

WATER DESALINATION REPORT

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Florida

NO LONGER IF, NOW IT'S WHEN

Nine local governments from four eastern Florida counties met this past Friday to consider how seawater desalination might factor in their collective futures. The meeting was facilitated by St Johns River Water Management District (SJWMD), and included water utilities from Flagler, St Johns, Volusia and Marion Counties.

Barbara Vergara, director of the District's Water Supply Management Division, told *WDR* that the question is no longer one of whether seawater desalination would be an alternative supply source, but what form it might take. "A seawater desalination project of up to 30 MGD [113,550 m³/d] will be implemented, but it still hasn't been decided if it would be a land-based plant or vessel-mounted, like that which has been proposed by Water Standards Group," she said. "There is a sense of urgency in the matter and the city officials attending the meeting were very motivated. A decision is likely within the next several months."

According to Department of Resource Management director Hal Wilkening, the District has considered all available alternatives in an effort to identify sustainable water supply sources. "Reuse and conservation are no longer considered 'alternatives'; they are a given. The primary alternatives are the use of fresh surface water from the Ocklawaha River, desalination of brackish water from the St. Johns River, and seawater desalination. We expect the solution will include all three sources," he said.

Wilkening told *WDR*, "It could take seven to ten years to get a desalination plant operational, but we'd all be thrilled if it could be up and running it in five."

It still hasn't been determined if the project would be delivered using a conventional design-bid-build approach or if a public-private partnership would be employed. Vergara said that issue would be one of the first considered by the utilities.

SJWMD executive director Kirby Green had another suggestion, and was reported to have said last week, "If I was king for a day, I'd put a severance tax on bottled water." He suggested that a \$1 per gallon (\$0.26/L) severance tax on bottled water could be earmarked for alternative water

source development and the pumps and pipes to deliver it. It would be levied in the same way that the natural gas, oil, phosphate industries and sand pit businesses all pay a severance tax for removing or severing a natural resource from the ground or water.

Meanwhile, state representative Kurt Kelly filed legislation two weeks ago, directing the Secretary of Environmental Protection to "coordinate with the water management district to conduct a study examining all current and available desalination technologies." According to the bill, the Legislature's intent is to aggressively pursue desalination technologies for use in the state.

Marion County commissioners sent a letter to the Florida house speaker supporting the bill, noting that desalination is a better option than exploiting the fragile river systems and although it is not without its challenges, "it is widely regarded as our best solution."

California

ACTION ON CARLSBAD LEASE DELAYED

Poseidon's application for State Lands Commission (SLC) approval of a lease for the Carlsbad SWRO project has been deferred for a second time. At last week's meeting, Poseidon submitted a climate action plan and impingement/entrainment (I/E) mitigation plan for further review, and which the SLC will coordinate with the Coastal Commission's evaluation.

The climate action plan is a voluntary measure offered by Poseidon to address the carbon footprint associated with the energy used by the proposed desalination plant. It is understood to include Poseidon's calculation of the 'net carbon emissions' that defines the carbon footprint of the 50 MGD (189,250 m³/d) facility. The amount has been calculated based on the total electrical requirements associated with the facility, less the carbon footprint of the energy required to pump an equivalent amount of water from northern California.

Because the facility will replace water being pumped from northern California, they are proposing to offset the difference between the carbon emissions associated with the energy used by the desal plant and the gross carbon

emissions resulting from the delivery of traditional supply source being replaced.

A detailed I/E assessment prepared during the EIR phase of project development has been used to substantiate the company's proposed 1:1 lagoon habitat restoration plan. Under the plan, 37 acres (15 hectares) of new tidal wetlands at the nearby San Dieguito Lagoon are proposed to be developed to compensate for the equivalent "area of production foregone" of the Agua Hedionda (Spanish for 'stinky water') Lagoon that could theoretically be impacted by the stand-alone operations of the desalination plant, if and when the power plant switches from once-through to other form of cooling. Under the current co-located intake configuration, the desal plant is designed to collect only cooling water already used by the Encina power plant and therefore is said to have no incremental I/E impact.

The SLC does not meet in January, so it is expected that the application will be considered at the February meeting.

Texas & the World

GAS FIELD WASTE A POSSIBLE WATER SUPPLY

Annual gas production in Texas is up over 13 percent from ten years ago to 5.1 trillion ft³ (144.5km³) last year. The growth can be explained in two words: Barnett Shale. Some experts have suggested that the Barnett Shale geological formation – a layer of rock 7,000 ft (2,130m) beneath the 17 counties surrounding the Dallas/Fort Worth Metroplex – may be the largest onshore natural gas field in the US and could contain 30 trillion ft³ (850 km³) of natural gas.

Considered an "unconventional" or "tight gas" reservoir, it would be virtually impossible to extract gas from the Barnett Shale in commercial quantities without modern gas production techniques. Using 3D seismic imaging, hydraulic fracturing and horizontal drilling technologies, Barnett Shale's annual gas production doubled between 2002 and 2005 to almost 450 billion ft³ (13km³).

Because the shale is so hard, a process known as *hydraulic fracturing* is employed to release the gas. To "frac" a well, a mixture of fresh water, sand and chemicals are pumped into the well at high pressure to create microscopic fractures in the formation, allowing sand particles to wedge open the cracks, releasing more gas and stimulate flow from the reservoir to the wellbore.

When a well begins producing gas, frac water is forced back to the surface, where it is known as *flowback water*. The flowback

typically has picked up salt, crude oil and other contaminants that require appropriate disposal, usually in an injection well. Fracturing also releases additional water – often highly saline water – from the shale, known as *produced water*, which is almost always disposed of through deep well injection.

A significant amount of the Barnett Shale gas is located directly beneath the city of Fort Worth, and gas companies operating there want to dispose of flowback and produced water in injection wells drilled inside the city limits. They say the only other option is to truck the water away, a process that could require 1,700 truckloads per day from the city of Fort Worth alone. But the city thinks the recycled wastewater should be recycled.

David Burnett, a professor at Texas A&M's Global Petroleum Research Institute, told *WDR* that much of the water could be put to beneficial use, greatly reducing the water transported to injection well disposal sites. "It can take five million gallons [18,925 m³] of water to frac a well and there are an estimated 1,000 wells are planned for the Metroplex in 2008. Using MF/UF membrane technology, more than 50 percent of this brine can be re-used in subsequent well fracs by removing suspended solids. As much as 24 percent of the brine can be desalinated and beneficially reused using RO," he said. "The irony is that desalination is usually less expensive than the \$1.50 to \$4.00 per barrel [\$35-\$95/kgal; \$9-\$25/m³] it costs to transport and re-inject the brine."

Dr Burnett has conducted several tests using trailer-mounted desalination systems to demonstrate the practicality of treating produced water at the point of use. He has concluded that a business model in which a modular treatment unit is strategically located to serve multiple wells is economically feasible and environmentally acceptable.

A few weeks ago, *WDR* compared the staffing challenges facing the oil and gas industry to the desalination industry. The water disposal/reuse problem facing producers of unconventional oil and gas reserves is another example of the similarities of issues facing both industries. Unconventional resources such as Barnett Shale, coal bed methane, tar sands and tight and heavy oil reservoirs will inevitably replace conventional oil and gas alternatives in much the same way desalination of seawater and marginal water sources are replacing conventional fresh water supplies.

It seems desalters have many opportunities in the oil and gas sector to help improve project economics while reducing environmental impacts.

Canada

UF PLANT GOES UNDERGROUND

A 32-year old water treatment plant in the Region of Peel, Ontario is set to get a membrane facelift. The 100.4 MGD (380 ML/d) Lorne Park Water Treatment Plant will replace its clarifiers and sand filters with low-pressure ultrafiltration (UF) membranes, granular activated carbon (GAC) and ultraviolet (UV) disinfection.

Located in Jack Darling Park on the north shore of Lake Ontario, the Lorne Park Water Treatment Plant provides water for the Mississauga and Brampton. Since it was constructed in 1975, the population of the plant's service area has more than tripled. The introduction of the Ontario Safe Drinking Water Act was another key factor influencing the Region's decision to expand and upgrade the plant. An evaluation of water quality and regulatory trends revealed that Great Lakes water quality issues may increase and regulations will become increasingly stringent.

The Region evaluated alternative methods of expanding the plant to meet the water quality requirements that would also mitigate adverse impacts on the park in which it was located. Jeff Hennings, the Region's project manager, told *WDR* that the use of UF membrane technology would ensure the water quality goals would be met while minimizing the plant footprint. "The membrane alternative resulted in fewest impacts to the park. The plant is largely built underground and the surface area above it is used for a leash-free dog area and toboggan run," he said.

Existing sedimentation basins will be outfitted with GE's ZeeWeed 1000v3 UF membranes in 16 trains with eight cassettes per train. According to GE/Zenon regional manager Samantha Fraser, the units will operate at a 95 percent recovery, and provisions will be made to add a coagulant if it is necessary. "The units will operate over a water temperature ranging from 2° to 25°C [36° to 77°F]. The filtrate turbidity must be less than 0.3 NTU 100 percent of the time and less than 0.1 NTU 99 percent of the time," she said.

KMK Consultants Limited partnered with Genivar for the planning, design and contract administration of the project.

The detailed design is scheduled for completion by spring 2008 with construction planned to start in mid-2008. The plant will be commissioned in two stages over 2009-2010 with six UF trains commissioned in the first stage and ten in the second. Project completion is targeted for 2011.

California

SOLAR ENERGY REDUCES SWRO FOOTPRINT

Implementation of an integrated water plan that includes the addition of a seawater desalination plant will result in the addition of \$1.5 million worth of solar panels at Santa Cruz's Graham Hill Water Treatment Plant.

According to Linette Almond, the city's engineering manager, an 115kW photovoltaic system is to be installed on one building and three water tanks and will generate 205,000 kWh/yr of climate-neutral energy. The amount will help offset the additional energy consumption required to operate the planned 2.5 MGD (9,462 m³/d) SWRO plant.

The city has applied to Pacific Gas & Electric for a rebate of \$0.34/kWh generated over the first five years of the photovoltaic system, amounting to a total anticipated total of \$338,000.

Middle East

RED/DEAD RFP RELEASED

Last week, the World Bank issued the RFP for the 24-month, \$15.5 million Red Sea-Dead Sea Conveyance (RSDSC) study to shortlisted consulting firms. The study consists of two parts, a feasibility study for which six consortia were shortlisted and an environmental and social assessment for which four different consortia were listed.

As currently planned, the project will consist of a 180 km (112 mi) tunnel and channel transferring 1,890 million m³ (MCM) per year (1,368 MGD) of seawater from the Red Sea to the Dead Sea. Initially, the entire flow would be used to raise the Dead Sea water level, which has been falling at a rate of 1m (3.28 ft) per year. A seawater desalination and hydropower component could be added to produce as much as 840 MCM/yr (608 MGD) of potable water and 800 MW of hydroelectric power.

Proposals are due on 31 January 2008.

Saudi Arabia

IWPP BID DATE EXTENDED

A twelve-week extension has been granted to prospective bidders of the Ras Azzour IWPP project. With a water production capacity of 1,000,000 m³/d (264 MGD), Ras Azzour will be the largest seawater desalination project in the world. The project will also produce 850-1,000 MW

of electrical power when the project is commissioned by mid-2012.

The delay is reportedly due to issues regarding specified requirements for the power plant turbine. The new bid submission date is 4 May 2008. Shortlisted bidders will be selected by 30 July 2008; signature of project agreements and financial close are expected for 30 October 2008 and 15 January 2009, respectively.

Water & Electricity Company (WEC), the project's water/power off-taker, and Fichtner, their technical advisor, have specified that RO can constitute no more than 25 percent of the water production capacity.

Consortia (desal suppliers) reported to be bidding the project include ACWA/Mitsubishi (Doosan), Sumitomo/Malakoff (Fisia/GE), UIDC (Fisia), Taiwan Power/Masader (Fisia) and Marubeni/Suez (Sidem).

London HOLD THAT DATE

The International Desalination Association (IDA) will be holding a joint conference entitled *Water, Finance & Sustainability 2008 – New directions for a Thirsty World* in London on 31 March to 1 April. The conference will incorporate the Global Water Awards, and bring together luminaries from the worlds of desalination and money.

It follows the success of GWI's Barcelona 2007 conference and continues the IDA's off-year seminar series. By combining the two events, it also ensures that there is one less conference date in next year's schedule. Additional details, including the conference venue, will be attached soon.

IN BRIEF

Alfred Kärcher GmbH & Co. KG has announced it will introduce a new point-of-use water filtration system for households using **inge AG's** Multibore UF technology.

Bureau of Reclamation Commission Bob Johnson has named two deputy commissioners. Karl Wirkus was named deputy commissioner for operations and will oversee operations in Reclamation's five regions including the technical service center and R&D office. Kris Polly was named deputy commissioner of external and intergovernmental affairs.

TRANSITION

WDR has learned of the passing of veteran desalter Abdullah A. Al-Azzaz after a long illness. He was vice governor of operations and maintenance for the Saline Water Conversion Corporation (SWCC) and had long been active in the organization's research and development efforts.



Abdullah served as a member of the International Desalination Association's board of directors from 1997-1999, was responsible for organizing SWCC's funding of the *ABC's of Desalination*, and authored many papers on desalination.

On behalf of the desalting community, we offer our sincere condolences to his family and friends.

JOBS

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- Project Engr for Boston (Watertown, MA)-Job# 756999
- Project Engineer (Toronto, ON)-Job #721526

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