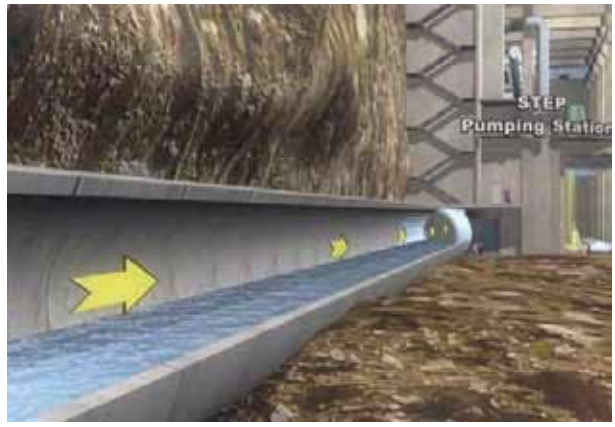
UAE Pumps Life with a Big Project

*The **Abu Dhabi Sewerage Services Company (ADSSC)** has appointed **Mott MacDonald** to provide contract administration and site overview services for the development of one of the world's largest underground pumping stations. Located in the Emirate of Abu Dhabi, United Arab Emirates, the pumping station will be over 100m deep and approximately 40m in diameter and will have an ultimate peak pumping capacity of approximately 3.3 million cubic meters per day. ADSSC is the service provider for sewerage services and currently owns and operates the sewerage network and treatment plants throughout the Emirate of Abu Dhabi. To address projected growth within the Emirate, ADSSC has developed a comprehensive plan to increase system capacity. The cornerstone of this plan is the Strategic Tunnel Enhancement Program (STEP).*

"Management and reuse of wastewater is a critical component to Abu Dhabi's long-term sustainability"

The focus of STEP is a deep 41km long tunnel sewer and several systems of link sewers which will collect and transport wastewater to a main pumping station for onward treatment at the Al Wathba Independent Sewage Treatment Plants (ISPTs). The link sewers will intercept the flows from existing gravity sewers upstream of the existing pumping stations, both on Abu Dhabi Island and the mainland. These flows will be channeled by gravity into the deep tunnel. At the downstream end of the deep tunnel, in the Al Wathba area, an underground pumping station will be built to lift the sewage to the surface, and into newly constructed ISTPs.

The pumping station will be housed in a large deep structure at one end of the tunnel. The facility will also accommodate electrical and power generation facilities, operations and maintenance facilities, standby power fuel storage and pumping and a flow distribution facility. Mott MacDonald will undertake the role of engineer for the contract administration and construction oversight. This will involve project, design, cost, contract and health, safety and environment management. *Peter Hall*, Mott MacDonald's project director said: "The UAE is the third largest consumer of water in the world after Canada and the USA. There is a daily water consumption rate of nearly 550 liters per person in a region that receives less than 1cm of rain per year. Therefore, management and reuse of wastewater is a critical component to Abu Dhabi's long-term sustainability." The Strategic Tunnel Enhancement Program, which is about 41-kilometer long wastewater tunnel in Abu Dhabi, UAE, is in direct response to aggressive growth set forth in recent years. This growth plan was formalized in 2007 with the release of Plan Abu Dhabi 2030. Specifically the Plan states "The current infrastructure capacity will not meet the forecasted demand and the resulting development envisioned in the Urban Structure Framework Plan". STEP addresses these needs for



the collection and transport of used water from all the expansion in currently developed areas and development of new areas identified in the Plan. It is also sized to accommodate the range of flows that could result from the development. The project will also be a critical part of the system which will generate over 15 m3/sec of grey water for irrigation. The project is due for completion towards the middle of 2015. ■

Source:

Mott MacDonald

Email: *www.mottmac.com*

عيّنت شركة أبو ظبي لخدمات الصرف الصحي الشركة الإستشارية للإدارة والهندسة والتنمية موت ماكدونالد لتوفير خدمات إدارة العقود وتأمين نظرة عامة لموقع تطوير إحدى أكبر محطات الضخ تحت الأرض في العالم. تقع هذه المحطة في إمارة أبو ظبي في الإمارات العربية المتحدة، وسوف تكون على عمق يتجاوز المئة متر وذات قُطر يبلغ حوالي ٤٠ متراً، وقدرة ضخ حوالي ٣،٣ مليون متر مكعب يومياً. لمواكبة النمو المتوقع في الإمارة، وضعت شركة أبو ظبي لخدمات الصرف الصحي خطة شاملة لزيادة قدرة نظام محطة الضخ؛ يعتبر حجر الزاوية في هذه الخطة البرنامج الإستراتيجي لتطوير الأنفاق.

Pedrollo: Pumps' Symbol of Made in Italy

company in the traditions of excellence and of "made in Italy", was founded in 1974 and is now one of the world's landmark in the production of pumps. For almost 40 years the Pedrollo group has been growing world-wide and continues to design and build pumps that help carry water where it is most needed. Pedrollo believes that to bear fruit, solidarity is a commitment that has to be cultivated every day. Today more than ever companies need to have a social purpose, and feel the responsibility of doing their part to change the world, to help people and their countries grow. At Pedrollo, professional growth is considered a moral commitment to all collaborators, especially workers, as the company feels a responsibility to contribute to retraining and raising qualifications. This way the workers are accompanied from doing manual, production-oriented work to a more intellectual, supervisory role oriented towards quality. ■

The PKm60 pump is recommended for irrigation and distribution of domestic water

Water is the source of life and has a growing importance for the people of the world: **Pedrollo S.p.A**. designs pumps able to transport and move with efficiency and low power consumption. Continually improving its technology, pumps ensure quiet and fluent operation and high flow rates, easy operation and high efficiency thanks to the use of high-efficiency motors. Here are some submersible and surface pumps of great success: 4SR are 4" submersible pumps recommended to pump clean water with sand content of up to 150 g/m3. For high performance and reliability, they are suitable for use in domestic, civil and industrial purposes. The TOP submersible pumps for drainage of clear waters are constructive solutions used to provide ease of use and safe operation, thanks to the total cooling of the motor. They are recommended for emptying of small flooded rooms, basements and garages. The new PKm60 is the evolution of the famous PKm60 pump, present in the Middle East since 40 years, which has undergone considerable improvements for a greater operation and duration. Reliable, simple and economical, it is recommended for irrigation and distribution of domestic water. Pedrollo S.p.A., a symbol

Neptune to Display Pumps at WEFTEC 2012

Neptune™ Chemical Pump Co., a manufacturer of diaphragm metering pumps, is pleased to announce that it will be exhibiting in Hall G, Booth 5649 at the 85th Annual Water Environment Federation Technical Exhibition and Conference (WEFTEC). The event, which brings together thousands of water quality professionals from around the world, will be held from Oct. 1 – 3 in New Orleans, LA. At WEFTEC, Neptune will be showcasing its Series 7000 mechanically actuated diaphragm metering pump that has specifically been designed with water and wastewater applications in mind. The mechanical design of the Series 7000 eliminates the use of contour plates on the liquid side of the diaphragm while the simple, straight-through valve and head design allows for improved flow characteristics. The Series 7000 is self-priming, provides superior performance, and has a maximum capacity range up to 300 gph (1,135 L/h) at 150 psi. Neptune's PZ Series electronic diaphragm metering will also be featured at WEFTEC. PZ Series pumps have numerous designed in features, making them ideal for various product applications at flow rates from .01 to 20 gph. The company's Series 500 hydraulically actuated metering pumps will also be showcased. The Series 500 pumps feature EZE-CLEAN™ valve cartridges that can be removed for cleaning without disturbing the piping to the pump and a Variable Oil By-pass™ stroke adjustment that allows for better valve performance than traditional variable-linkage designs. ■

The Series 7000 has a maximum capacity range up to 300 gph (1,135 L/h) at 150 psi

Gorman-Rupp Introduces New Line of Pumps

The new **Gorman-Rupp** line of Prime Aire Plus® priming-assisted pumps are designed to provide the ultimate pumping performance. This line is built to the same standards expected from Prime Aire pumps, but with increased head and flow, enhanced maintenance features and additional benefits. The Prime Aire Plus line is available in sizes up to 8" (200mm) flanged discharge sizes and provides flows up to 1124 m^3/hr (4,950 gpm) and heads to 145m (475 feet). These pumps are suitable for both clear liquids and liquids containing large solids and have the ability to fit other pumping installations. All Prime Aire Plus pumps are available coupled to the latest EPA Tier compliant engines or premium efficiency electric motors. The Gorman-Rupp Company is a manufacturer of pumps and pumping systems for the municipal, water, wastewater, sewage, industrial, construction and original equipment manufacturing markets. Established in 1933, Gorman-Rupp provides a quality, competitively priced product backed by superior customer service. The Gorman-Rupp company is an expert in its field, boasting a history of innovation, continuous improvement and excellence that sets the industry standard. The extensive line of pump products include self-priming centrifugal pumps, standard centrifugal pumps, submersible pumps, trash pumps, priming assisted pumps, and rotary gear pumps. In addition, Gorman-Rupp manufactures a complete line of state-of-the-art packaged lift stations and booster stations that include pumps, motors, controls, piping, accessories and enclosures. ■

The Prime Aire Plus line provides flows up to 1124 m^3/hr (4,950 gpm)

A Long Service Life Pump

Ruirong Pump Industry Co., Ltd is a national High-tech industry, specialized in producing high efficiency submersible borewell motors, submersible borewell pumps, sewage pumps, spring pumps, etc., with an annual output of 300,000 units and selling to over 50 countries. Applied with kinds of patents, the new developed 6" plastic impeller submersible pump uses a special designed sand-proof bearing structure, which can prevent the sand from going back into the bushing in the pump when the pump is switched off, allowing the pump to double its service life. The impellers and diffusers are applied with the new flow-channel design, and use the material of American GE-PPO and stainless steel to have high efficiency, high strength and anti-friction. At the same time, some improvements are carried at the motors. The up-graded thrust bearing and disc for 6", 8" and 10" water cooling motor has much lower friction and high thrust load,

which increases the motor efficiency and reliability. Ruirong has achieved great improvements in its products, and gained trusts from customers all over the world. It is the company's mission to develop more to serve in the water world. ■

System Reliability from Grundfos' Centrifugal Pumps

The heart of a multi-stage pump installation is the CR pump. These pumps are characterized by durability, reliability and high efficiency and must be able to run year after year, maintaining the same pressure requirements for a variety of water capacity and control applications. Of course, it requires knowledge to build up a complete system component by component. **Grundfos** has had 40 years of experience and is now into the third generation of development. The Premium (IE3) type motors used as standard in CR pumps are remarkably silent, improve efficiency and increase motor lifetime. These motors are also available in the self-regulating MGE configuration, featuring an integrated frequency converter. Looking more closely inside the CR pump, the cartridge shaft seal configuration comes in a wide choice of materials. It is available in flushed seal, double seal and mag-

The CR pump is available in four different material options

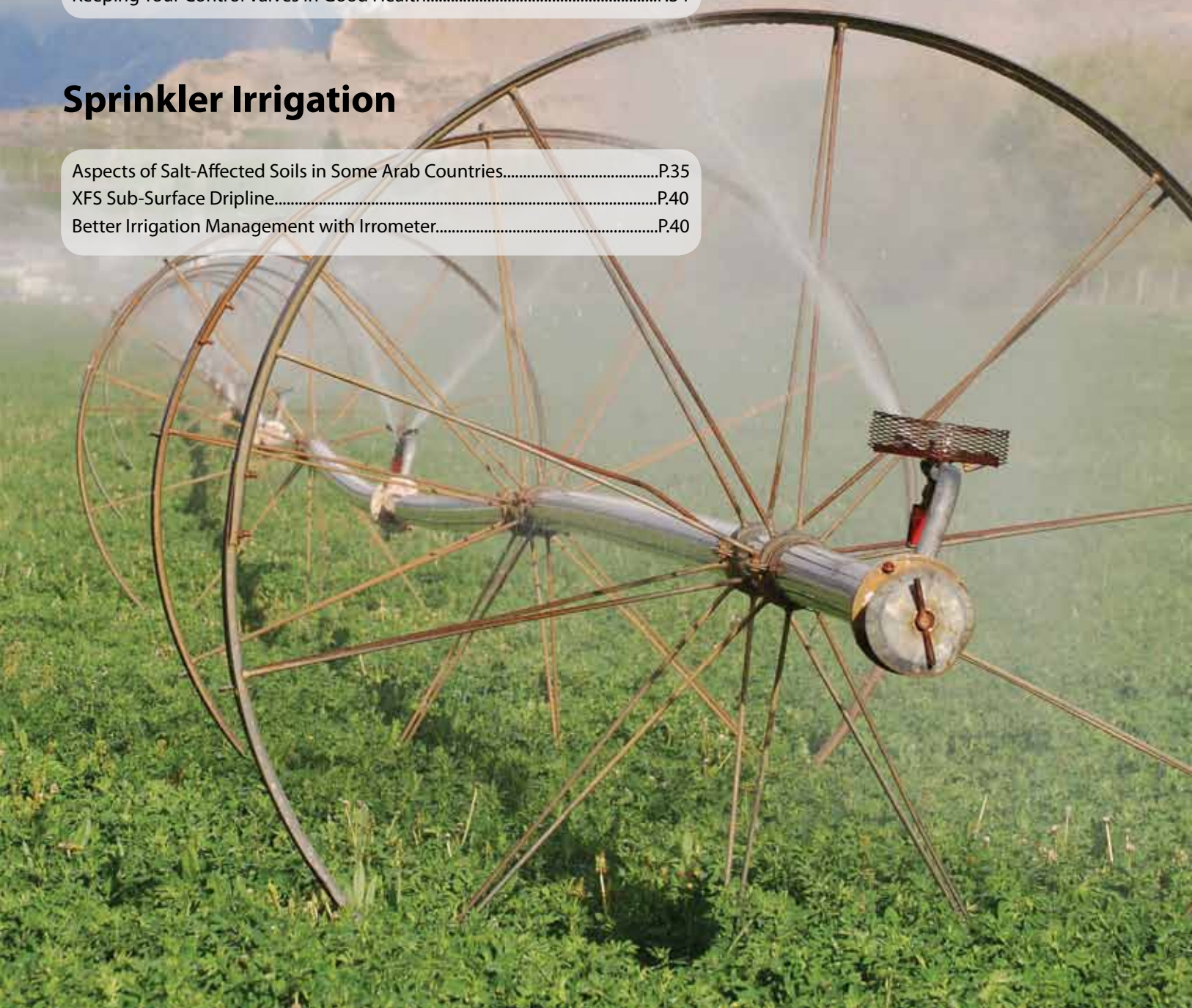
netic drive configurations and can handle temperatures from minus 40°C to 180°C. The CR pump is also available in four different material options: titanium, stainless steel AISI 316, stainless steel AISI 304, and AISI 304/cast iron. Thirteen flow sizes and hundreds of pressure sizes ensures that exactly the right pump for the job is always available. ■

Industry Spotlights

Flow Meters

Pipes, Valves & Controls

Sprinkler Irrigation



Using Virtual Reference Grounding for **Electromagnetic Flowmeters**

By Ralf Haut*

Electromagnetic flowmeters (EMFs) are the leading choice for recording the volume flow of electrically conductive liquids in a wide range of industries, including chemical, pharmaceutical, water/wastewater and food. Like all electrical equipment, EMFs must be grounded for safety reasons. Grounding is usually done by using the conductive non-lined pipe flange, grounding rings, or occasionally with grounding electrodes.

In some applications, however, these standard grounding methods can pose problems. For example, in lines with cathodic corrosion protection or in galvanization plants, voltage is generated between the electrodes and the earth. Or, when using aggressive media in the application, the grounding rings for conventional procedures must usually be manufactured from special materials that are very expensive, which adds significantly to costs when dealing with large nominal widths. With a new method called virtual reference, also known as virtual grounding, EMFs can be installed in any type of pipeline, without grounding rings or electrodes. The method facilitates the use of less expensive plastic nonconductive piping, which would otherwise require grounding rings or disks that can be quite expensive, reducing the cost savings inherent in plastic piping. It is also ideal for use in chlorine alkali electrolysis plants, where very low voltages and very strong currents cause stray currents on liquids flowing through pipes, which can disturb measurements. Finally, it can be of use in circumstances where fatty substances like emulsions may coat surfaces inside pipes, reducing the conductive connection needed for proper grounding.

Figure 1 – An example of an Electromagnetic Flowmeter

EMF grounding needed to ensure electrical isolation

The EMF's basic measuring principle relies on Faraday's Law of Induction, which requires that the inner wall of the measuring tube be electrically isolated. That is why most EMF measuring tubes for chemical applications are lined with polytetrafluoroethylene (PTFE), perfluoroalkoxy (PFA) or polypropylene (PP), or made entirely of ceramic. EMFs must be grounded in accordance with safety regulations to ensure protection against contact and prevent electric shock. This guarantees that in the event of an error there is no hazardous voltage to the conductive parts of the device. In addition, grounding provides a fixed reference potential to the EMF signal voltage.

This EMF signal voltage is typically about a millivolt or less. The converter can only process such small signals without interference and with maximum resolution provided there is not a great difference between the potential (the voltage) of the medium and the reference potential of the signal processing in the converter.

"EMFs can be installed in any type of pipeline, without grounding rings or electrodes"

Grounding methods

There are several grounding methods available. The three standard grounding methods are the conductive non-lined pipe flange, grounding rings, or grounding electrodes. In addition, there is the virtual reference method, which is done without separate grounding of the medium.

Grounding in pipelines that are electrically conductive – non-lined pipe flange

This is the simplest grounding method, used in pipelines that are electrically conductive on the inside (for example blank steel or stainless steel). The liquid in the pipe has the same potential as the grounded pipe. The signal voltage on the electrodes thus has a fixed reference potential.

Grounding in electrically non-conducting pipelines – grounding ring or discs

For ceramic, plastic or concrete pipelines and for lines isolated on the inside, the product is brought to a known

fixed potential, usually by the use of metal grounding rings (grounding discs). The ring is in conductive contact with the product and usually jointly grounded with the sensor. When assembling the pipeline and the EMF flanges, two additional gaskets are usually necessary. Groundings rings and gaskets must not disturb the flow profile at the measuring point. Careful selection and assembly of grounding rings and gaskets will prevent leaks. This method is technically reliable and has been proven for many decades. Disadvantages include higher costs when special materials are needed for aggressive media or in the case of large pipe sizes. There are some instances in which the cost of the grounding rings exceeds that of the EMF itself.

In addition, when there are electrical potential differences, stray currents will occur between the product and the earth via the grounding rings and the grounding cable. The grounding rings can be destroyed as a result of electrochemical reactions with the product. Since they can be expensive, this solution has significant cost implications.

Grounding with grounding electrodes

With this method, the grounding electrode is situated at the invert of the pipe and is in direct contact with the housing that is connected to functional earth (FE) of the EMF sensor. Often the cost of this additional grounding electrode is less than grounding rings.

"EMFs must be grounded in accordance with safety regulations to ensure protection against contact and prevent electric shock"

pipeline.

Virtual reference – the alternative to classical grounding methods

With virtual reference (virtual grounding) the EMF sensor can be installed in any type of pipeline without grounding rings or electrodes. The converter's input amplifier records the potentials of the measuring electrodes and a patented method is used to create a voltage that corresponds to the ungrounded liquid's potential. This voltage is used as the reference potential for signal processing. Thus, there are no interfering potential differences between the reference potential and the voltage on the measurement electrodes.

This method has several advantages: For one thing, there is no need for any grounding method to come in contact with the product. The elimination of grounding rings and simpler EMF installation results in lower costs. This advantage should not be underestimated, as faulty grounding is the most common cause of error when commissioning an EMF. There is no risk of electrolytic destruction when there are potential differences in the system, such as when using grounding electrodes. No stray currents flow over the product or grounding lines. Ungrounded use is also possible where voltage and current are applied to the pipeline, such as with electrolytic and galvanic treatment. The virtual reference method can be used on pipes with a diameter (nominal

Figure 2 – A diagram comparing standard grounding methods with virtual reference

Grounding: Blank metal pipe

Grounding with rings: Coated metal pipe or plastic pipe

Grounding with virtual reference: Reference potential created by signal converter

In the event of electrical potential differences in the plant, these grounding electrodes can be destroyed by electrolytic action, resulting in leakage or destruction of the whole EMF. Abrasive solids in horizontal pipelines can also quickly destroy these grounding electrodes. In some cases, deposits on the grounding electrode can prevent the proper function of the product grounding, thus also inhibiting correct measuring results. In the case of large EMFs with grounding electrodes, significant deviations also occur when – as is often the case – the EMF was calibrated in an electrically conductive pipeline and then used in an isolated

width) from DN10 (3/8-inch) and conductivity of _ 200 micro Siemens per centimeter (µS/cm).

Virtual reference in practice

Andritz AG, headquartered in Austria, uses EMFs for pickling steel, an acid treatment used to clean off the surface and remove coatings resulting from the production process, giving the raw metal parts a better surface finish. The flow of mixed acids, consisting of hydrofluoric acid, nitric acid and water, is measured. At 90°C and a pressure of 3 bars (194 F, 43 psi), the acid flows at a speed of approx. 1.5 meters/second (5 feet

Figure 3 – OPTIFLUX 4300 with Virtual Reference shows the system in operation at Andritz

per second).The extremely corrosive fluid would ordinarily have required corrosion resistant rings made of tantalum. These rings are exceptionally expensive, costing cost about 1.5 times more than the price of the EMF instrument itself, so the company was interested in using another, less expensive, grounding method. Andritz opted to use OPTIFLUX 4300 EMFs, in sizes of DN10 to 300 (3/8-inch to 12-inch), manufactured by Duisburg, Germany-based measuring instrument manufacturer **KROHNE**. The OPTIFLUX 4300 uses virtual reference, a method patented by KROHNE. According to automation engineer *Helmut Platzer*, there are many advantages to using virtual reference. "Without this virtual reference electrode, grounding rings would have to be used. The rings must be made of different materials for different media, which would make it easy to confuse them during installation." He expressed concern that this could result in problems, because the chemical resistance is uncertain. He adds, "Also, these grounding rings can be very expensive, so not using them results in a significant reduction of cost."

Virtual reference performs reliably, even in the harshest conditions. If pipe diameter and product conductivity conditions are satisfied, the EMFs can be installed in all systems in which classical grounding is a challenge. ■

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تعتبر عدّادات المياه الكهرومغناطيسية الخيار الرئيسي لتسجيل حجم تدفق السوائل الموصولة بالكهرباء في صناعات كثيرة، بما في ذلك صناعة الكيمياويات والأدوية والمياه والصرف الصحي والمأكولات. مثل كل المعدات الكهربائية، يجب أن تُؤرض هذه العدّادات لأسباب متعلّقة بالسلامة. وعادة ما يتم تأريضها باستخدام شفة الأنابيب غير المبطنة، حلقات التأريض، أو أحياناً الأقطاب الكهربائية. يناقش هذا المقال إمكانية إستخدام التأريض الإفتراضي لعدّادات المياه الكهرومغناطيسية، حيث تم إثبات مدى فعالية هذه العملية.

World's Most Compact Coriolis Flow Solution

The new generation of Coriolis flow measurement technology from **Siemens Industry Automation Division** is the most compact solution in the market. The digitally based flow solution Sitrans FC430 with short build-in-length is suitable for any liquid or gas application within the process industry. The new device is capable of optimizing a wide range of processes for increased productivity in industries like Chemical and Pharmaceutical. Sitrans FC430 is ideal for multi-parameter measurement and can be used in applications like fast filling, batch control, blending and dosing as well as for measurement of gases or fluids. Sitrans FC430 features market-leading compactness, very high accuracy of 0.1 per cent, low pressure loss, extremely stable zero point and best-in-class data update with 100 Hertz high-speed signal transfer. Innovative user friendly support tools provide direct access to all operational and functional data, certificates and audit trails. Sitrans FC430 is amongst the first Coriolis flowmeters to offer SIL (Safety Integrity Level) 2 and 3 approval in hardware and software respectively, enabling maximum redundancy meeting the highest standards of safety and reliability. The highly automated production of the Sitrans FC430 ensures a flexible supply chain for rapid responses to customer inquiries. Very short lead times for tailor-made solutions are guaranteed by assembly robots guided by sophisticated 3 D vision laser systems. The Siemens Industry Automation Division (Nuremberg, Germany) supports the entire value chain of its industrial customers – from product design to production and services. ■

Sitrans FC430 is ideal for multi-parameter measurement

Verify Flow Rate Anywhere

Designed to help systems engineers quickly troubleshoot problems and verify performance during system commissioning, the Dynasonics® DXN portable clamp-on ultrasonic meter by **Badger Meter** easily attaches to pipes for ad hoc measurement. Allowing users to maintain system aseptic conditions, the Dynasonics DXN captures more than 50 flow readings per second, retains measurements in memory that are stored in user-defined files and has USB connectivity. An advanced touchscreen interface, full-color graphing, and wizard-based start-up configuration makes the DXN an excellent choice for any job site. The compact design fits into one convenient over-the-shoulder bag. Applications include clean, solids-bearing or gaseous liquids in closed full pipes ½ inch (12 mm) and larger. In addition to the Dynasonics DXN, the Dynasonics® TFX Ultra offers an easy and accurate solution for monitoring water intake and outflow making compliance reporting and regulation easier. With accuracy at one percent of reading and a large bi-directional measuring range that ensures reliable readings at low and high flow rates, the TFX ultrasonic meter can be installed easily. Without shutting down the process or breaking into piping, the TFX clamps onto the outside of the pipe and does not contact the liquid being measured. In addition to low cost installation, the TFX has no moving parts to maintain or replace. Since the meter clamps onto the outside of the pipe, there is no need to worry about fluid compatibility and pressure head loss. ■

The Dynasonics DXN captures more than 50 flow readings per second

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Grooved mechanical Pipe Joining:
The Groove Explained

*By Rami Mahmoud**

*Grooved mechanical pipe joining is a no-flame joining technique of forming or cutting a groove in pipe ends and then joining them with bolted housings around a sealed gasket. Since being made commercially available in 1925 by **Victaulic**, it has become a preferred joining method on many piping applications when compared with welding, threading and flanging, and is commonly used in water systems technology projects. The following article explains the benefits of this method, spotting the light on how more and more water engineers are adopting it.*

A mechanical joint is comprised of four elements: grooved pipe, a gasket, coupling housings, and a pair of nuts and bolts. The pipe groove is made by cold forming or machining a groove into the end of a pipe. The key section of the coupling housings engage the groove and the bolts and nuts are tightened with a socket wrench or impact wrench and hold the housings together. The coupling housings engage in the groove around the circumference of the pipe and encase the gasket. A pressure responsive gasket then creates a seal unified joint that is enhanced when the system is pressurized.

For engineers, the benefits of the grooved system are many: the design versatility of the joint can allow both rigidity and flexibility, or a combination of the two, throughout a system when necessary; a mechanical joint provides noise and vibration attenuation, seismic relief, and accommodates for thermal expansion and contraction. Added to these benefits, the system provides a union at every joint for ease of system maintenance and expansion.

The basics of grooving and latest developments

The preparation method most commonly used today in mechanical piping systems is cold forming a roll groove onto the end of a pipe. This method - known as roll grooving - is used on 90% of grooving applications. Fast and clean, it is suitable for a wide variety of pipe sizes and standard wall thicknesses. Roll grooving is suitable for carbon steel, stainless steel, copper and aluminum pipe or tubing. With pipe that is roll grooved, any potential increase in pipe hardness, reduction in tensile strength or reduction in elongation has no effect on the integrity of the joint. Pipe material changes are comparable to any other cold-forming manufacturing operations. For medium to large diameter pipes between 350mm and 1525mm, the Advanced Groove System (AGS) developed by Victaulic is designed to offer enhanced strength and reliability through a more robust coupling housing and a patented wedge-shaped roll groove that is deeper and wider thus providing increased coupling-to-pipe engagement. The AGS design results in a 40 percent increase in end load carrying capabilities compared to previous joining methods.

Proven reliability

Mechanical grooved pipe joining has been proven through research, testing and extensive evaluation. It has stood the test of time in some of the most impressive engineering feats of the last century, including the Hoover Dam, the Alexandria Library, Burj Khalifa and the Taipei Financial Center.

Moreover, mechanical joining has been a reliable and rugged component of mission critical applications such as data centers, flammable chemical cleaning applications, the rigorous system demands required for high pressure applications in desalination plants, as well as mines, power applications, life safety systems, tunneling and in hydraulic elevators.

From brackish or seawater intake to membrane assembly and water distribution, Victaulic has a product suit-

able for nearly every size of pipe and piping application. By using complete grooved pipe joining systems it is possible to reduce required build time, allowing more space to commission, test and turn over systems. Maintenance simply requires the loosening of two bolts and nuts and no time is lost cutting out sections of pipe and re-welding.

Victaulic is vertically integrated - designing and manufacturing its own products and gaskets – and Victaulic couplings up to 12"/300mm can withstand pressures of up to 1200psi / 8237 kPa, and valves with matching ratings are also available, as well as large diameter joining solutions.

Grooved technology has been robustly tested by Research and Development Engineers in labs as well as in the field to consistently demonstrate its strength and reliability. Details about the grooving process, the strength of grooved pipe, and flow characteristics are further explained in published reports from independent agencies as well as by many manufacturers. ■

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التقنية الأخدودية الميكانيكية لوصل الأنابيب هي تقنية وصل من دون نيران لتشكيل أو قطع أخدود في أطراف الأنابيب ومن ثم وصلها بطبقات محصّنة حول الختم الميكانيكي. منذ إطلاقها تجارياً في عام ١٩٢٥ من قبل شركة Victaulic، أصبحت هذه التقنية الأسلوب المفضل لأعمال وصل الأنابيب مقارنةً مع تقنيات أخرى كاللحام مثلاً، والتي شيعَ استخدامها في مشاريع تكنولوجيا أنظمة المياه. يناقش المقال التالي فوائد هذه التقنية ويلقي الضوء على كثرة استخدامها من قبل مهندسي المياه.

The Decision about Special Alloy Valves

Reliable and well designed and manufactured products

TECVAL, S.L. is a valves & fittings manufacturer with more than 25 years of experience in desalination plants. Today, the company is the most important manufacturer in Spain of Needle Valves for instrumentation processes in sales volume. The products include, needle, ball, check and control valves, manifolds and fittings, everything according to UNE EN ISO 9001. Nevertheless, thanks to the experience accumulated throughout the years, and the desire to adapt to the necessities of the customers, Tecval also fabricates customized valves.

For that reason, Tecval puts a wide range of possibilities at the disposal of customers to satisfy the most specific demands: sea water resistant alloy valves, high pressure endurable valves, multi-way distribution valves, special dimension or connection valves or high corrosive fluid valves. Since the export department has been created with the permanent growth and the increase in sales year by year, Tecval is looking for distributors, brand representatives and new customers all around the world. This objective is not easy, but with the effort of the staff, it will achieve it. The company offers a reliable, well designed and manufactured product, testing every unit to ensure 100% product functionality before it leaves the factory. Considering high reputation to supply valves in high quality at competitive pricing, Tecval can adapt to every requirement because, a customer does not only expect a good product, but also a solution to problems. ■

Keeping Your Control Valves in Good Health

*By Mark Gimson**

Whether that brand new control valve in your system is the first one you have ever had to look after or if you are an old hand at valve maintenance with tens of valves in your system, there are a few simple guidelines and reminders for keeping it operating at optimal performance. It's important to physically check valves at least every 12 weeks or so, assuming everything is running fine in the system. This inspection is to check for any leaks in the tubing, check pressure gauges to ensure the valve is actually doing what it is supposed to and generally inspecting for anything that looks abnormal. If it is determined that something is wrong, always ensure you have the correct instruction manual for the valve. Regular maintenance will ensure your valve stays in good working order. Here are some simple tasks that you can perform:

Pilot system shut off ball valves

Exercise the three isolating cocks on the main valve. These are located in front of the strainer on the upstream side of the valve, on the valve bonnet on top of the valve, and below the pressure-reducing pilot on the valve downstream. Giving the isolating cock a momentary quarter turn to the closed position, then returning it to the open position is sufficient. Open position is when the handle of the isolating cock is inline with its body.

Air in the Pilot System

Air is your number one enemy in the pilot system as it will give false readings and cause poor valve operation. Bleed air from the valve bonnet. If the valve is equipped with a position indicator, on top of the position indicator is a bleed cock. Open the bleed cock slightly by turning the handle counter-clockwise. Otherwise, bleed the air from the high point of the valve. If the water runs clear, and no air bubbles are seen in the glass of the position indicator close the bleed cock. If air is present (the water will be foamy white) run the water until the air is gone.

Strainers

Pilot systems rely on a supply of clean water, usually taken from the inlet of the valve. Either external or flush clean type strainers can be installed. If an external strainer is installed a simple occasional flush is a good idea. Normally 3 – 5 seconds is sufficient time to clean the strainer screen. Experience will dictate if it needs to be flushed longer than this, but it is unlikely in a municipal system. A number of water utilities install a ball valve on the flushing plug of the strainer, allowing operators to give a short flush every time they are in the valve station. (This certainly helps to eliminate disaster as a plugged strainer causes a valve to remain open.)

Reducing Pilot

Ensuring the control valve pilot is still operational, is a simple task. As a cautionary note – before you make any pressure adjustment, ensure that this is acceptable for the system and any SCADA alarm controls that may be triggered by a change in pressure are turned off. To exercise the pressure-reducing pilot, loosen the lock nut on the pilot adjusting screw and turn clockwise to increase the pressure 5 psi above the normal set point. Check that the downstream pressure gauge is tracking the adjustments you are making. Then turn the adjusting screw counter-clockwise to reduce the pressure to 5 psi below the set point. Does the pressure gauge track this also? Finally, turn the adjusting screw clockwise to increase the pressure back to the original set point, and tighten the lock nut. If for some reason the pressure gauge is not moving as you adjust the screw, you either have a bad gauge or a pilot that needs looking at.

By following this simple routine your valves should give years of trouble free service. Of course such variables as pressures, operational use, water quality (hardness, TDS etc.) all have an effect on the periods between major valve overhauls. ■

Aspects of Salt-Affected Soils in Some Arab Countries

By Mohamed Hachicha and Gilani Abdelgawed*

The salt-affected soils in the Arab countries represent an important part of the limited soil resources. Soil salinization has been identified as a major process of irrigated land degradation in several Arab countries. Reclamation of the salt-affected soils was realized under rainfall, drainage and irrigation conditions. A big pressure induces to use some of them to irrigate with brackish/saline water.

Introduction

The Arab countries are characterized by an annual irregularity of the rain and aridity of the climate. The area of arable land per capita has decreased in the last decades. Water and soils resources are limited and the major part of water resources is affected by salts. The salt-affected soils in the Arab world are found generally around salty depressions. These depressions have very complex hydrological systems and are subject to strong pressures induced by natural and anthropogenic phenomena. The reclamation of the salt-affected soils was realized since decades thus the management of salt-affected soils requires a combination of technical and agronomic practices into an integrated approach (FAO, 2003).

"Management of salt-affected soils requires a combination of technical and agronomic practices into an integrated approach"

Causes & management of salt-affected Soils

Salt-affected lands are reflected as saline seeps in dryland agriculture and secondarily salinized irrigated lands. More than 77 Mha of land in the World is salt-affected by human-induced salinization (FAO, 2003). The total Arab area of irrigated land is about 9.5 Mha. Salinity poses a major management problem in many non-irrigated areas where cropping relies on limited rainfall. Dryland salinity has been a threat to land and water resources in several parts of the Arab world. If the concept of about 20% of that land is affected by human-induced salinization is accepted, a total of more than 1.9 Mha can be attributed to secondary salinization of irrigated lands. In rainfed agriculture intrusion of saline seawater to areas lying near the sea can cause land salinization during dry periods.

In the Arab countries, the scarcity, variability and unreliability of rainfall and high evaporation affect the water and salt balance of the soil. Various types of Na, Mg and Ca salts are concentrated, mainly chloride and sulphate. Marine cycle has been considered the main natural cause of salinization. Anthropogenic cycles of salinization or sodication are caused by poor soil and water management and irrigation with saline water, irrigation mismanagement, excessive leaching with insufficient drainage, use of improper cropping patterns and rotations, poor land leveling, dry season fallow practices in the presence of shallow watertable. Several techniques are used for the management of salt-affected soils. Leaching is used to prevent excessive accumulation of salt in the root zone and various types of

drainage are used to control the watertable. Land leveling, deep ploughing and tillage, subsoiling and planting procedures have been used to improve infiltration and permeability in the surface and root zone and thus to control saline and sodic conditions. Gypsum, sulphur and sulphuric acid are used in limited scale in the Arab countries. Organic matter, farm manure, growing legumes, mulching, crop residue and selection of salt-tolerant crops are largely used. In several areas, local appropriate systems are developed by the farmers to manage the salt-affected soils at their parcels scale.

Extent of Salt-affected Soils

The total area of salt-affected lands of the World is 831 Mha: 397 saline soils and 434 sodic soils (Oldeman et al., 1991). Of the current 230 Mha of irrigated land, 45 Mha are salt-affected soils (19.5%) and of the almost 1,500 Mha of dryland agriculture, 32 Mha are salt-affected soils (2.1%) to varying degrees by human-induced processes. The total Arab land is about 1402 Mha. Only about 197 Mha are arable (14.1%). The cultivated areas not exceed the third, 70 Mha, about 5% of the total area (ACSAD, 2004). The total irrigated area is about 9.5 Mha. According to the FAO (2003), the salt-affected soils for the Arab World are about 82.7 Mha, 5.1% saline (71.5 Mha), 0.8% sodic (11.2 Mha).

Case of the Maghreb countries

The aridity of the climate and high evaporation, saline groundwater, seawater intrusion, poor water management and in proper agronomic practices and low water quality are the major causes of salt-affected soils commonly formed in depressions and low parts of the landscape. The Maghreb contains several natural water

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As a complete membrane filtration solution provider, **H2O Innovation** provides integrated technological water treatment solutions based on membrane filtration technology and focuses on three main target markets: municipalities, energy and mining. It designs, manufactures, and assembles state-of-the-art custom-built water treatment systems for the production of drinking water and industrial process water. H2O Innovation has also developed expertise for the reclamation and reuse of water, and the treatment of wastewater. The company uses its unique expertise in membrane technology to develop superior solutions.

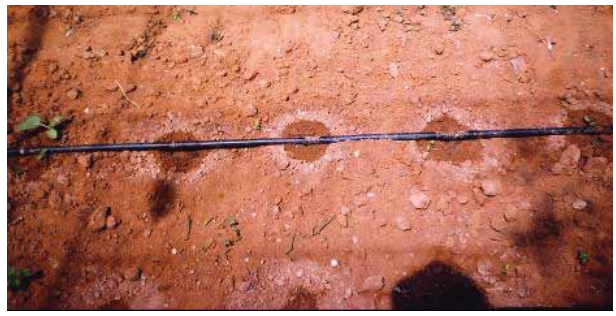
plans with characteristics ensuing from the topography, the geology and the climate. In Tunisia, the words "chott", "sebkha", "bahira", "merja", "haria", "kaoui" and "garaât" indicate regions with very variable hydrodynamic and geochemical characteristics.

In Tunisia, the salt-affected soils represent about 1.5 Mha, 10 % of the total area. The irrigated areas cover about 400 000 ha. According to main salinization factors and several common agropedoclimatic and geochemical criteria, we can group these areas in four major irrigated systems (Hachicha, 2007). In the North, the low zones soils are affected by salinization and waterlogging. In the Centre, the salinization concerns soils and aquifers. Along the coast, the bad quality of the waters and the contamination of these waters by the seawater are the main factors of salinization. In the South oases, the salinization results either from saline water or shallow and saline ground water induced by reduced external drainage. The rest of irrigated areas are distributed everywhere in Tunisia. About 50 % of irrigated areas are affected and 10 % severely. We distinguish three levels of salinity manifestation in the Tunisian irrigated landscape: small areas around wells, large areas irrigated by dams and region constituting hydro-pedological system. The reclamation of salt-affected soils in Tunisia has more than a half century. It is based on the improvement of their physical and chemical properties by the decrease of the watertable level of these waterlogged areas and the introduction of adapted crop species. This reclamation took place under rainfall conditions and under irrigation.

In Libya, salt affected soils exist in several places in Northern west coast from the Tunisian border to Elajalt area as sebkhas and from Tourgaa east of Tripoli. It exists as well around Benghazi.

In Algeria, the total area is about 237.6 Mha. The available agriculture area is only 7.5 Mha, about 3% of the country. The irrigated areas are about 350,000 ha and about 25% are salt-affected. Some areas affected by water logging and salinity of the Algerian Arid region are constituted by the Chotts. The problems of salinity affect some areas in particular in the Northern West and the South.

"Gypsum, sulphur and sulphuric acid are used in limited scale in the Arab countries"



In Morocco, the total area is 71 Mha. The useful agricultural area is 8.7 Mha, about 1.664 Mha are irrigable and 1 Mha are irrigated. The soils affected by salt are estimated to be 350,000 ha, about 21% of the irrigated area, most of them in the Gharb irrigated area. In the North and Northwest (Gharb and Loukkos), the soils are affected by waterlogging induced by the rainfall excess and irrigation water. In the South and East (Tadla, Moulouya, Ouarzazat and Tafilalet), the soils are affected by the waterlogging and salinization induced by watertable rising by irrigation.

In Mauritania, the salt affected and sodic soils covers about 86.28 million ha, about 38% of the total surface area. Most of the irrigated area along Senegal River is affected with various degrees of salinity levels.

In the Gulf countries

In Saudi Arabia, about 2 Mha are sebkhas and about 3.641 Mha is affected by salinity at various degrees (Al Assri, 2004). The UAE has about 4 Mha of coastal sebkhas. The biggest is the sebkha of Matti situated in the west and extends inside land about 120 km (ICBA, 2002). Salinity and waterlogging are also induced by irrigation with saline water. In the costal agriculture zone of Abu Dhabi, about 1600 ha are affected. In Bahrain, the salt affected soils is about 41273 ha (Ahmed, 2004), 17540 ha are slightly and 22473 ha severely affected soils (ACSAD, 2004). In Kuwait (Abaid, 2004), the salt affected soils are about 85000 ha. From this area, about 65827 ha are slightly affected by salts. In Oman, the

Regional and Arab distribution of salt-affected soils

Regions	Total area	Saline soils		Sodic soils	
	Mha	Mha	%	Mha	%
Africa	1899.1	38.7	2.0	33.5	1.8
Asia and the Pacific and Australia	3507.1	215.1	6.1	251.5	7.2
Europe	2010.8	6.7	0.3	72.7	3.6
Latin America	2038.6	60.5	3.0	50.9	2.5
Arab countries	**1402.0**	**71.5**	**5.1**	**11.2**	**0.8**
North America	1923.7	4.6	0.2	14.5	0.8
Total	**12781.3**	**397.1**	**3.1**	**434.3**	**3.4**

Source: FAO

total area affected by salts is about 9.442 Mha. It consists of about 30% of the total area of Oman (309500 km2). One of the most affected areas by secondary salinization is around Muscat area due to the sea water intrusion which caused high salinity in the ground water which is the mean source of irrigation water (Al Mokadmi, 2004). In Qatar, salt affected soils are about 70124 ha, 6517 ha slightly salt affected and the rest severely affected by salinity (Hashem, 2004). In Yemen, about 483467 ha are salt-affected soils with various degrees of degradation especially in Eljouf, Marb Aden, and Shabwa (ACSAD, 2004). In Jordan, about 6500 ha are affected by salinity out of this area 1400ha has an ECe of 4-8 dS/m,1600 ha with An ECe of 8-16 dS/m and the rest has an ECe of greater than 16 dS/m (Shakatra, 2004). In the eastern Jordanian Desert, its soils contain an amount of salt content ranging from 1-10 %.

"The reclamation of salt-affected soils by drainage and irrigation is feasible in many Arab countries"

Conclusion

In the Arab world, several salt-affected soils were rehabilitated. The reclamation of the salt-affected soils, considered marginal, was realized under rainfall conditions and under drainage and irrigation. It was progressive and dependent on the cost required. The salty depressions with their very complex hydrological systems are subject to strong pressures induced by natural phenomena and by anthropogenic actions, which influence the hydraulic regime of these plans of water. The reclamation of salt-affected soils by drainage and irrigation is feasible in many Arab countries. For decades, several salt-affected soils in particular in semi-arid areas, were planted with salt-tolerant crops and trees. Waterlogging is many times associated with the salinization. This reclamation is easier for sandy soils; however the contribution of rains in salts leaching is significant in only semi-arid region. Experiments realized in many Arab countries proved that we can save very salty soils of the borders of sebkhas and of Chott. Drainage and crop practices improve the efficiency of irrigation. This was confirmed on a large-scale with the recent creation of irrigated areas. The success of this reclamation is perceptible through the soils desalinization, the irrigation of formerly not cropped zones and the introduction of new vegetables and trees. In many Arab countries, the reclamation is based in the first stage on the control of the regime of the ground water. The decrease of the watertable level results in the genesis of new soil proprieties, in particular the soil porosity and salinity in the surface layer. Desalinization does not happen with the same intensity for all the salts species. According to their solubility, three main salts (calcium carbonate, calcium sulfate and sodium chloride), undergo in the order, a more and more intense transfer. In the second

stage, the superficial layers grow rich in organic matter, thus contributing to the improvement of soil structure. In the semi-arid areas, rains contribute to the salt leaching. Deep ploughing and introduction of salt tolerant crops allow better reclamation of these soils. Annual cereals and forage are used, and then gradually less tolerant crops are introduced. The water mobilization (dams, etc) in many Arab countries has reduced the water balance of the low lands by the decrease of the watertable level and soil salinity. In the past, the reclamation of the salt-affected soils was based essentially on technico-economic criteria. In the last decade, environmental aspect became a basic element in their management. Finally, the situation being globally endoreïc of many Arab countries, after the mobilization of big quantities of their water resources, the total quantity of salts in movement in the landscape increases constantly in time. We must expect the salinization of soils and the creation of new salt-affected areas in the low lands situated near irrigated areas. Beginnings of these new sebkhas are already perceptible in some depressions. ■

Source:

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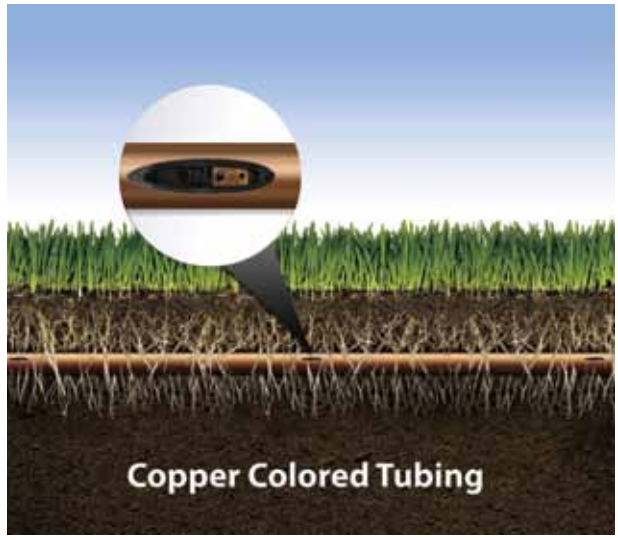
تمثل التربة المتأثرة بالأملاح في الدول العربية جزءًا هاماً من موارد التربة المحدودة، إذ يتأثر الجزء الكبير من الموارد المائية بالأملاح ليؤثر بدوره على مياه الري والتربة. تم التعرّف على تملّح التربة كعملية رئيسية في تدهور الأراضي المروية في عدة دول عربية، وقد تم استيعاب فكرة استصلاح هذا النوع من التربة في ظل ظروف سقوط الأمطار وعمليات مياه الصرف الصحي والري. يناقش هذا المقال حالات التربة المتأثرة بالأملاح في بعض الدول العربية.

XFS Sub-Surface Dripline

Sub-surface drip irrigation is recognized as an ideal method of efficiently watering shrubs, plants and turf. In the past, sub-surface driplines have also had a reputation of being infiltrated by roots and grit, reducing their effectiveness and reliability. Because many of these driplines have used a toxic herbicide to resist root intrusion, their safety and environmental-friendliness has been questioned. **Rain Bird**'s XFS Sub-surface Dripline with Copper Shield™ Technology answers both issues.

XFS Sub-surface Dripline offers up to 90% watering efficiency. Because the dripline is buried, it is unaffected by wind, evaporation or vandalism, effectively watering plants and turf while using 30 to 70% less water than overhead sprays. Durable and efficient the XFS Sub-surface Dripline provides a much-needed option for communities that are limiting the use of overhead sprays for irrigation near buildings and hardscapes. It's also ideal for areas between curbs and sidewalks and because there's no overspray, it provides protection against damage to fences, sidewalks and parking lots. The feature that sets the XFS Sub-surface Dripline far apart from other sub-surface products is Rain Bird's patent-pending Copper Shield™ Technology. This unique technology protects emitters from root intrusion without the use of chemical treated filters. Developed by Rain Bird researchers, this technology replaces a chemical-based herbicide containing Trifluralin which is used in competitive drip products. Since 2009, the use of Trifluralin as an herbicide has been banned by the European Commission. ■



The Copper Shield protects emitters from root intrusion without chemical treated filters

Better Irrigation Management with Irrometer

Irrometer Company, Inc. has been in business since 1951, manufacturing soil moisture measuring, controlling and sampling instruments used worldwide for irrigated farming, agricultural research and urban landscaping. These instruments were originally used by soil and plant scientists to measure soil water status. The demand for products that would help growers better manage irrigation led to the development of a family of products under the trade names Irrometer (tensiometer) and Watermark (electrical resistance granular matrix sensor). Although a scientific instrumentation, the instruments are inexpensive and easy to use by irrigation managers everywhere. In production agriculture, the use of soil moisture based irrigation scheduling, provides a farmer with site-specific measurements of soil water status based on the specific field, soil, crop and irrigation method, as well as the site-specific microclimate. Soil moisture scheduling is a widely recognized method of efficiently applying irrigation water which usually results in greater production, better quality and less water, energy and fertilizer use. A well established irrigation management program also helps protect water quality by eliminating run off and deep percolation loss of water and nutrients due to over irrigation. Most users of this technology have the initial cost of the instrumentation returned to them in the first season of use. Irrometer Co. also offers an extensive line of Soil Solution Access Tubes and suction lysimeters, for suction extract analysis of soil water for nutrient management and environmental sampling purposes. ■

The instruments are inexpensive and easy to use by irrigation managers everywhere

Country / Regional Reports

Iraq

Turkey

Spain

North America

Photo Courtesy of Drace infraestructuras

Iraq Water Sector: A Long Road Ahead

With the impact of Iraq's long years of war and insecurity still marring the future, older problems, such as water scarcity and weak infrastructure, are also harming prospects for development and stability. Furthermore, Iraq is a country that brims with potential, in a region that has huge potentials. Indeed, greater co-operation between Iraq and its neighbors – and across the region as a whole – would also help to secure success.

Overview

Iraq is heavily dependent on reservoirs and water control structures as 70 percent of its water comes from Turkey, with the bulk of the flow occurring between February and May. Iraq had no control over the inflow of water from Turkey, Syria or Iran. Meanwhile, the country's water and sewerage infrastructure has been one of the principal casualties of the Iraq war and continues to suffer from the resultant social and political fall-out. Access to potable piped water decreased between surveys carried out in 1996 and 2003 and 2004. According to the **United Nations**, water and sewerage systems repair and enhancement costs will be USD7billion, including providing 'universal' (in other words, for those living in urban areas) access to potable water and sewerage. Moreover, **the International Committee of the Red Cross** believes that 40 percent of Iraqis did not have access to safe drinking water in 2008 and 25 percent in 2010, with those who are supplied suffering from intermittent service provision.

"Water and sewerage systems repair and enhancement costs will be USD7billion"

Sewage and Sanitation

The estimated amount of water for the industrial sector is around 1.5 billion m3/year, according to **European Commission**. The water for heavy industry is supplied from rivers while the light industries are using water from the municipal network. The problems in the industrial sector are similar to those in the domestic sector. The sanitation services in Iraq are below the required level. Only 25.7 percent of the populations are connected to sewage network services while 51.2 percent are connected to septic tanks. Most of the sewage infrastructure is in bad shape and would require massive capital investment. There are 13 major sewage treatment works in Iraq, capable in theory of serving 5million people including three facilities that serve 3.8million people in Baghdad, according to a report by **Global Water Intelligence.** In practice, a shortage of parts, chemicals and power means they are operating well at below capacity. It is estimated that wastewater treatment is failing to occur for 80 percent of the collected wastewater due to the inability of plants to be operated under erratic power and materials supplies.

Big Projects

Hitachi Plant Technologies and **Sumitomo** have recently concluded an agreement with **South Oil Company (SOC)** to commence investigations for introduction of Hitachi Plant Technologies' advanced water treatment system for the Iraqi oil industry. SOC, one of the largest national oil companies, is responsible for Iraq's southern region. As the first step, the three companies will install a demonstration Industrial Water Treatment System unit developed by Hitachi Plant Technologies in an oil field owned by SOC in southern Iraq, and will study various applications as solution for environmental requirement and technical requirement demonstrating the proven performance. Hitachi Plant Technologies' advanced Produced Water Treatment System employs a separation of oil and water using flocculation magnetic separation system. In addition to achieving advanced processing of produced water, the system contributes to the life extension of oil wells by improving the quality of the re-injected water, reducing operating costs, and relieving chronic water shortages. In 2010, Hitachi Plant Technologies delivered 10 units of a Membrane Bioreactor-based (MBR) wastewater treatment systems for Al-Shafa and Al-Faw Hospitals in Iraq. The company also delivered a Reverse Osmosis-based (RO) water recycling system for the **Ministry of Municipalities and Public Works**. ■

Prepared by

Rasha Reslan
Editor and Researcher

تعتمد مصادر العراق من المياه بشكل رئيسي على نهري الدجلة والفرات – وتشترك في مياههما مع سوريا، تركيا، وإيران. وفيما خص إدارة المياه، فإن العراق لديه حاجات طارئة لتأهيل وبناء قطاع التخطيط في مجال إدارة المياه. وتعمل وزارة الموارد المائية بهدف تطوير قدرات الخبراء التقنية، تقوية القدرات المؤسساتية لإدارة متكاملة للموارد المائية، وبلورة سياسة وطنية شاملة لاستخدام مستدام للمياه.ولكن سنوات الحرب الطويلة في العراق وانعدام الأمن لا تزال تشوه المستقبل،ومشاكل مثل ندرة المياه وضعف البنية التحتية، تضر بالتنمية والاستقرار.

Generating Growth:
A Long Term Business

Environmental concerns are becoming a priority issue in Turkey mainly due to economic growth as a result of the increased energy demand, industrialization and urbanization of Turkey. Local firms are seeking foreign partnerships to undertake larger projects and the regulations have been modified to favor investments. Many water and energy projects have been initiated in order to generate alternative energy in Turkey. Development of municipal water/wastewater treatment is developing faster than the other areas of the sector in Turkey.

Turkey is not a country rich in water resources. It is anticipated to be a water-stressed country by 2030. Most of Turkey is situated in a semi-arid region. Precipitation is limited to 5 to 6 months per year. Some of the water resources are not in the right place, thus they cannot be fully utilized. Given its climate, the country needs to store water during the brief season of rain and snowfall, in order to use throughout the year. This makes the need for building dams and reservoirs inevitable. The dams built over the last 50 years have enabled Turkey to use water resources in an efficient and sustainable manner. They contributed significantly to the overall socio-economic development of the country.

"The government aims to diversify Turkey's power mix with an increased use of domestic, renewable energy resources"

Jumping to energy

According to **Apricum GmbH**, renewable energy technologies are expected to play an increasingly important role in Turkey's future energy mix. The Turkish government has recently laid the regulatory foundations for renewable market development; building on these foundations, many renewable energy companies and investors will find attractive business opportunities in hydro, wind, solar and geothermal projects.

Turkey's rapid economic growth over the past years has created a strong demand for new power generation capacity. The country will need nearly 50 GW of additional and replacement capacity between now and 2020. To lessen its strong dependence on energy imports, primarily natural gas, the government aims to diversify Turkey's power mix with an increased use of domestic, renewable energy resources. The country's energy consumption is growing by 6% a year, yet per capita energy consumption of Turkey is about 1/5th of that of the EU average. Turkey has to fully utilize its water resources to generate hydropower, which is renewable, clean and affordable.

Recent projects

In the spice of development, environmental companies engaged in consultancy, engineering or equipment aspects of hazardous/medical waste treatment

are likely to be very active in Turkey in the near future. The Ataköy wastewater treatment plant located in Istanbul is considered to be one of the largest waste water treatment plants in Turkey, with a treatment capacity of two million population equivalents, it is designed for up to 500,000 m^3 effluent/day in the final stage.

Similarly, two wastewater treatment plants at Adana - Turkey's fourth largest city - represent part of a major national program to enhance the country's infrastructure and improve environmental management. Designed to meet the needs of the city's predicted population to the year 2025, when the plants' combined daily flow is expected to be 516,000m^3, the project was one of a number of similar schemes partially funded by the European Investment Bank. The overall growth is mainly translated into Turkey's efforts to get into the European Union, efforts which are pushing the country's potentials fast forward. ■

Prepared by

Rawand Fakih
Assistant Editor & Researcher

أصبح الإهتمام البيئي في تركيا مسألة ذات أولوية، ويرجع ذلك أساساً إلى النمو الإقتصادي نتيجة زيادة التصنيع والتحضر والطلب على الطاقة. تسعى الشركات المحلية إلى تأمين الشراكات الخارجية لتنفذ مشاريع أكبر، وقد تم تعديل القوانين لصالح هذه الإستثمارات، وأطلقت العديد من مشاريع المياه والطاقة من أجل توليد الطاقة البديلة. تعتبر معالجة المياه والصرف الصحي المجال الأسرع تطوراً بين مجالات القطاع الأخرى في تركيا.

Solutions for Pressurized Irrigation Projects

Antalya is one of the most popular summer places in Turkey. Elmali Plain is located inside the mountains where irrigation was done in open channels with flood irrigation. However, due to water scarcity and the need for more efficient and effective irrigation, government invested on closed channels and pressurized irrigation. **DVD Valves** (**Dogus Vana ve Dokum**) have supplied more than 5,000 valves in this devastating system from the water resource for the farms. The reservoir outlet and DVD Hydraulic Control Valves are used to regulate the water level of the open canalet and to regulate flow. 10 pieces of DN 718 Series Hydraulic Control Valves and necessary accessories such as Strainers, Dismantling Pieces and Butterfly Valves are used for this purpose. On the valves, there are four solenoids, which receive signal from a SCADA system. There are level sensors on the main canalet, and when the level drops, control valves start opening. The number of valves opened is calculated by the software, according to the level of the canalet. Furthermore, to increase the life time of the valves, the software opens them sequentially. Once the valves are opened, they provide a constant flow in the downstream, which is set by the SCADA. The valves have orifice plates in the downstream, where they sense the differential pressure, meaning flow. As a result, no flow meters are needed for flow regulation, which saves cost of the project. ■

On the valves, there are four solenoids, which receive signal from a SCADA system

Artas: The Solution from Turkey

ARTAS is a specialized company in environmental protection technologies, particularly in the water and wastewater treatment field, since its foundation back in 1982. The engineering, manufacturing and contracting firm has a powerful background, which allows giving the perfect service to customers. ARTAS has stricken its background by transferring technology from globally well-known companies. It is the largest company in Turkey in its field with more than 120 employees and over 400 references. Besides being one of the specialized companies in its field, continuous technological leadership and contemporaneity, international vision are ARTAS' values and characteristics. In addition, ARTAS cooperates with well-known specialized international engineering, manufacturing and contracting companies. With this background and license agreements, the company designs and builds: Waste water treatment technologies; physical, chemical, aerobic-anaerobic biological treatment, nitrification-denitrification; Water treatment technologies; filtration, softening, demineralization, dealkalization via licensed fluidized bed ion exchange, membrane technologies, nanofiltration, reverse osmosis, electrodeionization, sterilization (UV, liquid-gas chlorination), ozone, arsenic treatment; Solid waste (sludge, hospital wastes, etc.) technologies; dewatering, incineration and composting plants.

The company also deals with Domestic-industrial waste water (and sludge) treatment, recycling; Biogas production-management-utilization; Potable and domestic-industrial process water production; Solid waste disposal, management and reuse plants. ARTAŞ provides design, detailed engineering, manufacturing, research and development, consulting, supervision, start-up, training, operation, and after-sales services in Turkey, Europe, Middle East, Russia, CIS Countries and UAE. ■

Transferring technology all over the world

Spain:
The Heartbeat of Desalination Industry

Spain built Europe's first desalination plant nearly 40 years ago and is the largest user of desalination technology in the Western world. However, faced with water shortages in its sunny south, Spain has become an industrial front-runner in desalination. Water providers in Spain – as well as Italy, Greece and Malta – are increasingly turning to desalination to address freshwater needs in dry periods. However, desalination also raises environmental concerns as it generates higher levels of greenhouse gas than conventional water plants.

"Spanish companies lead the market, operating in regions including India, the Middle East, and North America"

Desalination: a fertile industry

From 2009 to ,2015 the municipal sector in Spain is expected to represent 80 percent of the total water and wastewater treatment market in Spain ,according to a report published by **Frost & Sullivan**. As the industrial end users are currently in the throes of the economic slowdown, the Spanish Government will invest USD25 billion in the next seven years to help local municipalities achieve the goals of its new national sanitation plan (2007-2015). "In line with its 2009-2015 plans, the Spanish Government will invest USD2.5 billion in desalination projects to increase the supply of fresh drinking water to those municipalities in water-stressed areas, especially in the Mediterranean region," says the analyst of this research. "However, most of the desalination projects under **PROGRAMA AGUA** will be complete by 2015 and hence, it is expected that the Spanish Government will change the objectives of its investment program from desalination to water reuse and recycling."

Spanish companies lead the market, operating in regions including India, the Middle East, and North America. Today, Spain is the fourth-largest user of desalination technology in the world, behind Saudi Arabia, the United Arab Emirates, and Kuwait. Spain's more than 700 plants produce approximately 1,600,000 cubic meters of water each day, or enough for about 8 million inhabitants. Without a doubt, the use of desalination is rising around the world and the planned new projects in Spain have been a boon for desalination companies. Spanish companies including **Aqualia**, **Acciona** and **Bifesa** along with multinationals like **Dow Chemical**, **Siemens**, **Veolia** and **General Electric** are among the prominent in managing and building desalination operations.

Torrevieja plant: Idle

The award-winning USD438 million desalination plant at Torrevieja on Spain's arid south-east coast is Europe's largest facility for converting seawater into fresh, and the second biggest in the world. Finished last year, the plant is idle, however, and likely to be so for at least another 18 months. Neither the pipes to the sea nor the power transmission lines have been approved or built. Financed with Spanish taxpayers' money and around USD69 million of European Union regional development funds, the Torrevieja plant has been challenged on environmental and financial grounds repeatedly.

No gain without pain

It's worth noting that desalination also raises environmental concerns - making seawater drinkable is an expensive and energy-intensive process depending on the salinity levels in the water. Treating seawater requires thermal technology using heat and pressure to extract salt and costs some three times as much as treating water with a reverse-osmosis system that uses membranes to remove impurities, according to **EurActiv.com**. Environmental groups including **WWF** and the **European Environmental Bureau** have for years raised concerns over the expansion of desalination plants and their potential harm to coastal habitats and generate far higher levels of greenhouse gas than conventional water plants. ■

Prepared by

Dina Fawaz
Senior Editor & Researcher

بَنَت أسبانيا منذ حوالي أربعين عاماً أوّل محطة لتحلية المياه في أوروبا وكان الدافع تلبية حاجة السكان من المياه في جزر الكناري وغيرها من الأماكن الجافة البعيدة. وتعتبر أسبانيا أكبر مستخدم لتكنولوجيا تحلية المياه في العالم الغربي. ويسعى موفّرو المياه في أسبانيا بالإضافة إلى إيطاليا واليونان ومالطا إلى الاعتماد المتزايد على تقنية تحلية المياه من أجل تأمين المياه العذبة في فترات الجفاف. وبالرغم من أهمية هذه التكنولوجيا إلاّ أنها تثير القلق فيما يتعلّق بالبيئة إذ أنها تولّد معدلات أعلى من غازات الدفيئة مقارنة بمحطات المياه التقليدية.

Achieving Worldwide Recognition

Drace infraestructuras is a subsidiary Spanish company of the **ACS Group,** one of the reputable construction and services groups in the international scene. Its objective is to grow within the international market as long as it has the experience and capacity required to develop in other countries. The company is currently carrying out projects in Ireland, Portugal and Australia and working to start business in new countries, expanding its presence in the international market. Drace infraestructuras is backed by more than 35 years of experience in the fields of design, construction and operation and maintenance of all types of installations dedicated to the treatment of water (over 170 plants including drinking water purification, desalination, municipal and industrial wastewater). Drace infraestructuras is one of the companies specialized in water recycling, and has designed and built the largest part of the MF, UF, EDR and RO for wastewater reuse capacity in the world. The Operation and Maintenance section of Drace infraestructuras is responsible for treating more than a 1,000,000 MLD currently. The company's wide experience places it in a very good position in the global Water and Environmental sector with the capacity to develop all type of projects anywhere in the World. The modern water industry is fast paced and cost oriented. That's why Drace consistently achieves project completion within budget, within the agreed timescales and with maximum focus on quality. ■

186,000 PE Shanganagh WWTW Dublin, Ireland

The Green Pumping Technology

Molins de Vent TARRAGÓ is a company dedicated to the production, commercialization and installation of windmills for pumping water. The main product of Molins de Vent TARRAGÓ is the multi-showel windmills. The company was founded in 1982, although the origins of the company go back to the year 1964. In international markets, Molins de Vent TARRAGÓ has representative offices in Europe and exports products to Middle East and Latin America. The windmill starts functioning with soft breezes. A wind speed of max 3 m/s is required to start pumping water. At this rate, the wind-wheel begins to rotate in a vertical movement. The rotation of the wind-wheel is transformed, through the connecting pumping piston, in a vertical movement, and this is transmitted to the pump. The pump (mainly a piston pump, but depending on water needs, other pumps are installed) has a piston and a system of valves that, in a way coordinated with the movement transmitted by the offspring, push the water until the surface and, if needed, to an altitude even higher than the windmill. One of the main characteristics of the windmills is that in case there is no further water in the ground, the pump continues functioning without being damaged. The windmill not only works with just very low wind speeds, but also automatically stops in case of too strong wind. This is possible through an automatic brake system. ■

The windmill automatically stops in case of too strong wind

North American Market
Watered by the U.S Membrane Growth

Ongoing interest in minimizing waste and recycling or reusing input fluids is to stimulating gains in the North American membrane market. Specifically in the United States, the membrane demand is projected to see a growing progress by 2016, estimated at the rate of 7.1% per year. Polymeric membrane materials will continue to dominate the market because of their relatively low initial costs and their ability to be used in a variety of applications.

"Reverse osmosis and ultrafiltration membranes will grow the fastest"

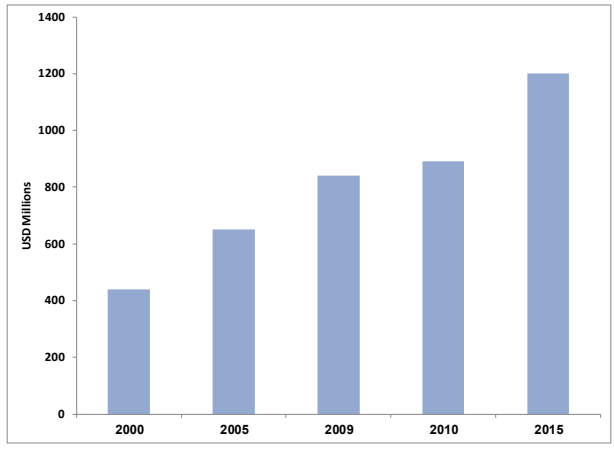
Demand for membranes in the US is expected to increase 7.1% per year to USD 5.4 billion in 2016. According to a recent report by **Freedonia Group**, advances will be supported primarily by the continued adoption of environmental regulations that require purity levels that are best achieved with membrane separation technologies. Additionally, ongoing interest in minimizing waste and recycling or reusing input fluids will stimulate gains in membrane demand, especially in the industrial market. Water recycling is also being embraced by many municipalities in water-stressed regions where the cost of obtaining potable water is high. Further contributing to growing membrane demand is the increasing penetration of membranes into the water and wastewater treatment, and food and beverage processing markets.

Membranes growing rapidly

Microfiltration membranes account for the most established and mature segment of the market and are projected to continue to account for the largest share of total demand. However, demand is expected to grow more quickly for reverse osmosis and ultrafiltration membranes, both of which are capable of removing a wider range of contaminants. Demand for reverse osmosis membranes will benefit from growing interest in treating brackish water and desalinating seawater to create potable water sources, while ultrafiltration membranes are increasingly being used in place of microfiltration membranes for pretreatment purposes. Of the major applications, demand gains are expected to be fastest for pervaporation membranes, albeit from a very small base. Pervaporation membranes are increasingly being used to remove volatile organic compounds from wastewater produced by hydraulic fracturing processes. Other markets in which pervaporation membranes are used include the chemical processing and pharmaceutical and medical markets.

Polymeric membrane materials will continue to dominate the market because of their relatively low initial costs and their ability to be used in a variety of applications. However, polymer-based membranes are subject to an increasing level of competition from non-polymeric membranes, which are less likely to foul and can be more easily cleaned. Demand for membranes made from such materials as ceramic and metal is expected to grow more rapidly than demand for polymeric membranes through 2016, albeit from a smaller base.

Value of U.S. Market for UF Membranes, 2000-2015 (USD Millions)



Source: BBC Research

As the ultrafiltration market in the US is progressing, its sectors are getting ahead of each other. A report by **BBC Research** estimates that hemodialysis is the largest ultrafiltration application market, with 52% market share registered in 2010. The market for hemodialyzers will reach USD 626 million by 2015, a compound annual growth rate (CAGR) of 5.2%.

In addition, the biotechnology sector is expected to continue growing robustly over the next 5 years. The market for UF products used in biotech research, biopharmaceuticals processing, and compendial water production was worth approximately USD 80 million in 2010. Growth in the market until 2015 is forecast to rise at a compound annual growth rate (CAGR) of 10.2%, for a value of USD 130 million. ■

Prepared by

Rawand Fakih
Assistant Editor & Researcher

يساهم الإهتمام المستمر في التقليل من النفايات وإعادة تدوير أو استخدام السوائل في تحفيز المكاسب في سوق الأغشية في أميركا الشمالية. تحديداً في الولايات المتحدة، من المتوقع أن يشهد الطلب على الأغشية تقدّماً متزايداً بحلول العام ٢٠١٦، يقدر بنسبة ٧,١٪ سنوياً. وستستمر مواد الأغشية المكوثرة بالسيطرة على السوق بسبب تكاليفها الأولية المنخفضة والقدرة على استخدامها في مجموعة متنوعة من التطبيقات.

Improved Fire Flow Planning in Salt Lake City

The Challenges

The past several years, pipelines in areas of Salt Lake City, Utah, have fallen behind current fire flow service requirements, and customers regularly complained of low pressures during peak demands. This was caused by a combination of problems, including small pipe diameters (4 inches and smaller), dead-end pipelines, and pressure zone boundary issues. To resolve them, the Salt Lake City Department of Public Utilities used WaterGEMS, **Bentley**'s water distribution modeling software, to evaluate required distribution system improvements to meet pressure, fire flow and fire hydrant coverage requirements in the area serviced by **Green Ditch** and **Big Cottonwood Tanner Irrigation** Companies. The software also helped the department develop a prioritized plan for the completion of these improvements.

Fire Flow Study Conducted with WaterGEMS

WaterGEMS, which can run within ArcGIS, MicroStation, AutoCAD, or as a stand-alone application, was used to complete all modeling tasks. The water model was built as a complete representation of the city's distribution system and included all of the pipelines, pump stations, tanks and control valves in the current system.

WaterGEMS was also used to determine which pipes were the best candidates for replacement in order to meet current fire flow requirements. In addition, the utility used the model to determine the best placement for control valves (and their settings), along with the boundaries for the new pressure zones.

Pressure and flow patterns were consistent with field observations and fire flow tests that the city's engineers used for calibration of pipe roughness coefficients. The performance of the distribution system was evaluated against four criteria:

system delivery pressure: pressure should not drop below 60 psi during peak demand conditions;

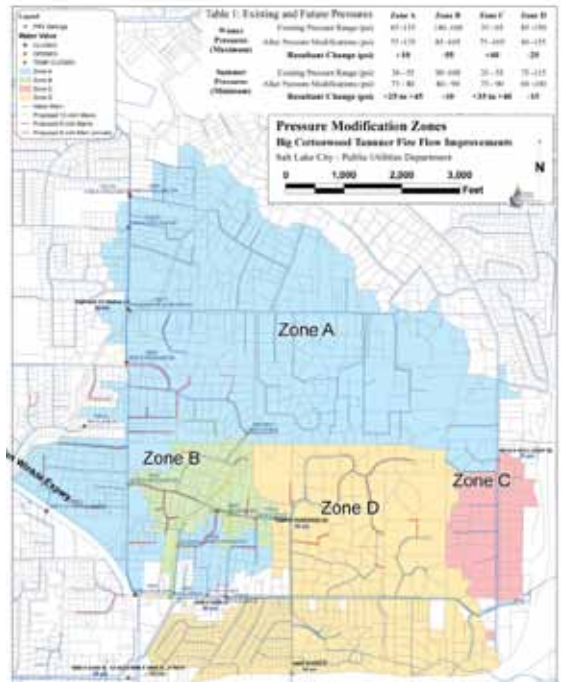
fire flow capacity – 1500 gpm or 3000 gpm at 20 psi, depending on the area;

fire hydrant size – replace all 4-inch pipe diameter hydrants;

fire hydrant coverage – hydrants should be located no more than 500 feet apart.

No constraints were placed directly on flow velocity in the system; however, pipe velocity was used to identify possible restrictions in the system.

During the fire flow evaluation, it was determined that existing pressure zone boundaries in the area



would need to be modified, as they created less than ideal pressure ranges throughout the zones. In addition to the boundary adjustments, two new zones would also be created.

Brandon Arnold, GIS specialist at the Salt Lake City Department of Public Utilities, said: "By combining the high-powered modeling capabilities of WaterGEMS with **Esri**'s ArcGIS, Salt Lake City was able to develop a plan of action that improves the city's infrastructure and provides a great benefit to our customers. The water model has also been critical in determining new pressure reducing valve settings and provided a very easy way of doing 'what-if' scenarios to test different design alternatives."

Pressures Now Adequate for Fire Flow Requirements

The first phase of this project, including the creation of two new pressure zones, was completed in late 2009. This was the largest phase and included numerous pipe replacements, as well as the zone boundary changes. As a result, all new hydrants now meet the 1500 gpm flow requirement. Some areas are even able to meet the 3000 gpm required by the presence of larger homes.

Arnold concluded, "This project enabled the city to boost the available fire flow to the area and provide a higher pressure for many customers, increasing customer satisfaction." ■

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Pitch Fiber Replacement for Lincoln

The new pipe being fed into the ground during a bursting run

U Mole (a division of **Vp plc** within **Groundforce**) recently provided a Hammerhead PB30 cable-based pipe bursting system to Saxilby-based drain and sewer specialist contractor **Drain Wise** for the replacement of a number of deteriorated pitch fiber pipes on a project for the City of Lincoln Council. The project arose after survey work was undertaken at a block of flats known as Fordham House in Lincoln which was designed to establish the existing condition of the drainage facilities serving the building which had recently suffered subsidence problems, and to determine if the drainage was a causal factor for the subsidence. During the inspection work Drain Wise uncovered a number of deteriorated pitch fiber pipes that were in need of replacement, so engineers at the City of Lincoln Council awarded the contract to undertake this replacement work to Drain Wise.

The Project

After careful examination of the site, ground conditions and the pipe that needed replacing, Drain Wise decided that whilst shorter lengths of the pipes involved could be replaced with open cut techniques, often hand digging, several sections, all over 10 m in length, would be better replaced using a trenchless option.

The existing utilities and services including gas electric, water and communications cabling could be better avoided using a trenchless option. Secondly, the ground, which comprised not only soil but also old bricks, concrete and other debris, would need to be removed from site and transported to landfill as it could not be re-used once excavated. This in turn meant new backfill would need to be sourced and transported to site in significant quantity. The site traffic would of course have also increased significantly because of this which would have had a knock-on effect to the local area in terms of vehicle traffic and environmental impact to both the flat's residents and the local community. Thirdly, to excavate trenches to depths of around 2.4 m (7 ft) through mixed ground with many existing services would have required extensive trench support and site security around the open cut sections.

Having investigated the options, it was decided that the longer pitch fiber pipe lengths could be best replaced using a pipe bursting option. Given the site conditions and the relatively limited access to the pipe burst sites and the pipe sizes involved (100 mm {4 in} diameter) it was decided that a cable-based, small footprint bursting technique would be applicable. The system chosen for the work was the PB30 unit provided by U Mole.

In total about 180 m of bursting work was undertaken with the PB30 unit over nine individual bursting runs. Reconnection of lateral connections to the newly installed plastic pipe, where it was found the laterals were still in use, were made using small scale open cut techniques.

What was impressive about the pipe bursting section of the project is that all nine bursts were completed in just over 7 working days, despite the significant difficulties with excavation of the start and reception pits given that they all encountered the numerous existing services. Despite this, once prepared, each burst only took approximately 45 minutes to complete including set up and removal of the PB30 unit. All of the burst runs were completed without problems. ■

Well Efficiency for New Supply Wells

Highly efficient, reducing clogging and power costs

Until recently, the principal objective of most water well operators in the municipal supply and agricultural sectors was to maximize ground water production. But that has changed markedly in the U.S.A. such that well efficiency is now of near-equal importance to quantity. While some water managers remain focused on the pumping rate, many of them strive to reduce their electrical power costs by constructing highly efficient wells. Heightened interest in efficiency has developed, in part, because of drought conditions that have impacted the agricultural and municipal sectors. As ground water levels are lowered by less direct recharge from rainfall, pumping costs have increased dramatically. This motivates well operators to reduce drawdown in new wells by limiting well loss in new wells through the use of highly efficient well screens.

In years past, wells were completed with crude, inefficient, mill-slotted pipe, which clog, limit production, and increase power costs. In contrast, louvered screens and wire-wrapped screens, as manufactured by **Roscoe Moss Company**, are highly efficient, and reduce clogging and power costs. Well operators realize that efficiency is built-in to a well design by selecting well screens that are inherently efficient. That is why, without exception, efficiency-minded well operators no longer accept mill-slotted pipe. RMC offers designers and well operators (in the U.S. and worldwide) a variety of products for all types water wells and onshore seawater intakes.

In the years since its inception, Roscoe Moss Company has contributed significantly to the ground water development industry around the world. The addition of new products and continuing innovations in manufacturing methods have placed Roscoe Moss Company in a unique position as a global provider of water well casings and screens. Today these products, along with water transmission pipe, are used throughout the United States and in over twenty foreign countries. ■

YSI to Monitor Water Quality Interactions

Critical water sources up and down the Atlantic seaboard are monitored and protected with some of the first EXO water quality instruments. **YSI Inc**. (a Xylem brand) shipped and installed the new EXO sondes to three customers last June. New York City Department of Environmental Protection (NYC DEP) has been checking water quality for more than 100 years. With 20 new EXO sondes, the organization will continue to measure several important water bodies around New York City: New York Harbor, East River, Gowanus Canal (a Superfund site) and Jamaica Bay. These are used for recreation, commerce and wastewater discharge.
"Equipment that allows us to obtain accurate and reliable data in an estuarine environment is important to us. The EXO sondes are powerful tools that provide us with the ability to provide real-time data to better serve our mission of monitoring water quality in New York Harbor," said *Beau Ranheim*, Section Chief, Marine Sciences, NYC DEP. The sondes are installed with portable "job boxes" that contain DCPs and cellular modems transmitting the data real-time. Eventually, the data will be shared with the public. A network of aquatic monitors in New Hampshire tracks the complex interaction of water, land, and people over long periods of time---creating opportunities to address upcoming challenges to the ecosystem. ■

NYC DEP staff learns how to set up and calibrate the EXO2 sonde and sensors.

Reinke Irrigation Aids U.S. Producers in Drought Areas

A severe drought is affecting many producers throughout North America. The extreme lack of moisture suffered in areas of the United States in particular is claimed to be one of the worst in the country since the 1980's. **Reinke Manufacturing**, a specialist in mechanized irrigation systems, is helping to aid producers throughout the states this season with center pivot irrigation systems, along with their advanced irrigation technology designed to enhance water application, acreage coverage and precision.
"Reinke designs all of our irrigation products with our customers in mind," said *Chris Roth*, Reinke President. "During this time of drought in so many areas of the country, we're doing all that we can to aid producers with crop saving irrigation solutions."
In addition to an increasing number of producers requesting irrigation systems this season, the company has been fielding requests for its irrigation system technology. As the first manufacturer to incorporate GPS capabilities for center pivot irrigation systems, the Reinke Navigator GPS is designed with satellite-guidance technology to more accurately determine the exact location of the end tower for a standard pivot and assist with the precise navigation of lateral move machines and swing arm corners. And with most every acre in jeopardy in the extreme drought-ridden areas, Navigator GPS is helping to aid producers who require precise accuracy in timing and water application and need to maximize their difficult-to cover-acreage. ■

The Reinke Navigator GPS is designed with satellite-guidance technology

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Photo Courtesy of BGR Energy Systems Ltd.

New President for Volvo Penta Americas

Ron Huibers, currently President of Sales & Marketing North America within Volvo Trucks Americas, is set to assume his new position on September 1, 2012. Huibers has been with Volvo Group for 20 years. He has held various North America and International executive positions within Volvo Group including Volvo Construction Equipment, Volvo Financial Services, Mack Trucks and Volvo Trucks. In his current position, Huibers is the leader of Volvo Trucks North America commercial sales and marketing operations with more than 25,000 annual unit sales through private distribution networks and national accounts.

"I am very happy to have Ron Huibers onboard Volvo Penta as the leader of a business of key strategic importance for us. We have ambitious growth objectives both for our marine and industrial engine business. Based on his extensive experience and record of performance, Ron is the right person to continue to grow our business and strengthen our already strong market positions in the Americas", says Volvo Penta´s global president Björn Ingemanson. In his new role, Huibers will have responsibility for Volvo Penta´s sales, marketing and aftermarket operations in North America, Central America and South America in the newly formed organization, Volvo Penta Region Americas. He will succeed Clint Moore who after more than 16 years of distinguished service and leadership has decided to retire from his position as president of Volvo Penta of the Americas. ■

Ron Huibers, the new president of Volvo Penta Americas

A New Look for Microfilter

Microfilter Co. Ltd transferred its RO membrane business to **MCM Co., Ltd.** on the first of August, 2012. This transfer offers Microfilter a great opportunity to deliver unique and high quality products for customers. The company's combination of talented people, high-tech environment and full automated operations present tremendous advantages. Thus, the company will be better positioned to compete on national and international basis in this industry. All of Microfilter's rights and duties transferred to MCM Co., Ltd. and the name (MCM Co., L.td) will be shown on all products, correspondences and commercial documents. However, contacts in sales, customer service, manufacturing facility and everything else will remain the same. Microfilter has been manufacturing and distributing the premier point of use inline water filter since its establishment in 1996. ■

NeoTech Aqua Solutions Expands Global Rep Network

NeoTech Aqua Solutions, the industry specialist in High-Efficiency Ultra-Violet (UV) water treatment systems, announces the expansion of its global representative network, now spanning over forty countries worldwide. A map and listing of the NeoTech Aqua Representative Network may be viewed online at the company's website. "We are pleased to be partnered with this core group of UV technology and distribution experts around the world," commented *Stephen Dunham*, NeoTech Aqua's President/CEO. "Our global rep network provides local sales and service support to end-users, ensuring a cooperative and highly competitive offering to fill the needs of local end-users."

According to *Larry Pelegrin*, NeoTech Aqua's Vice-President of Global Business Development, "The NeoTech representative network is a hand-picked selection of qualified companies in key geographical markets who have demonstrated an ability to provide top-quality service and water treatment expertise in their respective regions. ■

CH2M HILL Employees Named WEF Fellows

CH2M HILL, a global full-service consulting, design, construction, and operations firm, is pleased to announce that *Jay Witherspoon*, CH2M HILL International Technology Leader based in New Zealand, and Dr. *Glen Daigger*, **International Water Association** President and CH2M HILL Chief Technology Officer based in Colorado, have been recognized as 2012 **Water Environment Federation** (**WEF**) Fellows for their distinguished accomplishments in and contributions to the global water environment. Witherspoon and Daigger will be recognized during WEFTEC 2012, WEF's annual technical exhibition and conference to be held in New Orleans, La., this September 29 to October 3.

"In our ever globalizing society, both Jay and Glen have played crucial roles in improving the water environment across the world. Each of them has had distinct, individualized and meaningful impacts on how we approach designing global water and environment solutions as an industry – enhancing the economies, environments and communities in which we serve," said CH2M HILL Water Business Group President *Bob Bailey*. Witherspoon and Daigger are two of twenty-three outstanding professionals named by the Water Environment Federation as this year's 2012 group of WEF Fellows. This prestigious designation recognizes members' achievements, stature and contributions in professional segments served by WEF. The WEF Fellow Recognition Program, now in its second year, identifies individuals with outstanding accomplishments who have made an impact in their field of expertise and has been approved by WEF Board of Trustees. ■

Two New Faces at Intellitect Water

Intellitect Water, the company that succeeded in the development of in-pipe water quality monitors, has announced the appointment of two new staff members, which CEO *Tony Halker* says "represents an investment in innovation and customer support." *Mark Duckworth* has been appointed Engineering Manager and will work in product development. He has an MSc in Cybernetics and seven years of experience in the design of low-power, high-precision instrumentation for use in harsh environments. He says he is delighted with his new position "because the Intellisonde is a truly innovative technology which deals with an issue that has confounded the water sector for decades."
Jo Cooper joins the company as Product/Market Specialist. She has 20 years of experience in the chemical industry and will be responsible for supporting customers and Intellitect's international network of distributors. For example, following the successful completion of an in-house training program, one of Jo's first assignments involved a site visit to help a customer in the Middle East. Originally formed in 2005 and operating from two sites in the UK, Intellitect Water Limited develops highly innovative water monitoring instrumentation. The business is venture capital backed with the principal shareholders being **Pemberstone Group**, **Catapult Venture Managers** and management. Key features of the technology include solid state membrane-free sensor technology; Tiny easy-fit sensors; No requirement for chemical reagents; Robust and highly accurate; Built in data logger and GPRS capability. ■

Mark Duckworth, the new Engineering Manager at Intellitect Water

SEAL Analytical Appoints Finnish Distributor

Laboratory instrument manufacturer **SEAL analytical** has announced the appointment of Ordior Oy as exclusive distributor in Finland for the company's range of market automated discrete and segmented flow analyzers. Established in 1992, Ordior is a specialist provider of global laboratory equipment and instrument service support. With an established customer base and satellite offices throughout Finland, Ordior aims to help customers find the best solutions to their analytical needs by improving ease of use, efficiency and instrument work rate, with high levels of reproducibility and low detection limits. Ordior Managing Director *Marko Vainikka* says: "The SEAL Analytical products will fit very well in the range of instruments that we provide for environmental and agricultural laboratories. Importantly however, we focus heavily on service and customer support so the fact that SEAL is a developer and manufacturer of both hardware and software will be a great advantage." The distribution agreement was signed at Ordior's Helsinki headquarters by SEAL Analytical's *Haydon Warner*, who commented: "Increasingly stringent environmental regulations and a growing requirement for testing agricultural and horticultural produce mean that the market for SEAL Analytical instruments is growing rapidly and I believe that Ordior is the ideal partner to ensure that our instruments fulfill their potential in Finland." As the designer, developer and manufacturer of both hardware and software, SEAL is able to provide complete bespoke monitoring solutions. The company has a strong record of consistent growth that is built on innovation. ■

EnviroGear Launches New Website, Corporate Brochure

A new brand style that demonstrates a commitment to one voice and image

EnviroGear®, a premier manufacturer of seal-less mag-drive internal gear pumps, is pleased to announce that it has redesigned its website and created a new Corporate Brochure. The debut of these new marketing tools has been designed to coincide with the rollout of the **Pump Solutions Group**'s (**PSG®**) new "One Company-One Customer" campaign. EnviroGear's redesigned website includes a new brand style that demonstrates how the company, in addition to all of PSG's operating companies, has made a commitment to one voice and image while still maintaining its individual brand integrity. While the look of the website has changed, it still contains the same comprehensive information about the company, its pumps and the markets it serves. Additionally, EnviroGear has developed a new Corporate Brochure that includes the most up-to-date information regarding its line of seal-less gear pumps and baseplate systems, as well as examples of the many successful installations EnviroGear has experienced around the world. The brochure also includes explanations and illustrations of the industries in which the company serves, including Process and Hygienic. The company is a global manufacturer of seal-less internal gear pumps and baseplate systems used in a wide variety of industries. EnviroGear's revolutionary seal-less design, with patented between-the-bearing support system, effectively eliminates leaks and mechanical wear, helping to decrease costs while increasing personnel and environmental safety. ■

Toray Membrane:
Making the Desalination Mark

There is no doubt that the world is continuously facing water problems, the thing that makes desalination one of the many treatment technologies adopted worldwide. ***Toray Membrane****, one of the global companies contributing much to the desalination industry, has successfully been delivering large numbers and various kinds of RO membranes to many desalination plants around the world, implementing various projects in many Middle East and North African countries. The* ***Arab Water World (AWW)*** *team met with Hiroyuki Yamamura, Toray Membrane's CEO & President in an exclusive interview to talk about the membrane market and demand.*

1. Please introduce your company – who are you? What do you do?

Toray Membrane offers integrated skills and expertise in water and wastewater treatment technologies, high quality membranes and complementary water treatment products to help our customers improve their competitiveness and plant performance. We are one of very few companies with expertise across the entire spectrum of high-performance water treatment membranes, including reverse osmosis (RO) membranes, nano-filtration (NF) membranes, ultrafiltration (UF) membranes, micro-filtration (MF). Providing value to our customers is our main objective and it is the basis on which we strive to build our market leadership in the membrane water treatment sector.

2. What are you currently working on in the Middle East region? How is business?

Toray has successfully delivered largest numbers and various kinds of RO membranes to many desalination plants in the world. Toray's RO membranes have been widely spread by its good performance with technical support to OEMs and Operators from the early stages to a continued cooperation during plant operation. To cite one of many examples, in Fujairah II RO desalination plant (140,000 m3/d); Toray membranes have been used showing good performance as presumed. In Algeria, the Magtaa RO plant which is largest RO plant in the world with a 500,000 m3/d production capacity will be started later this year as well. The company currently has a number projects to be under-

taken in the MENA region. However, we presume that these will be announced by the respective OEMs Toray is cooperating with as the selected core equipment supplier.

3. How is membrane technology changing the desalination sector? What new technology is coming to market and what benefits do they bring?

Starting in around 1985, Toray membranes achieved a proven 40% recovery in normal seawater conditions of 3.5 % salinity, which was a big topic at that time in the desalination industry. Then, in around 1998, the company achieved a proven 60% recovery, which was called the "Brine Conversion Membrane System", which logically was nearly at limit recovery ratio (Efficiency), considering practical parameters of operation and always allowing sufficient buffer tolerances. In the latest projects, Toray has been selecting the most suitable membrane elements depending on the individual demand and conditions. Today, the main point is saving energy, while providing maximized production with long-lasting equipment. Toray is a specialist in this thanks to the wide range of membrane products, developed by Toray R&D.

4. How is the current demand for membrane and filter products in the region described? What particular technology is proving most popular?

Toray has already delivered a huge number of RO membrane elements to the Middle East and still is continuing in many projects in GCC and beyond, together with its international and regional OEMs. Also, it is engaged in several national projects and strategic activities in various locations across the Middle East, continuing a longstanding history of close collaboration in R&D with the global institutions in the region. The Middle East is obviously one of leading markets in need of desalination technology. Aside from gearing up to the latest technology for new developments, RO technology will be increasingly applied to improve Thermal type desalination as one of the excellent pretreatment technologies. Also here, Toray is taking the lead by introducing Integrated Membrane Systems, using an optimized combination of the available Toray membrane equipment, such as UF & RO.

5. How competitive is the current market? What distinguishes competitors?

Large scale demand for desalination and waste water reclamation is apparent in the Middle East and attracts many international technology and equipment providers. This results in a growing requirement for design engineers and decision makers to be well acquainted with the various technologies and their implications for owners and operators. Toray is a well reputed and trustable company that has a long-standing commitment to the Middle East, operating two regional offices located in the UAE and Saudi Arabia. It has the ability to offer customers a true partnership, starting with direct technical advisory during plant design stage all the way to on-site monitoring and technical support during plant operation, which is reliably provided by qualified in-house Toray engineers.

6. Where do you see future growth opportunities in the region?

Toray initiated R&D of Reverse Osmosis in 1968. Since then, it has been leading the Reverse Osmosis industry as a one of major membrane suppliers in the world. All resulting products available for Reverse Osmosis solutions by Toray have been developed by the Toray R&D team. Toray products and solutions lead global market trends and do so with a significant contribution to the many people who are suffering from limited access to quality water and shortages. The company sees excellent future growth opportunities in the region by making a real difference in technology advancements and strategic alliances. It has the capacity and motivation to maintain the leadership position of today and grow together with its partners and OEMs. ■

Solar Hot Water without a Big Deal

World's 3rd biggest flat plate collector producer of **Ezinc** has introduced its new batch solar water heater model Nanosol NA 130. A carefully designed direct passive system combines a solar collector and a 130 lt enameled storage tank into one unit which does not involve pumps or a separated storage tanks, anti-freezing, heat exchangers, pumps, valves, sensors, ancillary control devices etc. Its compact design places special attention on simple, reliable and cost-effective product. The water is heated directly and no pump is required to move the water and thus without any operating cost. It is really an economical option with almost no maintenance and installation costs and a reliable technology in most of the climate conditions. Ezinc reduced the heat loss by placing the water tank in a thermally insulated special UV resistant box. This is achieved by encasing the water tank in a double layer ultra-high transmittance polymer-topped box that allows heat from the sun to reach the water tank. The water's large thermal mass, along with the insulation; reduces the heat dissipation outwards the tank. It has also an inbuilt back-up electric heating element of 2 kW with adjustable thermostat in the integrated tank, the operation of which may be necessary on cloudy days to ensure a reliable supply of hot water. Nanosol is also an excellent space-saving solution for people that do not have enough space for a conventional solar water heater as it can be installed in balconies, terraces, roofs and walls. ■

The water is heated directly and no pump is required

Mobile Water Suitcase for Emergency Supply

Emergency water supply is an important and challenging need. Especially search and rescue detachment/ troops, who visit the field soon after the incident for evaluation, lack reliable supply of clean and safe water.

The unit delivers 180 liters of clean drinking water per hour

The Swiss based water treatment specialist **Trunz Water Systems AG** developed a mobile and light weight watermaker that is installed in a shock resistant, non-corrosive case – ready to plug in and run. *Lars Willi*, COO at Trunz Water Systems: "The idea came up when we went to Haiti for an installation of one of our solar powered, decentralized water treatment units. Aid agency people told us about their difficulties during the first few days after the earthquake and how they struggled to supply their own people with safe water. Trunz is specialized in independent water treatment and desalination system. So we started thinking of a rather small and compact version based on the same reliable technology we use for our mid-size and larger container units." The newly launched product is called "Survivor 300" which emphasizes on immediate clean drinking water for survival in a remote area. Therefore, the unit works independent from any technical or electrical supply. All that is needed is a freshwater source (lake, river or borehole). Power to operate the unit comes from the integrated solar panels with RV battery pack or if available any other power source (generator). ■

Handling the Toughest Samples

The Sievers InnovOx has a Web interface for remote monitoring

The Sievers InnovOx Laboratory Total Organic Carbon (TOC) Analyzer from **GE Analytical Instruments** runs thousands of common and challenging industrial process, wastewater and environmental water TOC samples—including brine, humic acid, and cellulose—with unprecedented uptime. The Sievers InnovOx offers unmatched oxidation robustness, dynamic linear working range and calibration curve stability. The tough, reliable Sievers InnovOx uses a patented Supercritical Water Oxidation (SCWO) technique to achieve superior TOC recoveries regardless of organic compounds and particulate impurities in the sample. This new process also removes oxidation byproducts and sample between each analytical run, eliminating frequent maintenance and expensive catalyst replacement. The InnovOx uses an enhanced Non-Dispersive Infra-Red (NDIR) design with a dynamic detection range of 0.5 to 50,000 ppm. It measures Total Carbon (TC), Total Inorganic Carbon (TIC), Total Organic Carbon (TOC), and Non-Purgeable Organic Carbon (NPOC). The Sievers InnovOx has a Web interface for remote monitoring, an intuitive touchscreen display, and USB ports. The Analyzer is easy to set up and operate and requires no external carrier gas. Preventive maintenance is recommended every 6 months and calibration is typically stable for 6 months. GE Analytical Instruments, part of GE Power & Water, GE Water & Process Technologies, designs and manufactures state-of-the-art instruments for simpler, faster and more accurate analytical measurement. The company's instruments combine advanced microchemistry, molecular and atomic physical measurement to achieve the most sensitive laboratory and process control instrumentation in the world. GE Analytical Instruments has a strong history of technical innovations, and holds numerous product design awards and more than 30 patents. The company has achieved many technology "firsts" by anticipating market needs and demands. ■

New High-Capacity Stormwater Chamber

CULTEC, Inc. introduces a new Recharger® 900HD detention/retention chamber to the stormwater market. The ultra-high capacity model offers the benefit of maximizing storage while reducing installation area. The 900HD is now the company's largest capacity model, measuring 9.25' long, 78" wide and 48" tall. It features a bare chamber storage capacity of 123.34 ft^3/unit and a minimum installed storage of 190.73 ft^3/unit. Systems constructed with the tallest available chambers typically allow customers to use fewer units to achieve the needed storage volume and require less labor, resulting in the lower cost per cubic foot. Additionally, such systems decrease a required installation footprint.

The introduction of the Recharger 900HD brings the total number of CULTEC's chamber sizes to 10, further expanding the selection to help accommodate almost any site parameter. The 900HD is optimal for replacing large diameter pipe, stacked or crate systems and allows for additional site development. It features CULTEC's unique side portal internal manifold feature and works together with HVLV FC-24 Feed Connectors to allow manifolding to take place at any point

The new technology is 9.25' long, 78" wide and 48" tall

within the system for maximum design flexibility. Each unit has the ability of accepting up to a 24" diameter pipe into its endwall to manage greater flow rates. The company provides a complete stormwater management plan consisting of filtration, conveyance, storage and infiltration. Engineers and clients are able to meet the regulations of EPA's Phase II of the Clean Water Act for their commercial and residential projects. ■

Wilks Offers the Best in Measurement

Oil in wastewater discharges is highly regulated and each region of the world has its specific regulations. For the offshore oil industry, regulating bodies such as the NPDES (National Pollutant Discharge Elimination System) in the US have strict ppm limits that are coupled with costly fines for non-compliance. Onshore industrial wastewater producers also have limits imposed either by the wastewater treatment facilities or by government regulations such as the US Clean Water Act (CWA) or the EUs Integrated Pollution Prevention and Control (IPPC). Excessive amounts of oil in the wastewater discharge can lead to fines and/or pollution from sanitary sewer overflows (SSOs). Portable infrared analyzers, such as the InfraCal TOG/TPH Analyzers from **Wilks Enterprise**, provide on-site oil in water measurement capability in a matter of minutes, eliminating the wait for off-site laboratory results. They help provide the assurance that oil in water levels is in compliance with discharge permits and give treatment operators needed information on how their system is performing.

On-site oil in water measurement capability in a matter of minutes

The rugged InfraCal TOG/TPH Analyzers have been specifically designed for easy, on-site measurement of the oil and grease concentration level in water in under 15 minutes and are built for years of dependable operation. They are based on field-proven infrared technology and enable non-technical users to obtain accurate measurements with a few simple steps. Measurement data correlates with EPA Methods 1664, 413.2, 418.1 and ASTM Methods D7066 and D3921. ■

Metito: Two New Projects in Australia

Metito, the global provider of total intelligent water management solutions in the emerging markets, has announced its latest overseas projects with **Bechtel International Inc.** in Australia. The two projects are an integral addition to Metito's burgeoning oil and gas portfolio and part of a long term partnership with Bechtel, one of the global Engineering, Procurement and Construction Management companies and a major player in the booming Liquefied Natural Gas (LNG) industry in Australia. Both projects are located on Curtis Island, near Gladstone in Queensland, Australia. Bechtel is constructing three separate LNG plants on the island which liquefy coal seam gas ready for export for two customers – GLNG (Santos, Petronas, Total and Kogas) and Australia Pacific LNG (Conocophillips, Origin and Sinopec). Metito's scope of work includes design, fabrication and supervision of installation of initial equipment supplied by Metito including seawater reverse osmosis desalination plants and sewage treatment plants to be used for the construction sites at GLNG.

The specification required these plants to meet challenging feed water quality and very strict discharge limits. Moreover, to meet the needs for the construction schedule, construction water and sewage treatment plants were fast-tracked. This was followed by the supply of demineralization systems using reverse osmosis and electrodeionization for Australia Pacific LNG, as well as oily waste treatment systems for GLNG. The demineralized water is used for the Acid Gas Reduction Unit (AGRU) and turbine wash. ■

The World's Highest Cooling Towers

BGR Energy Systems Ltd., specialized in energy plant engineering and construction, is in charge of one of India's most important energetic projects. With an initial budget of almost USD 820 million, the Kalisindh Thermal Energy Plant is part of an ambitious plan from the Rajasthan Government, who expects to produce up to 1,200 Mw (2 x 600) when the plant is operative. For the construction of the two cooling towers, BGR Energy Systems is using two 21CJ290 tower cranes from **Comansa Jie**, with maximum load capacity of 18 tons. Both have jib length of 74 meters, the maximum of this model, which allows them to reach the tower's base diameter, of 142 meters. To build the towers up to 202 meters, which it is believed to make them the world's highest cooling towers (ahead of Niederaussem in Germany), both cranes have been jacked-up with a hydraulic cage in different phases, until they reached 217 meters of height. To dismantle the crane at such height, and without any access for a mobile crane, a new dismantling device, designed by Linden Comansa, was used. This device allows to disassemble the jib sections and to hoist them down inside the cooling tower. Dismantling the first jib sections, the jib length of the 21CJ290 was decreased to 35m, shorter than the minimum diameter of the tower. ■

cranes have been jacked-up with a hydraulic cage in different phases to reach 217 meters of height

An Event not to Be missed

Thousands of professionals from around the world will meet at the 2012 NGWA Groundwater Expo December 4 through 7 in Las Vegas, Nevada, USA -- hosted by the **National Ground Water Association**. At the Groundwater Expo, everyone will have the opportunity to discover latest in products and services from hundreds of exhibitors; Learn from industry experts during 60-plus hours of educational offerings; Connect with old friends…make new ones…forge partnerships across all sectors of the industry; Grow one's business and industry, professionally and personally. Groundwater professionals from all sectors—water well contractors, scientists and engineers, manufacturers and suppliers—will gather at the Groundwater Expo to work together to advance the groundwater resource and the industry.

Much can be learned from industry experts at more than 60 hours of educational workshops covering topics such as groundwater supply and quality, geothermal operations, and business management. Some of the offerings available will be: Environmental Geochemistry Made Easy for Site Investigation and Remediation; Field Techniques to Understanding Your Well Problems; High-Capacity Pumping; Introduction to the

The Event will feature more than 60 hours of educational workshops

Use and Installation of In Situ Piezometers for Groundwater Monitoring; Sell More by Overcoming the Price Objection. It's the industry's leading annual event with its cutting-edge educational programming, an exhibit hall with the latest in equipment and technological innovations, a multitude of networking opportunities, and more that groundwater professionals from all industry segments and all geographic areas will gather. ■

Encouraging Marks for Wire & Tube China 2012

Asia's No.1 wire, cable, tube and pipe industry exhibitions, the 5th All China - International Wire & Cable Industry Trade Fair (wire China 2012) and the 5th All China – International Tube & Pipe Industry Trade Fair (Tube China 2012) will be held concurrently again in Shanghai New International Expo Centre from 25 to 28 September, 2012. By the end of May, exhibitor recruitment has concluded with encouraging results. The exhibitor promotion went smoothly, and booths of the two exhibitions have almost been booked up. Both new and old exhibitors applied very actively to get on board of the ideal platform for them to meet the industry again, many of who have requested to expand the booth area to enhance their exposure.

Up until now, a total number of 752 companies from 26 countries have confirmed their participation in wire China 2012. The main product groups of wire China 2012 cover wire manufacturing & finishing machinery, process technology tools, auxiliary process technology materials, materials, special wires & cables, measuring & control technology, test engineering, and specialist areas. In this September, from Hall W1 to W5 of Shanghai New International Expo Center, a number of manufacturers from Europe, America, Japan and other countries, as well as Taiwan Region will once again gather together. In addition, national or regional pavil-

Both new and old exhibitors applied very actively

ions from Germany, Italy, USA, France, Austria, South Korea, Japan and Taiwan will continue to exhibit in large-scales. ■

2012

September

UAE

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Dubai –UAE
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October

Turkey

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Abwasser.Praxis - Expo & Congress 2012
Congress with trade fair dedicated exclusively to the topic of wastewater
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Algeria

Algeria Water and Electricity Expo 2012
Exhibition devoted to Algeria's Electricity & Water Sectors
19-21
Algiers – Algeria
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Kuwait

Kuwait Watertech Conference & Exhibition 2012
Kuwait Water Technology Conference & Exhibition
28 – 29
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Radisson Blu Hotel Kuwait
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December

Saudi Arabia

SWPF (Saudi Water & Power Forum)
The Gateway to Saudi Arabia's Water & Power Industry
2-4
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2013

February

Qatar

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Abu Dhabi Conference and Exhibition for the Middle East Power Generation Industry
4-6
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April

UAE

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Water, Energy Technology and Environment Exhibition. WETEX will focus on the advanced Technologies in the areas of Energy such as Fossil Fuel, Nuclear, Renewable, Power Generation, Smart Grids, Efficiency and Conservation
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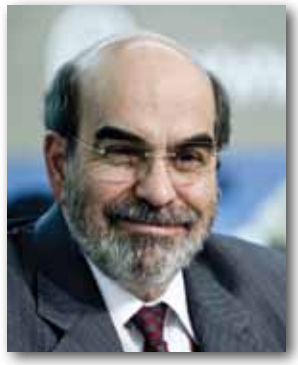
تمت الطباعة عند شمص - للطباعة والنشر

The Need to Better Manage Water Resources



ضرورة النهوض بإدارة موارد المياه

Drought in some parts of the world has hurt global grain production and contributed to food price spikes virtually every other year since 2007, highlighting the need to transform the way water is used - and wasted - throughout the entire food chain. This is one of the key messages that **FAO** transmitted at World Water Week in Stockholm, Sweden.

In a speech made at the Week's opening ceremony, FAO Director-General *José Graziano da Silva* stressed that "there is no food security without water security," noting that FAO's recent report, The State of Land and Water Resources for Food and Agriculture, warns that water scarcity and pollution are posing a growing risk to key food production systems around the world. "Agriculture, as we practice it today, is one of the causes of this phenomenon, as it represents 70% of all freshwater uses," said Graziano da Silva. But, he also noted, the food production sector also offers tremendous potential for changing how the world uses water.

"Agriculture holds the key to sustainable water use," said Graziano da Silva. To achieve that and meet the world's growing demand for food, "we need to produce in a way that conserves water, uses it more sustainably and intelligently, and helps agriculture adapt to climate change" he added.

Toward that end, FAO is proposing a new framework for water management in agriculture: Coping with water scarcity: An action framework for agriculture and food security. FAO's framework stresses in particular the importance of the following areas where policy and action should focus: Modernization of irrigation ;Better storage of rainwater at farm level ;Recycling and re-using ;Pollution control and Substitution and reduction of food waste.

At the same time ,the reduction of post-harvest losses must be part of any water scarcity coping strategy .Of all food produced globally, 30% - the equivalent of 1.3 billion tons - is lost or wasted every year along the value chain from field to fork .Reducing these losses go a long way towards reducing pressuring on natural resources that are essential to food production ,like soils and water.

José Graziano da Silva
Director-General
Food and Agriculture Organization of the United Nations (FAO)

أكّدت منظمة الأغذية والزراعة للأمم المتحدة «فاو» أن الجفاف تسبب في إلحاق ضرر بإنتاج الحبوب العالمي في بعض أجزاء العالم، كما يساهم في ارتفاع أسعار الغذاء كل سنتين تقريبا منذ العام ٢٠٠٧، مما سلط الضوء على الحاجة إلى تغيير الطريقة التي تُستخدم فيها المياه، وتُهدر، عبر السلسلة الغذائية برمتها.

كانت هذه إحدى الملاحظات الرئيسية التي نقلتها المنظمة خلال الإسبوع العالمي للمياه المنعقد في ستوكهولم، السويد. وفي خطاب ألقاه خلال حفل افتتاح الاسبوع العالمي للمياه، شدد جوزيه غرازيانو دا سيلفا، مدير عام المنظمة، على «عدم وجود أمن غذائي دون تحقيق أمن المياه»، مشيراً إلى أن تقرير المنظمة الأخير المعنون «حالة موارد الأراضي والمياه في العالم لأغراض الغذاء والزراعة» يحذِّر من أن ندرة المياه والتلوث يشكلان مخاطر متزايدة على نظم انتاج الأغذية الرئيسية في جميع أنحاء العالم.

وأضاف غرازيانو دا سيلفا بأن «الزراعة، كما نمارسها اليوم، هي واحدة من أسباب هذه الظاهرة، حيث أنها تمثل ٧٠٪ من إجمالي استخدامات المياه العذبة». ولفت إلى أن قطاع الإنتاج الغذائي يوفر إمكانات هائلة لسبل تغيير استخدام المياه، معتبراً أن «الزراعة تعد أساس تحقيق الإستخدام المستدام للمياه». ومضى قائلاً أنه بغية تحقيق ذلك وتلبية الحاجة العالمية المتزايدة للأغذية «علينا أن ننتج على نحو يحافظ على المياه، وأن نستخدم المياه على نحو أكثر استدامة وذكاءًا، وأن تعمل المياه على مساعدة الزراعة على التكيف مع التغير المناخي».

وبغية تحقيق الهدف المذكور، تقترح المنظمة إطار عمل جديد لإدارة المياه في الزراعة: «في مواجهة ندرة المياه: إطار عمل للتحرك في مجال الزراعة والأمن الغذائي». ويشدد إطار المنظمة، بشكل خاص، على أهمية المجالات التالية التي يتعين على السياسات والاجراءات ذات الصلة أن تصب عليها جهودها: تحديث الري؛ تخزين أفضل لمياه الأمطار على صعيد الحقل؛ إعادة التدوير وإعادة الاستخدام؛ مكافحة التلوث والإستعاضة والحد من هدر الأغذية.

وفي غضون ذلك، فأنه يتعين أن يكون الحد من خسائر ما بعد الحصاد جزءًا من أية استراتيجية معنية بمواجهة ندرة المياه. ومن بين إجمالي الأغذية المنتجة عالمياً، فإن ٣٠٪ منها– أي ما يعادل ١,٣ مليار طن– يُفقد أو يُهدر سنوياً على طول سلسلة القيمة من الحقل إلى المستهلك. إن الحد من هذه الخسائر من شأنه أن يقطع أشواطاً بعيدة باتجاه التقليل من حدة الضغوط الواقعة على الموارد الطبيعية التي تعد ضرورية للإنتاج الغذائي، مثل التربة والمياه.

جوزيه غرازيانو دا سيلفا
المدير العام
منظمة الأغذية والزراعة للأمم المتحدة (فاو)

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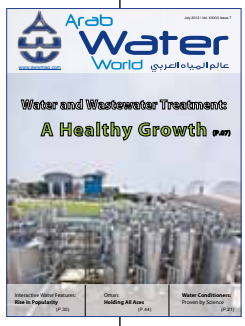

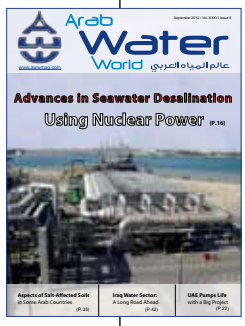

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