

# WATER DESALINATION REPORT

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## Australia

### WHO'S WATCHING THE WATCHDOG?

In today's *The Age*, a senior columnist weighed in on the human health effects of boron in desalted water. This time, the columnist incorrectly describes boron's threat to human health. He had previously and recklessly misinterpreted a CSIRO report on boron before going on to suggest that the WHO's recent relaxation of boron guidelines might have been influenced by the RO industry to help desal plants comply with the rule.

Carelessly paraphrasing reports from Harvard Medical School, the columnist now implies that the 2.4 mg/L WHO guideline and US EPA standard and the 4.0 mg/L Australian National Health and Medical Research Council standard are unsafe for children. His analysis is incorrect and clearly shows his unfamiliarity with how the tolerable daily intake (TDI) of a substance is calculated.

In terms of environmental health and toxicology, the US Department of Health & Human Services defines TDI as an "estimate of the amount of a potentially harmful substance (e.g. contaminant) in food or drinking water that can be ingested daily over a lifetime without appreciable health risk." To boron's TDI value, the WHO guideline has applied an uncertainty factor (i.e. safety factor) of 60.

What is surprising is that this particular columnist has taken up his crusade against the Victorian Desal Plant before the plant has even made its first drop of water. The contract between the Victorian government and the AquaSure consortium building the plant specifies a 0.5 mg/L boron limit, above which AquaSure will be required to pay a penalty.

In the meantime, *The Sydney Morning Herald* has already picked up on the story, and the urban legend surrounding boron's impact on human health continues.

## California

### THE 'PEOPLE'S DESAL PROJECT'

While Marina's proposed seawater desalination project continues to languish as a combination of legal/political issues are being sorted through, local developer Agha Nader continues to promote his project as the only viable alternative. According to Agha, a 10 MGD (37,850 m<sup>3</sup>/d) SWRO plant located on his 200-acre tract at Moss Landing "simply makes sense."

He told *WDR* that the project he is now proposing would be located at the former National Refractories site and could use approximately \$200 million of existing infrastructure.

Agha said that he has now hired a consultant to prepare an environmental impact report (EIR) and has engaged a team to design the SWRO system for a 10 MGD (37,850 m<sup>3</sup>/d) SWRO project he calls "The People's Moss Landing Water Desal Project." The project details are almost as ambitious as the name is idealistic.

He predicts that the project will be able to produce water at a total water cost of \$1,650-\$1,950 per acre-foot (\$1.33-\$1.58/m<sup>3</sup>). He estimates its total capital cost at \$128 million, including an \$18 million, 6-8 MW solar energy system that will provide 50-60 percent of the electricity required to run the plant. The new project will employ the sites' existing seawater intakes and concentrate outfalls, and Agha said that Desal America, an RO system supplier for whom he is CEO, will provide the technology.

Tom Luster, the Coastal Commission's desalination expert, told *WDR* that he is not aware of any application having been submitted for the Coastal Development permit needed for the proposed Moss Landing project. *WDR* also understands that changing the site's uses may need approval by both the county Planning Commission and the Coastal Commission, a multi-year permitting process that apparently has not yet been initiated.

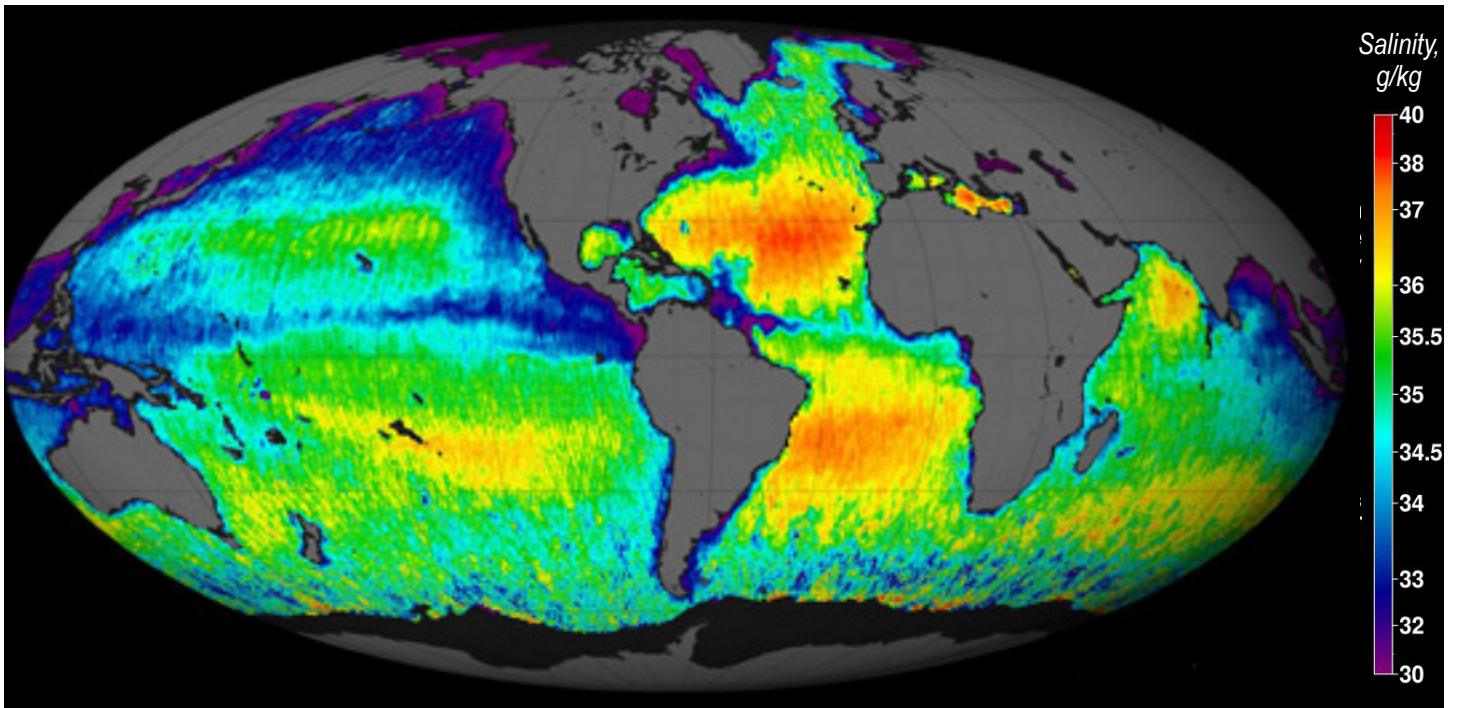
To move forward, projects must also be backed by a public agency. Although he does not yet have an agreement in place, he said that he is currently in negotiations for the necessary support, and has not ruled out forming a new agency.

Despite these seeming impediments, Agha says that the Moss Landing project "could be designed, permitted, assembled and commissioned within 24 months." Sounding surprisingly altruistic, he told *WDR* that he was not supporting the project for a profit, insisting, "I want to give something back to the people; it's my gift to the community."

The People's Project, along with CalAm's proposed Regional Desal Project at Marina and nine other alternatives, will be presented at a public forum in Monterey on 26 October.

#### American Water Summit 2011

AWI will host its Water Summit in Atlanta, Georgia on 9-10 November. For the program visit [www.americanwatersummit.com/schedule](http://www.americanwatersummit.com/schedule). Registration deadline is 28 October.



NASA's Aquarius instrument produced this 'Salt of the Earth' global map of the Earth's ocean surface salinity. It was produced from data taken between 25 August and 11 September 2011

## Saltiness

### ALL SEAWATER IS NOT CREATED EQUAL

Would salinity by any other name be just as salty? Free from land influences, the salinity of seawater usually varies between 31g/kg to 38g/kg, and 'typical' seawater is considered to have a salinity of 35g/kg.

Although seawater contains more than 80 elements, 99.9 percent of its solute mass is comprised of eleven elements, of which sodium and chloride account for almost 86 percent. Despite salinity's variation from location to location, the relative concentration of most ionic species remains similar in a relationship referred to as Marquet's Principle.

Seawater and concentrate salinity in the desal industry are commonly determined by evaporation, summation of ions or salinity-conductivity relationships. Results from these methods are often abbreviated as "TDS," regardless of whether the measurement is actually referring to "solids" or "salts". Although these methods should yield the same result, they often do not.

In contrast, marine monitoring at sea with a CTD (conductivity temperature depth) probe is based on the UNESCO Practical Salinity Scale (PSS-78), to determine salinity from conductivity at different depths. Oceanographers define PSS as the dimensionless conductivity ratio of a seawater sample to a standard potassium chloride solution. However, PSS-78 is limited to salinities less than 42.

GHD's Siobhan Boerlage evaluated the various methods

used to measure seawater and SWRO concentrate salinity and presented her results recently in Qingdao, China.

She told *WDR*, "Traditional evaporation methods [TDSolids] quantify dissolved *solids* and typically overestimate salinity. Summation of ions [TDSalts] from a discrete seawater or brine sample is more time consuming but provides a breakdown of constituent ions, which is useful in monitoring of the key SWRO design ions such as chloride and boron. However, TDSalts requires laboratories that are skilled in saline analysis and the ion balance should be independently checked."

Dr Boerlage showed that PSS-78 was valid for higher salinity SWRO concentrate at Australia's Gold Coast Desal Plant, concluding, "PSS-78 allows consistent measurement of seawater *and brine* salinity on land and at sea and is relatively simple for online, real time process monitoring."

### Hong Kong PLANNING AHEAD FOR SWRO

In a directive issued last Wednesday, Hong Kong's Special Administrative Region (SAR) Government said that it has reserved a site at Tseung Kwan O to build a medium-sized seawater desal plant. The 10-hectare (25-acre) site on Eastern Victoria Harbor was one of three locations at which SWRO pilot studies were conducted in 2003-2004.

The desal plant will supply approximately five percent of the territory's fresh water supply. Based on an average daily consumption of 2.6 million m<sup>3</sup>/d (695 MGD), that equates to a facility with a production capacity of about 130,000 m<sup>3</sup>/d (34 MGD). The Government said that it would conduct more detailed studies and field surveys over the next two years and would then need another seven years to build the plant.

Seventy percent of Hong Kong's current water demand is imported from the Dongjiang River, 80km (50 mi) away, in China's southern Guangdong province. The remaining fresh water comes from local catchments.

An interesting aspect of Hong Kong's water system is a completely separate seawater distribution system that provides 740,000 m<sup>3</sup>/d (195 MGD) of screened and chlorinated seawater for flushing 80 percent of its toilets.

In the same directive, the Government also said that it was negotiating a new water supply agreement with Guangdong authorities. Under the agreement, Guangdong would continue to supply fresh water from Dongjiang until 2014.

Although the directive did not mention the price of imported Dongjiang River water, one report said that it was HK\$9/m<sup>3</sup> (\$1.16/m<sup>3</sup>; \$4.39/kgal), compared to an estimated cost of HK\$12 (\$1.54/m<sup>3</sup>; \$5.83/kgal) for desalinated seawater.

## Texas

### **OILFIELD TREATMENT FACILITY PLANNED**

STW Resources has announced that it will build a 20,000-30,000 bbl/d (3,180-4,770 m<sup>3</sup>/d) brackish water and produced water treatment facility to serve oil and gas producers near Midland, Texas. According to CEO Stanley Weiner, the facility will employ RO treatment technology, including a proprietary membrane pretreatment process to treat a variety of water and wastewaters. The pretreatment system was developed by STW's technology partner and is said to increase the product water recovery.

Weiner said that the facility will include multiple brackish water wells to obtain water with a TDS estimated at 10,000-18,000 mg/L, which will be blended with produced water before undergoing RO desalination. "We will target the removal of sulfates and chlorides from the blended water to produce fresh water for various drilling, fracking, and production-related uses, while the RO brine will be used in place of drilling muds for oil and gas wells," he said.

The company has had agreements with a company to deploy mobile evaporators for use in the oilfield, but found the technology limiting. Weiner said that working with the new system, which he described as an "RO on steroids", provides more treatment flexibility at a lower cost.

The facility is being built in a joint venture with CK Investments Energy and is expected to be operational by the end of March 2012.

## Company News

### **FY2011: THE END OF AN ERA?**

With Siemens' 30 September close of the fiscal year, the company continued the quiet reorganization of its water industry business. *WDR* has learned that the company's water treatment activities in the oil and gas market, which had formerly been part of Siemens Water, have now been made part of Siemens' Energy group. Meanwhile, its municipal water and wastewater products have been reorganized as part of Siemens' Industrial Automation group.

There are also understood to be changes within the reporting structure. Rather than being structured around separate product groups, the organization will be streamlined with one service manager responsible for all service engineers, all programmers reporting to a programming manager, all electrical engineers reporting to an electrical engineering manager and so on.

Memcor appears to be the only exception to the new structure, fueling growing rumors that the group is for sale. When USFilter initiated its acquisition of Memcor parent Memtec in 1997, it was initially characterized as "a hostile takeover" and the bid was said to be "woefully inadequate".

This time, a suitor will likely be welcomed with open arms.

## Saudi Arabia

### **O&M FIRM LOOKS BEYOND GCC**

Since its establishment in 2005, the First National Operation and Maintenance Company (NOMAC) has assembled a stable of desal operations contracts totaling almost 2.2 million m<sup>3</sup>/d (581 MGD) of water production capacity. Three of the projects also include operation of power facilities totaling more than 4,500 MW of power production.

The company is a joint venture between Saudi Arabia's ACWA Power International (65%) and Oman's Sogex (35%). Although NOMAC's current projects are all located in Saudi Arabia and are the result of the development efforts of its shareholders, the company has much bigger plans.

Nabil Nada, NOMAC's chief technology officer, told *WDR* that the company's workforce currently stands at 650, and it continues to recruit, train and develop positions at all levels within the organization. In many of the GCC countries, nationalization of the workforce is a priority, and he notes that the company has successfully implemented nationalization programs on the projects it operates.

Project	Process	Capacity, m <sup>3</sup> /d (MGD)	Power, MW	Start-up
Barge-mounted SWRO IWP	SWRO (Wetico)	52,000 (13.7)	0	Jun 2008
Shuaibah IWP expansion	SWRO (Doosan)	150,000 (40)	0	Feb 2009
Shuaibah IWPP	MSF (Doosan)	880,000 (232.5)	900	Jul 2009
Jubail IWPP	MED (Sidem)	800,000 (211.4)	2,743	Dec 2009
Shuqaiq IWPP	SWRO (MHI)	212,000 (56)	850	Dec 2010

#### NOMAC's Current O&M Projects

Dr Nada said that Sogex Oman, NOMAC's affiliate, operates several projects in Oman and NOMAC also has plans to extend its horizons. "We are currently pursuing projects in Oman and Jordan, and plan to expand internationally, beyond the Gulf countries. We are also interested in operations projects that involve wastewater treatment plants and water transmission systems," he said.

#### Company News

##### PARTNERSHIP WILL PROMOTE FO IN MENA

Hydration Technology Innovations (HTI) has appointed Dubai-based Future Technologies as the Middle East/North Africa (MENA) distributor of its forward osmosis (FO) membrane technology for industrial applications, including those in the oil and gas industry.

Mark Lambert, HTI's managing partner, told *WDR* that the move was based on the continued success of its FO technology in desal and brine management applications in the US, noting "Future Technologies' water and wastewater experience will be a real asset as we introduce FO solutions in the MENA region."

Future Technologies is a newly established technology provider formed by Middle East veteran Kai-Uwe Buerger, the former managing director of Ovivo/Aqua Engineering's Dubai operations. According to Buerger, the company has a branch office in Riyadh, partners throughout the region, and will focus on desal, reuse and renewable energy systems.

#### IN BRIEF

Last week, *WDR* remembered **Mike Finan**. His niece, Judith, recently ran the Macclesfield Half Marathon to raise money for the East Cheshire Hospice where Mike died. Readers can learn more at [www.justgiving.com/Judith-Constable](http://www.justgiving.com/Judith-Constable).

The environmental group **Greenpeace** has launched its newest protest boat in Bremen, Germany. The 58m (190 ft) *Rainbow Warrior* has wind powered sails to assist its diesel engines and an onboard seawater desal plant to provide water for a 32-person crew. The group has previously opposed seawater desal because of its environmental impact.

SAWater's 100 GL/yr (72.4 MGD) Adelaide SWRO plant began delivering water into the network last week. The \$1.83 billion plant was constructed by AdelaideAqua, a consortium that includes Acciona Agua, United Utilities Australia (Trility), McConnell Dowell and Abigroup. The plant is currently producing at a rate of 5-10 ML/d (1.3-2.6 MGD), and will reach its full production capacity by the end of the year.

#### PEOPLE

Consolidated Water Company (CWCO) has announced the appointment of **Erik Desormeaux** as senior desalination engineer. He was formerly a process engineer with CDM and will relocate to Coral Springs, Florida. He may be contacted at [edesormeaux@cwco.com](mailto:edesormeaux@cwco.com).

Severn Trent Services has appointed **John Dyson** as its North American sales director for its water purification group. He was formerly responsible for Infilco Degremont's municipal sales. He will be based in Richmond, Virginia, and may be contacted at [jdyson@severntrentservices.com](mailto:jdyson@severntrentservices.com).

Acciona Agua has announced the appointment of **Alejandro Jimenez** as development director of water services. He had previously been the company's commercial director for MENA and India. He is based in Madrid and may be contacted at [alejandro.jimenez.benitez@acciona.es](mailto:alejandro.jimenez.benitez@acciona.es).

CH2M Hill has appointed **Marek Mierzejewski**, formerly with Siemens Water, as its water-for-mining sector leader. He is based in Richmond, Virginia and may be contacted at [marek.mierzejewski@ch2m.com](mailto:marek.mierzejewski@ch2m.com).

**Steve Watzeck**, formerly GE Water's president of engineered systems, has left the company and been appointed CEO of Anaergia, Inc where he succeeds Andrew Benedek who will remain as executive chairman and chief technology officer. Watzeck will be based in Burlington, Ontario, Canada, and may be contacted at [steve.watzeck@anaergia.com](mailto:steve.watzeck@anaergia.com).

**Paul Spofford**, formerly regional business manager, has been appointed vice president of municipal sales of Infilco Degremont. He will continue to be based in Richmond, Virginia, and may be contacted at [paul.spofford@infilcodegremont.com](mailto:paul.spofford@infilcodegremont.com).