Recovery Zone
March 2019

City of Cape Coral Utilizing Reverse Osmosis Treatment for More Than 40 Years

Author: Andrew Fenske, City of Cape Coral, Water Production Manager

Southwest RO Plant 2 Addition Built in 1985

North RO Plant Production Trains and High Pressure Pumps

The City of Cape Coral occupies a large peninsula encompassing 120 square miles, making it Florida's third largest city by land mass. Located in Southwest Florida, it is situated along the west coastal area of Lee County with a current population approaching 200,000 residents. Cape Coral continues to be one of the fastest growing cities in the United States. Although it is currently only 45% developed, Cape Coral's population is expected to exceed more than 400,000 residents at full build-out. Since its inception, the city has affectionately been called the "Waterfront Wonderland" as Cape Coral features thousands of waterfront residential properties on more than 400 miles of canals and waterways, including many with direct saltwater access to the Gulf of Mexico. The City of Cape Coral owns and operates potable water, wastewater, and irrigation water systems. The potable water system includes 55 raw water supply wells, 28 miles of raw water transmission mains, an 18 million gallons per day (MGD) rated reverse osmosis plant in the southwestern part of the city, a 12 MGD rated reverse osmosis plant in the northern part of the city, 3 deep injection wells for concentrate disposal, 2 storage and re-pump stations, and 907 miles of potable water mains.

The Water Production Division of the City of Cape Coral Utilities Department has utilized the reverse osmosis (RO) treatment process to produce drinking water for its customers for more than 40 years. The city has the good fortune of having numerous staff members with decades of experience in reverse osmosis operation and maintenance. The City's Southwest RO Plant, fully constructed and operational by 1977, is the oldest continuously operational RO treatment facility in the world. The original Southwest RO Plant is known worldwide throughout the desalination industry. During its first couple of decades of operation, the plant was visited by a wide-reaching number of both domestic and international water professionals wanting to learn more about this new membrane treatment

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Message From The President

Dear SEDA Members,

Happy 25th anniversary! That's correct; 25 years ago, the original vision for SEDA (initially the Florida RO Group or FROG) began. I am sure there will be many discussions this year regarding the early days, the original board members, the founding members, and other topics. On behalf of those who benefit from membership in SEDA, thank you to those who started this organization so many years ago.

We are less than four months away from the Spring Symposium which will be held from June 2 through June 5 in Daytona Beach, Florida. While we celebrate our 25th anniversary this year, the theme that the program committee has assigned to this conference is "Racing into Membranes". The program committee has already prepared the symposium agenda, a great lineup of speakers and we look forward to starting registrations in the near future as we draw closer to June. The program committee has an event planned that has something for everyone including a family friendly Sunday evening reception; diverse and well thought out symposium topics; hands on demonstrations, and an all new Team Trivia on Tuesday afternoon. Be sure to save the date and be looking for the registration emails.

The program committee has been on overdrive this year with the desire to better serve our membership in the VA/NC/SC/TN area with a fall workshop being planned for the Tidewater area of Virginia. There will be more information forthcoming regarding this event as preparations continue.

SEDA continues to regularly offer highly rated MOC schools. The most recent MOC Module III course was held in Manteo, NC and we have two upcoming MOC modules that will be offered in Port St. Lucie, FL and in Williamsburg, VA. You can find the details about these offerings on the SEDA website, the SEDA app, or watch for the emails from SEDA and please remember that space is limited and they often fill up fast.

As the Board continually looks for ways to return value to the membership, the MOC committee continues to look for ways to improve course presentation and testing. With many ideas being put forth, we hope to continue to make MOC a valuable and consistent training tool for the membership.

As we move closer to the Spring Symposium, the awards committee will be sending out the call for nominations for the annual SEDA Operator and Plant of the Year awards. This is a great opportunity to recognize the outstanding work of a co-worker or a facility. We look forward to the awards committee having the opportunity to review these submissions, which highlight the talent and dedication of our members who contribute to the production of one of our most valuable resources.

I look forward to seeing you at one of the MOC schools, Tech Transfers, Symposiums or another event this year as we continue to exchange information, grow, and learn.

Respectfully,

Jason Bailey

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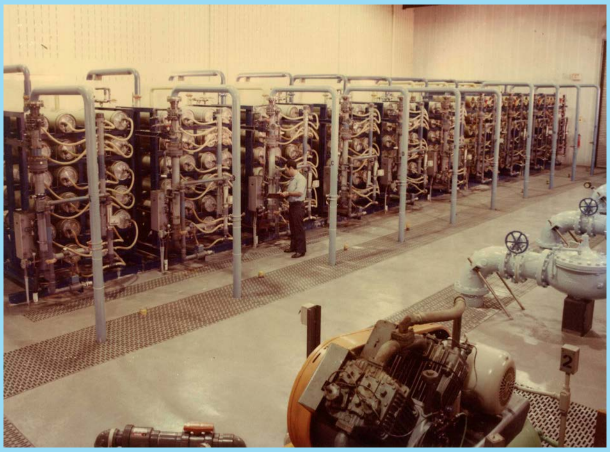
technology that was emerging for large scale use in the late 1970's and early 1980's. There were even visits from national media organizations like CNN and National Geographic.

The original Southwest RO Plant went on-line in 1977 with a 3 MGD production capability to supplement the city's existing 2 MGD Lime Softening Treatment Plant. In 1980, the city expanded the Southwest RO Plant to 5 MGD. At that time, the city was experiencing problems with its Lime Softening Water Treatment Plant due to salt water intrusion into the Upper Hawthorn Aquifer wellfield. The City was also experiencing a rapid growth in population. Faced with these two issues, the city decided to abandon the Lime Softening Plant and initiate a major expansion of the Southwest RO Plant facility. Cape Coral would be the first city of significant size in the United States to make the decision to rely completely on reverse osmosis treatment as its only means of producing potable water for its customers.

The decision paid off. By 1985, the city had the largest low pressure RO plant in the world, capable of producing 15 MGD. The plant was producing water at a cost that was cheaper than the Lime Softening Plant and it had tapped into a source water supply (the Upper Floridan Aquifer) that would provide enough water for many decades to come. Although the 15 MGD production capability remained the same for more than 20 years (1985-2007), many changes took place at the Southwest RO Plant during that time. The City kept pace with changing technologies and completed many upgrades and retrofits. These improvements included: use of more efficient low pressure membranes, variable frequency drives, computer automation, improved membrane cleaning techniques, etc. Despite being the oldest plant of its kind in the world, these past, and more recent improvements have allowed the plant to continue to be recognized as a "state of the art" facility producing high-quality potable water at a reasonable cost.

Due to another rapid increase in population and a planned major expansion of the utilities service area, the City began design work in 2005 to expand the production capacity of the Southwest RO Plant from 15 MGD to 18 MGD. This increased capacity would ensure that the city had a sufficient supply of potable water until an additional RO Plant could be designed and built in the northern part of the city. The expansion at the existing Southwest plant was completed in 2008. The new 12 MGD North RO Plant was completed and went on-line in 2010. The addition of this new plant has allowed for much needed major maintenance, repairs, and retrofits at the 42-year-old Southwest RO Plant that could not be initiated until additional production capacity on the system was available. The addition of the North RO Plant now ensures that the current and future water needs of the city can continue to be met with reverse osmosis treatment.



Southwest Plant 1 Hollow Fiber RO Plant Built in 1977

Operator Working in North RO Plant Lab

Clearwell Transfer Pumps, Degasifiers, and Dispertion Tower

Both the 12 MGD North RO Plant and the 18 MGD Southwest RO Plant, which have a combined production capacity of 30 MGD, utilize the same type of source water and treatment process. The source water is the Upper Floridan aquifer. The basic treatment process for both plants is the same. Production wells provide the raw source water, which enters the plants with an approximate TDS of 2,000 ppm and a pH of about 7.3. Upon entry to the treatment plants, two chemicals are injected into the raw water upstream of a static mixer. Sulfuric acid is added to lower the pH to 5.8, and 3 ppm of polyacrylic scale inhibitor is also added to prevent scaling of the membranes. Once this chemical pretreatment is completed, the water passes through a series of 5 micron cartridge filters to finalize the pretreatment process. At this point, the raw water becomes the feed water. Upon passing through the cartridge filters, the feed water is pumped with high pressure pumps into the RO production units for primary treatment using spiral wound thin film composite low pressure/high rejection RO membranes.

As the feed water travels across the RO membrane elements, it is separated into usable product water and non-usable concentrate water using a multi-stage RO process. The concentrate water is then discharged from the system by way of a pipeline to a deep injection well using residual concentrate pressure from the RO trains. The amount of concentrate removed in the RO process is approximately 20% of the feed water entering the system. After the RO units separate the water into product and concentrate, the product water, with a TDS of about 100 ppm, flows towards the degasifiers. Prior to entering the degasifiers, some raw water is blended with the product water to increase the TDS to about 350 ppm, which in turn increases alkalinity and hardness to a moderate level. This produces a more stable finished water for corrosion control. At this point, the water is called blend product.

Approximately 20 percent of the total blend product is blend water. The blend product water now enters the degasifiers where the final contaminant, hydrogen sulfide, is removed from the water. Blend product water cascades down packing in the degasifiers where it is forcibly mixed with air from a blower. The air strips the hydrogen sulfide gas from the water, and the combined hydrogen sulfide gas and air exit through a separate tower connected to the top of the degasifiers. The water now falls into the clearwell where chlorine and caustic soda are added. Chlorine (sodium hypochlorite) is added for disinfection and removal of any remaining hydrogen sulfide not removed by the degasifiers. Caustic soda (sodium hydroxide) also is added to raise the pH of the water to about 8.8. This pH adjustment is the final step in the process of stabilizing the water for corrosion control. From the clearwell, the finished water is pumped to storage tanks where it is available for pumping to the distribution system.

North RO Plant Cartridge Filters and Production Trains

Southwest Plant 1 DOWEX Hollow Fiber RO Permeators installed in 1977

The 18 MGD Southwest RO Plant is comprised of two independent production plants co-located on the same site and permitted as one facility. Although the treatment processes are similar, these two production plants, Southwest RO Plant 1 and Southwest RO Plant 2, have some separate and unique equipment configurations. Southwest RO Plant 1 (currently 6 MGD), which was the original 3 MGD portion of the plant built in 1977 utilizing a 3-stage hollow fiber membrane system, was retrofitted in 1991 to have 10 production trains with a 3-stage system using conventional 8” x 40” low pressure/high rejection spiral wound RO membrane elements in a 10:7:4 pressure vessel array with 4 elements per pressure vessel. Each RO train is capable of producing 0.5 MGD at a 75 percent setpoint permeate recovery. This unique 3-stage design with short pressure vessels was required due to the small footprint available for the retrofit.

Southwest RO Plant 2, which was the 9 MGD portion of the plant built in 1985 and expanded in 2008 to 12 MGD, has 8 production trains utilizing a 2-stage system with un-conventional 8.5” x 40” low pressure/high rejection spiral wound RO membrane elements in a 20:10 pressure vessel array with 7 elements per pressure vessel. Each train is capable of producing 1.25 MGD at an 80 percent setpoint permeate recovery. Although the 8.5” diameter membrane elements in this plant are not the industry standard, the city has always been able to find multiple manufacturers willing and able to custom make the 8.5” diameter membrane elements at nearly the same cost as a conventional 8” diameter element.

The North RO Plant, which was built and went on-line in 2010 with 12 MGD of production capacity, has 4 production trains utilizing a 2-stage system with conventional 8” x 40” low pressure/high rejection spiral wound RO membrane elements in a 48:24 pressure vessel array with 7 elements per pressure vessel. Each train is capable of producing 2.52 MGD at an 80 percent setpoint permeate recovery with a conservative flux rate of 12.5 GFD. Although the plant is currently rated at 12 MGD, the majority of the major infrastructure was put in place for the build-out capacity of the facility, which is approximately 30 MGD. The existing production trains can be expanded to a 54:27 array simply by adding additional membrane elements and connecting the extra pressure vessels already in place to the existing train headers. This, along with a slight increase in the flux rate, would allow the production capacity to increase from 2.52 MGD to 3.15 MGD per train.

The North RO Plant process building was sized to accommodate 4 additional production trains, for a total of 8 production trains at full build-out of the plant. Due to the amount of major infrastructure already in place at the North RO Plant, additional incremental production expansions will be relatively simple and economical to build as future increases in demand occur over time. This was an important consideration during design of the North RO Plant as the projected maximum day potable water demand at full build-out population of the City is estimated to be about 45 MGD. The Southwest RO Plant’s current 18 MGD production capacity and the North RO Plant’s future 30 MGD production capacity should be sufficient to meet this potential future demand requirement.

The City Cape Coral Water Production Division staff have consistently proven to be very cost efficient in their use of RO treatment technology. The most recent and past data from the Florida Benchmarking Consortium confirms that the city’s experienced water production team is producing water and maintaining the facilities at a reasonably low cost per customer account. In addition, in recent years, the city’s water production team has received multiple awards validating the staff’s commitment to providing excellent operations, maintenance, and safety at the facilities. In 2017, the Florida Section of the American Water Works Association awarded Cape Coral the title of “Best Tasting Drinking Water” in Region V. In 2016, the North RO Plant received the “Plant Operations Excellence Award” for the South District from the Florida Department of Environmental Protection. In 2016, the North RO Plant was awarded the Florida Water & Pollution Control Operator’s Association’s “Chairman’s Award” for exemplary safety training, policies, and practices. In 2016, the North RO Plant received the prestigious “Outstanding Membrane Plant Award” for the large plant category from the Southeast Desalting Association. The citizens of Cape Coral can be proud of not only the long 42 year history and legacy of its famous Southwest RO Plant, but also the more recently built North RO Plant which continues to solidify Cape Coral’s place as a membrane treatment industry leader in the efficient and successful long term use of reverse osmosis technology.

Technical Transfer Workshop Update

Author: Karla Berroteran-Castellon, Village of Wellington/SEDA Technical Transfer Chair

On December 4, 2018, SEDA held a workshop titled "Membranes System Normalization, Monitoring & Trending Hands-on" at the Village of Wellington Water Treatment Plant. The class was taught by three instructors: Julie Nemeth-Harn of Harn R/O Systems, Mo Malki of American Water Chemicals, and Kirk Lai of Hydranautics.

The morning started out with Julie Nemeth presenting an overview of electrical components, mechanical systems and instrumentation typically used in membrane plants. She explained how RO plants could be arranged and the different components needed depending on water source, recovery rate, etc. Julie emphasized the importance of selecting the proper monitoring equipment during the design part of a membrane plant to obtain the best recovery rate and guarantee good membrane performance. Mo Malki then gave a talk about the theory and principals of RO data normalization. He used some examples to illustrate the importance of maintaining good normalization data and understanding how the different types of fouling of scaling affect the RO data when troubleshooting. Kirk Lai provided an in depth explanation of the different normalization software available, depending on the membrane manufacturer. Kirk also went into detail on how to input daily RO data into normalization software and how to interpret the information and various factors such as salt passage, differential pressure, flux, etc.

Later in the day, Kirk Lai and Karla Berroteran, of the Village of Wellington, conducted a hands-on session. Attendees were split into six teams of four students. Each team collected RO data from one RO unit and probed a vessel from the same unit; at the end of the hands-on session, the information collected was entered into the normalization software. Attendees analyzed the data and generated conclusions based on their own readings. Then the class was opened for discussion where participants deliberated their different scenarios and examples, and shared their experiences from different water plants. The workshop wrapped up with a guided tour of the Village of Wellington Water Treatment Plant, hosted by Karla Berroteran, it's superintendent.

SEDA AMTA Joint workshop – Ceramic Membranes

Author: Lance Littrell, P.E., Kimley-Horn & Associates/SEDA Program Chair

Ceramic membranes are alive and treating water across the globe! The recent Ceramic Membranes Workshop held jointly by AMTA and SEDA hosted a large audience to learn about ceramic membranes on the market, applications in service, and performance case studies for several facilities. The workshop hosted 89 registrants from five different countries including: Mexico, France, Germany, Canada and the United States. The attendees were offered the opportunity to tour the Town of Jupiter's Water Treatment Facility with multiple treatment technologies in use as well as discuss the Utility's success in membrane applications. Later Wednesday evening, a majority of the attendees gathered for a Barbeque sponsored by Kimley-Horn and hosted by the Town of Jupiter in their ocean front Carlin Park Civic Center. The event included networking, great food, drawing giveaways, and satisfied appetites. SEDA sends a special thanks to the Town of Jupiter and Kimley-Horn for making the event possible.

Thursday's workshop included the full realm of presentations and perspectives from one equipment installation firm, eight ceramic membrane manufacturers, and one utility owner. Early discussions included updates on ceramic membrane basics including configuration, types of construction, installation methods, and a general application discussion. Attendees were then able to learn from eight ceramic membrane manufacturers with each presenting on their membranes as well as an application case study. The case studies ranged from small scale to large multi-million gallon per day facilities; pressure driven to vacuum driven applications; and potable water, to wastewater, to industrial processing installations both in the United States and across the Globe. A wide ranging variety was covered thanks to each manufacturer's presentation. Sandwiched between the presentations above, the Parker Water & Sanitation District presented their application and results using ceramic membranes.

All in all, the event was very successful in bringing attendees from Utility management, operations, engineering, and manufacturing to review ceramic membranes in our industry. A special thank you goes out to the Town of Jupiter for hosting the workshop at the Jupiter Community Center with fantastic accommodations. Please keep an eye out for the next SEDA Technical Transfer or joint workshop with AMTA in the coming months.

Membrane Operators Certification (MOC) Update

Author: Chris Ballard, Toray Membranes USA, SEDA Chair

The kickoff to 2019 included the SEDA Membrane Operator Certification (MOC) School Module III for low pressure membrane systems which was held at the East Carolina University (ECU) Outer Banks Campus Coastal Studies Institute in Wanchese, North Carolina on January 29th thru 31st, 2019, and hosted by Dare County Water Department. Distinguished instructors for the course included Kevin Clarke from DuPont Water Solutions, Nick Black from Kimley-Horn, Andrew Newbold from Hazen and Sawyer, and Jason Bailey from Avista Technologies. Sponsors for the course were Dupont Water Solutions, Avista Technologies, and Toray Membrane USA, Inc. Material covered over the 2 ½ day course included introduction to microfiltration (MF) and ultrafiltration (UF) membranes, pretreatment, operating membrane systems, troubleshooting, membrane cleaning, and data collection and normalization. At the end of the course, the participants took a course exam to receive a SEDA Membrane Operator Certification for Module III. Continuing education credits were awarded to all attendees of the course.

If you are interested in hosting or have recommendations for future MOC School locations, please contact SEDA's administrator at admin@southeastdesalting.com. A minimum of 12 attendees are required to be registered to hold a class so reach out to other facilities in your area to see if they are also interested. Check the Upcoming Events section of this newsletter and the SEDA website for future SEDA MOC courses and other SEDA events on the calendar for 2019.

The Traveling Troubleshooter: The Case of the Crusty End Cap

Author: Anonymous

Stubbs Gripschtik passed through security and signed in. He could hear the resonance of the units making water as he walked down the hall to the Control room.

Lead Ops Steinwater gave Stubbs the update, "….and we have a few more constant as well as intermittent end cap leaks, both on the same train, can you fix those?"

Stubbs thought to himself, "This is becoming a common occurrence; with too many units; at too many water plants. But what do they have in common? What's the cause?

"I'll get on it", Stubbs replied as he donned earplugs and went to work.

Two trains, operating at their designed 80% recovery, were in his path as he entered the process room. He walked around, recorded data and checked instruments for accuracy.

Eroded End Cap

Signaling for the trains to be taken off-line, Stubbs observed the shutdown process. Checking the feed and concentrate conductivities, permeate pressure, and tracking the flush time, he confirmed the post flush efficiency for each train. "Start um back up", he said twirling his finger up in the air toward Ops Steinwater, who was closely watching through the control room window.

Both trains came to life smoothly and were soon at a steady state of 80% production. Stubbs entered the control room and removed his earplugs. Turning to Chief Ops Steinwater he stridently announced "Fascinating!", smiling keenly while slowly regaining his normal hearing. Now with everyone's attention gained, he continued:

"Train 1 has membranes which are less than a year old. During the shutdown process, the post flush is adequate, no observed drawback and the permeate pressure remains a positive 3 to 5 psi after the unit is off-line. Confirming post flush time and conductivities of the feed water versus the concentrate, the post flush is successful, leaving the train in a mostly neutral osmotic state."

"Train 2 has membranes which are ready for replacement and are 8 to 12 years old. This unit also has, over the past few years, continued to support intermittent and constant end cap leaks, as did Train 1 prior to the membrane replacement. During the shutdown of this train, the process was not successful in reaching an osmotically neutral state, resulting in a negative permeate pressure of -3 to -5 psi. In some cases, during this negative pressure event, air is drawn in through the head seal and or permeate port seal and a little water seeps out creating intermittent or constant leaks in addition to salt build up on the end cap."

"The post flush time required for older and possibly more fouled membranes may need to be longer than what is required for newer membranes. Let's say the post flush time is 8 to 10 minutes for new/newer membranes, 8 to 12-year-old membranes may require 15 to 30 minutes for example, to achieve the same results."

"Sometimes the membranes can be fouled beyond reaching a neutral osmotic state no matter how much they flush." He paused.

"So, let's go see if we can help Train 2 rest at a neutral state when it's off-line." Stubbs completed and the process began…

Flow meter failure and resolution at Coral Springs Improvement District

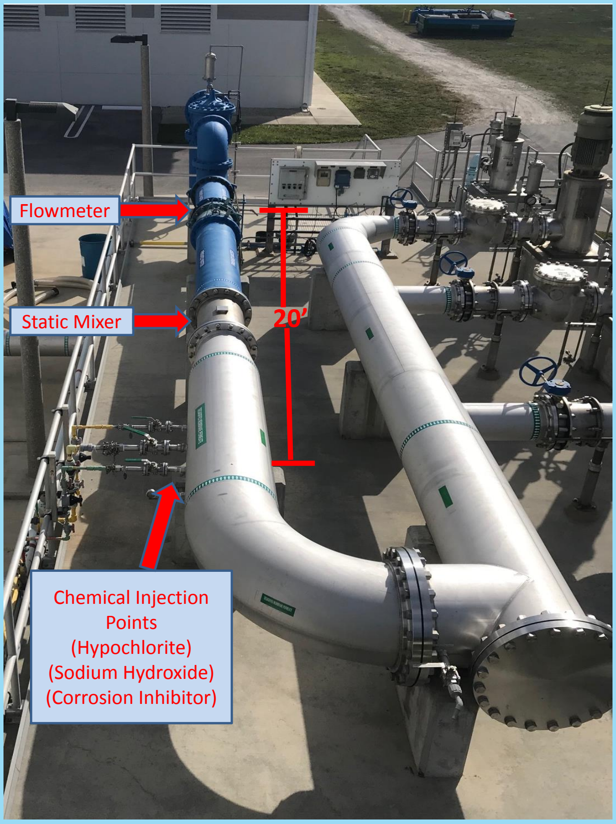
Author: Joe Stevens, Coral Springs Improvement District, Chief Operator

The Coral Springs Improvement District (CSID) began operating a new 7.4 million gallon per day membrane treatment plant for startup and testing purposes in late 2011. During initial startup, a 16” mag meter on top of the clearwell, which measures the flow leaving the clearwell as it travels to the ground storage tanks, worked well. Beginning in early 2016, the flow meter began to periodically indicate that the pipe was empty and that no flow was occurring. Plant staff called the manufacturer’s technician to troubleshoot and repair the flow meter and was told that the meter sensor had to be replaced. The flow meter sensor was subsequently replaced in 2016. Within two months, the new meter was experiencing the same issues. Plant staff again called the technician to evaluate the flow meter operation. The initial focus was on the grounding wire, which turned out to be fine. Staff then tried replacing the flow meter transmitter, but the problem persisted.

The technician was dispatched several times from Tampa to Coral Springs and finally determined that our issue was due to the location of the flow meter in relation to the upstream chemical injection ports. The electrodes within the flow meter were coated by mineralization due to the chemicals being injected upstream and too close to the flow meter. The chemicals in question were sodium hypochlorite 12% (approx. 6 ppm dose), sodium hydroxide 50% (approx. 3 ppm dose), and a corrosion inhibitor (1.5 ppm dose), which were fed approximately 20’ from the meter with a static mixer between the injection points and the flow meter. CSID staff then contacted another common manufacturer of mag meters and explained the meter failure and assumed cause. They concurred with this assessment and stated that the problem would not be solved by replacing the flow meter with a different model.

Staff questioned this assessment because the first meter worked for almost five years with the same chemicals and dosages in the same location relative to the meter. Nonetheless, in order to address the problem, the utility budgeted $75,000 in Fiscal Year 2018/2019 to relocate the injection points to a location farther away from the flow meter.

In early January 2019, as a matter of chance, the same technician was on site assisting the operations staff and electrical engineer during startup services on a Coriolis flow meter for a new antiscalant feed system. Discussions resumed concerning the problematic 16” flow meter on the clear well. The technician still did not seem to have a plausible explanation. During the preliminary work to relocate the injection points, the utility and the utility’s Design-Build Contractor (Globaltech) had reviewed the flowmeter signal trends and felt that the data did not confirm the theory that the electrodes were being coated, or that there was air in the line. Rather, it appeared to be an electrical fault. The technician suggested forcing a 12-milliamp signal from the meter to insure the transmitter and PLC were not faulty. While conducting this assessment, the technician realized that the same issue had been observed at plants in Sunrise, Pompano, and Martin County. What they discovered was that the flow meter sensor’s terminal block in the top of the meter was faulty. Once the terminal block was replaced, the problem went away. The technician stated that it appeared a batch of meters had been manufactured with this same issue. The technician happened to have several spare terminal block replacement parts with him. The bad block was replaced with a new one and the meter began working. It has been working flawlessly ever since, and as a result, the Utility has been able to cancel a $75,000 capital project.



CSID thought it would be helpful to share what we have learned about this flow meter because other utilities may be observing the same situation. This is an example of how looking at a problem from multiple perspectives enabled us to prevent an inconvenient and costly plant modification.

Member Spotlight

1. **How long have you been a member of SEDA?**
   I started with the Village of Wellington in 2010. I became a SEDA member soon after I began working for the Village.

2. **Why did you join SEDA?**
   Being a new operator working in a membrane plant I wanted to learn as much as possible about different membrane technologies, as well as being able to understand and troubleshoot problems.

3. **What is something that you have gained/or hope to gain by being a member of SEDA?**
   SEDA has been very beneficial in my career thus far in water treatment. I have attended many tech transfer workshops, spring symposiums, and MOC schools. It's not only the information that I have learned from the various workshops; but also the networking with the operators/managers in neighboring utilities and the sponsoring vendors displaying and teaching about their new technology.

Jason Mraz

4. **How did you get involved in the Water or Wastewater Industry?**
   This is a long story, so I will try to shorten it up the best I can. It starts back in Northern Canada where I was drilling deep natural gas and oil wells. I met a Florida girl, and of course she didn't want to freeze up north with me so after we were married, we moved to Florida. On my way to an immigration appointment in Lake Worth, I saw what I thought was an oil rig on the side of I-95. I stopped and talked to someone who looked to be in charge and I told him I wanted a job. His response was "do you even know what this is?" Of course, with my oil and gas well drilling experience answering that question was no problem. That was how I found out deep water wells are drilled here in Florida. Once I obtained my green card and legal right to work in the USA, I started with All Webb's Enterprises drilling everything from surficial wells to injection wells and everything in between. Fast forward after years of drilling at many different water plants all over Florida and speaking with many operators, I decided to further my knowledge and pursue a job in water treatment. I applied and accepted a job in maintenance at the Village of Wellington maintaining the water and wastewater plants. Soon after I completed the book work and accepted a water plant operations trainee job. Fast forward again, I accepted a job at the City of Pompano Beach in 2014 as B Operator. After 4 years at Pompano, I have Class A water and Class C waste water licenses and I am currently the operations supervisor over the water and reuse plants.

5. **What is the most recent book you have read or concert you have been to?**
   The last concert I was at was Sun Fest, I went to see Jason Mraz because, well we have the same name!

6. **What activities do you enjoy in your free time?**
   I enjoy practicing Taekwondo. For those of you that attended last year's SEDA Spring Symposium in Captiva, you may recall seeing me rolling around on my scooter with a broken foot, that came as a result of my thinking I was still in my early 20's. My kids and I attend classes at a Taekwondo gym in Delray, so between me attending my classes, and bringing the kids to theirs, most of my time away from the plant is at Taekwondo.

2019 SEDA Spring S

ABOUT THE SYMPOSIUM ...
Join membrane plant operators, managers and experts in the membrane industry to find how we race into membranes as you learn about the latest in regulations, membrane technology applications and operations/maintenance for water and wastewater treatment systems. Offerings will include small group hands-on sessions and a membrane plant facility tour. Operator CEUs/Engineer PDHs are available.

Sunday, June 2, 2019
12:00 - 4:00pm **SEDA - Out-going Board Meeting**
2:00 - 4:00pm **Exhibitor Set-Up/Check In**
5:30 - 7:30pm **SEDA's 25th Anniversary Bash - Ocean Terrace**

Monday, June 3, 2019 - General Session
7:00 - 8:00 am **Registration**
General Session
8:15 - 8:30 **Opening Remarks**
Jason Bailey, Avista Technologies
8:30 - 9:00 **Welcome to Daytona Beach**
9:00 - 9:30 **Membrane History**
Harold Fravel, AMTA
9:30 - 10:00 **RO Membrane Permeability, Power Consumption, and CEC Rejection**
Allen Sharpe, Lanxess
10:00 - 10:30 **Break**

Monday, June 3, 2019 - Track 1A - Back to Basics
10:30 - 11:00 **Source Water Supply**
Jim Andersen, PG, JLA Geosciences
11:00 - 11:30 **RO/NF Pretreatment**
Jason Lee, PE, Kimley-Horn & Association
11:30 - 12:00 **Reverse Osmosis and Nanofiltration Processes**
Roy Daly, LG/NanoH2O
12:00 - 1:30 **Lunch - Membership Meeting**
1:30 - 2:00 **Instrumetation and Controls**
Mark Haeley, C2i Controls
2:00 - 2:30 **Membrane Post Treatment**
Dave MacNevin, PhD, PE, Tetra Tech

Monday, June 3, 2019 - Track 1B - New Technology and Applications
10:30 - 11:00 **Revmoval of GenX Contamination From River Water Using RO**
Jorge Arevalo, PE, CDM Smith
11:00 - 11:30 **Emerging Contaminants with Membrane Processes**
Steve Duranceau, PhD PE, UCF
11:30 - 12:00 **Counterflow Reverse Osmosis**
Rick Stover, Gradient Osmotics Inc.
12:00 - 1:30 **Lunch - Membership Meeting**
Best Tasting Water - Prelim Round
1:30 - 2:00 **Case Study Deltona, MBR Performance Optimization**
Andrea Netcher, PhD PE, Tetra Tech
2:00 - 2:30 **Effects of Changing Sourcewater on Seawater RO Plant in Caymen Islands**
Ahmed Elsheshtawy, EIT, Caymen Islands
2:30 - 3:00 **Break**
Track 1C - Facility Case Studies
3:00 - 3:30 **2018 SEDA Plant Of The Year: Seminole Tribe of FL Hollywood WTP**
John Holdman, Seminole Tribe
3:30 - 4:00 **2018 SEDA Plant Of The Year: Island Water Association RO Plant**
4:00 - 4:30 **Plant Tour - Host Plant Overview**
Brad Bowman, Ormond Beach Utilites
4:30 - 6:30 **Networking Event - In Hotel**
Best Tasting Water Finals

Tuesday , June 4, 2019
7:30 - 8:00 am **Registration / Breakfast**
Session 2A - Group I on Bus for Plant Tour
8:00 - 10:00 **Session 2B - Group II - City of Ormond Beach Tour**
Hands On - Membrane Autopsy
Josh Utter, American Water Chemicals
Hands On - Cartridge Filters Pretreatment
Cecil Baty, HC Warner
Hands On - Vessel Maintenance and Probing
Richard Chmielewski, Protec
10:00 - 10:30 **Break**
Session 2B - Group II on Bus for Plant tour
10:30 - 12:30 **Session 2A - Group I - City of Ormond Beach Tour**
Hands On - Membrane Autopsy
Josh Utter, American Water Chemicals
Hands On - Cartridge Filters Pretreatment
Cecil Baty, HC Warner
Hands On - Vessel Maintenance and Probing
Richard Chmielewski, Protec
12:30 - 2:00 **Lunch and Awards Ceremony**
Session 3 - Operations and Maintenance
2:00 - 2:30 **Maintenance of Chemical Storage and Conveyance Systems**
Chris McKenzie, Town of Jupiter
2:30 - 3:00 **Utilizing Dashboards and Operator Developed SOPs to Optimize Your Plant**
Paul Biscardi, PE, Hazen and Sawyer
3:00 - 3:15 **Break**
3:15 - 3:45 **Water Quality Degradation and Spacial Variability in Upper Floridan Wells in South Florida - Strategies for Utilities to Plan New Systems or Expand Existing Systems**
Jon Friedrichs, PG, JLA
3:45 - 4:15 **Membrane Troubleshooting and Cleaning**
Jeff Johnson, King Lee
4:15 - 5:30 **Membrane Team Trivia Challenge and Networking Event**
Program Committee to Host
6:00 - 11:00 **Elective Fun Poker Event**

Wednesday June 5, 2019
7:30 - 8:00 am **Registration**
Session 4: Project Case Studies
8:30 - 9:00 **MF / UF Cleaning**
Mo Malki, Amercian Water Chemicals
9:00 - 9:30 **Process Challenges between Seawater and Brackish RO**
Mark Banzin, TSG Water Resources
9:30 - 10:00 **Break**
10:00-10:30 **Case Study: How a Membrane Autopsy Helped a Municipal Site Identify Iron Fouling and Troubleshoot System Design Issues**
Nagham Najeeb, Avista Technologies
10:30 - 11:00 **Orange County WD - Desalitech pilot at GWRS**
Mike Boyd, Desalitech
11:00 - 11:05 **Closing Remarks**
Jason Bailey, Avista Technologies
11:30 - 1:30 **SEDA - In-coming Board Meeting**

Symposium Program

SEDA Racing into Membranes

GET YOUR TEAM TOGETHER FOR SEDA'S TRIVIA CHALLENGE

Test your teams knowledge about the Daytona area, local plants, membranes and SEDA history!

Prizes will be awarded to the top 3 teams!

Tuesday June 4th, 2019
4:30 - 6:30 pm.

The Shores Resort and Spa
A group rate of $139 has been negotiated for this event, resort fee is included, for reservations made by May 11, 2019 (subject to availability). Make room arrangements directly with the Resort: 386-767-7350 and refer to group code, SEDA, for the discounted group rate. Guest rooms and suites feature stunning views in addition to luxurious bedding, in-room safes and contemporary décor. You will also enjoy complimentary wireless internet access. The Mediterranean-style resort is located on the Gold Coast and offers an oceanfront location that's near the infamous Atlantic Avenue. Dine at SeaCrest Grill, and enjoy fresh tastes without ever leaving the hotel. Visitors can walk to local bistros, boutiques, outdoor cafes and fascinating art galleries, all while enjoying the beautiful weather. We have two ocean-facing swimming pools, and there's always the beach, of course.

Each Participant Receives
Conference materials, continental breakfast each day (Mon.-Wed.), Sunday Welcome Reception, refreshment breaks, lunch (Mon. and Tue.), Monday evening reception, handson training, trivia challenge event, plant facility tour and certificate of attendance. Registrants now have the option to download the PowerPoints online or can receive them in electronic format; Please indicate on the registration form the option you prefer. All registration fees must be paid prior to the program. On-site registration and payment will be accepted.

Cancellations and Refunds
Written cancellation requests received by the SEDA Administrator at least 7 days prior to the start date of a scheduled event will receive a refund, less a $25.00 administrative processing fee. Written cancellation request received by SEDA at least 3 days prior to the start date of a scheduled event will receive a refund, less a $50 administrative processing fee. No refund will be provided for written requests received less than 3 days prior to the start date of a scheduled event or if the registrant does not attend the scheduled event. A substitution of the registrant may be made any time prior to or during the event, without additional cost. The requested amount of a refund must exceed the respective administrative processing fees described above in order to be considered. SEDA reserves the right to make changes to the scheduled event including but not limited to changes to event location, schedule date(s), program and speakers, or to cancel the event in its entirety when conditions beyond its control prevail. If the event is cancelled, SEDA's liability is limited to providing a full refund of the fees paid to SEDA for the scheduled event.

REGISTER EARLY AND SAVE $50 ... (see the registration form for details)
Ph: 772-781-7698 or Web: www.southeastdesalting.com

25th Anniversary Bash

Join us Sunday evening as we celebrate 25 years of SEDA!

Sunday June 2nd, 2019
5:30 - 7:30 pm at the Ocean Terrace.

Who's got the best tasting drinking water?

Preliminary taste testing Monday during Lunch, Finals taste testing Monday evening during the Networking Reception.

Full rules can be found on the SEDA Website under the Symposium on the calendar tab.

www.southeastdesalting.com/event/2019-spring-symposium

TUESDAY NIGHT EVENT

Are you ready to let loose after a long day of membranes? Come join us for our annual Texas Hold'em poker tournament!

Tuesday June 4th, 2019
6 – 11 pm.

Sign-up at registration
limited seats

Energy Savings by Design for New Advanced Treatment Plant for Groundwater Recharge in Southern California

Authors: Jorg Menningmann and Richard White, Biwater & Amanda Taylor, Tetra Tech

The Water Replenishment District of Southern California's focus is to manage the groundwater resources of the Central and West Coast Basins, which today supply over four million people with water. Through a joint effort with the Los Angeles County Department of Public Works (LACDPW), WRD partners in a program to artificially replenish the Central and West Coast Groundwater Basins by spreading and injecting replenishment water. Spreading facilities include the Rio Hondo and San Gabriel River Spreading Grounds located in Pico Rivera, California.

As a continuation of this effort, WRD selected a progressive design-build team to design, construct, and provide transitional operation and training for a new Advanced Water Treatment Facility (AWTF) on a 5.0 acre parcel in the City of Pico Rivera. The new treatment facility is part of an overall program titled Groundwater Replenishment Improvement Program (GRIP). The AWTF will be designed to produce 13,000 acre-feet per year of fully advanced treated recycled water (referred to as Phase 1), with provisions to expand to an ultimate minimum production capacity of 26,000 acre-feet per year (referred to as Ultimate or Phase 2). Phase 1 design flow capacity is 14.8 million gallons per day (MGD) with Phase 2 expanding to nearly 30 MGD. The AWTF system consists of the industry standard for indirect potable reuse projects which is 100% ultrafiltration (UF)/reverse osmosis (RO)/ultraviolet (UV) advanced oxidation processes (AOP).

The Project includes connection to the existing 66" diameter San Jose Creek Outfall (SJCO) pipeline to provide source water to the AWTF. For most of the year, purified water from the AWTF will be discharged back into the SJCO pipeline where it will blend with Title 22 reclaimed water and be conveyed to the Montebello Forebay Spreading Grounds (MFSG) for percolation. For the remaining portion of the year the purified water from the AWTF will be conveyed to the three supplemental recharge wells. A brine pipeline will convey the AWTF waste stream for treatment at the Joint Water Pollution Control Plant in the City of Carson.

The mission of the design of the process and building services was to reduce the CO2 footprint to the minimal attainable with today's technologies. Building services were designed to achieve energy savings projected at 25% of baseline energy budget as established in the Design Criteria Report (DCR). The use of dimmable LEDs and automatic lighting control and a highly efficient HVAC system with heat recovery condensing system were major design features to reach this goal. In addition, on site energy generation was included that provided 371 kW DC from a roof mounted solar array on the Process Building.

Process design features were focused on achieving the smallest footprint and lowest capital and operation costs, especially concerning energy. The membrane system employed is a direct feed UF followed by a first and second stage primary RO feeding a third stage secondary RO for concentrate recovery. By utilizing a direct feed UF to RO design the system eliminates a large UF filtrate tank, pumps required to forward filtrate, and cartridge filters for RO membrane protection that were all part of the base case design.

Tertiary treated water from the San Jose Creek Outfall will flow into the feed water equalization tank through a diversion structure. Then the raw water will be forwarded to the UF strainers prior to entering the primary UF membrane trains. UF filtered feed water will reduce total suspended solids (TSS) to immeasurable values and produce a turbidity value of no greater than a 0.2 NTU. The Phase 1 UF system will consist of ten primary UF trains and four recovery UF trains. Recovery UF trains treat the backwash from the primary trains to reduce the volume of waste water. This facility pays for feedwater and waste water so maximizing overall recovery rate was essential in lowering operating costs for not just water, but chemicals and energy. Filtered water from the recovery UF trains will be returned to the equalization tank. Waste from the recovery UF will be pumped to the brine/waste tank. The UF Primary and Recovery UF system will operate at an average overall recovery rate of 99.5+%.

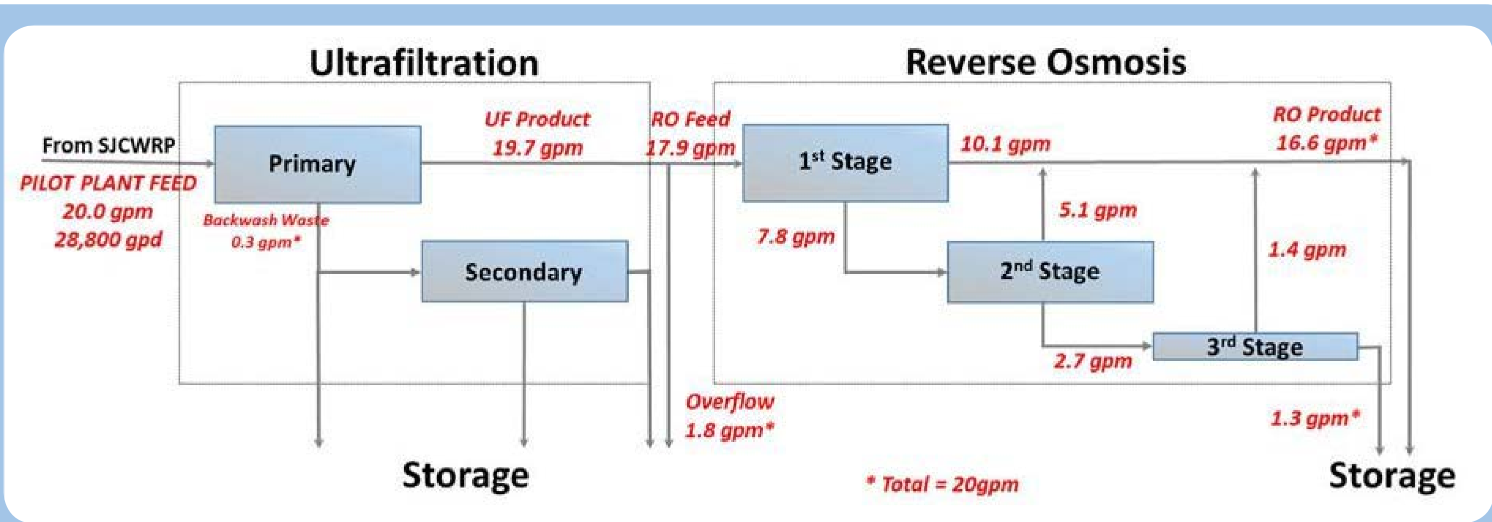
The UF membranes act as cartridge filters in a conventional RO system design and their filtrate will feed directly to the RO membrane trains. A manual strainer is utilized as a final precaution for any large particulates from entering the RO pumps or membranes. This direct feed arrangement whereby no intermediate storage of water occurs between the feed water supply pumps and the finished water reservoir (except for UF backwashing and RO flushing water), eliminates intermediate storage, a potential source of biological contamination, and the need for RO supply pumps and cartridge filters, thus providing a reduced footprint and energy savings. The details of these savings will be discussed later in this article.

RO high pressure (HP) feed pumps direct the pretreated water to the primary RO membrane trains. The primary RO membrane trains include 2-stages of treatment. The concentrate from the first stage RO is the feed water for the second stage RO bank on each primary train. The concentrate from the second stage RO banks for all primary RO trains are blended and becomes the feed to the third stage RO trains. The concentrate from the third stage RO trains is disposed of via the brine/waste tank. The permeate from the first stage RO, second stage RO and third stage RO are blended together before being treated by the UV AOP system.

Further post treatment will include a portion of the flow (40-55%) fed to decarbonators for reduction of CO_2 and then final stabilization and dechlorination of the combined blended product water. The final product will then either be pumped out to the on-site aquifer injection wells from the product water pump station wet well or it will continue to flow into the diversion structure connecting back at the existing SJCO pipeline and on to the Montebello Forebay to be directed to spreading grounds for adsorption into the aquifer below.

This method of delivery for this project is Progressive Design Build. However, there was no current facility in operation anywhere with the same feed water chemistry and there wasn't any pilot plant data that demonstrated the overall system recovery target of 92+% as given in the DCR could be met. Therefore, to ensure that the design and the anticipated system recovery and consumables quantities (water, chemicals, membranes, power) could be met, Biwater insisted a pilot program be designed and operated con-current with the 60% design work for the newly established design of direct feed UF and RO interstage booster pumping. Verification of the targeted operational performance parameters could not have been done without this pilot program.

Design of the pilot plant was a bit daunting as site discharge water restrictions limited disposal of the pilot effluent flows. The combined permeate and waste streams were not allowed to be sent back to the source, the SJCO pipeline. The only water allowed to be discharge on site of any significant quality would be for dust control, which was a maximum of ~25,000 gallons a day. Therefore, the design required utilizing 4" elements for the Primary 2 Stage RO and 2.5" elements for the 3rd Stage RO, in lieu of the desired 8" elements. The desire for 8" elements throughout the stages was to provide better scalability of the data to the plant design capacity. Because of these water disposal restrictions, the pilot was built to produce 17 gallons per minute of permeate flow and all ancillary system equipment was sized accordingly. The 3rd Stage 2.5" seven element vessel was manufactured by Biwater as none existed in the market. A 3rd Stage eighth element with independent vessel was incorporated to act as a Canary for telltale signs of scaling or excessive fouling. The final element was instrumented appropriately to gauge deteriorating performance conditions.



The Primary UF, Recovery UF, Primary RO and 3rd Stage RO were started in sequential/additive steps until operating as a complete process. Process steps were analyzed individually for initial performance to assure the system could perform as specified and controlled as required to insure the collection of reliable data. Biwater designed, built and operated the pilot plant. Operations began in March of 2017 and were completed in November 2017. The membrane treatment pilot project was to ascertain if the GRIP membrane system design, as given in DCR specifications with an overall recovery rate of 92.5% was sustainable, as determined by meeting the specific energy and consumables utilization rates proposed. The essential data and conclusions the pilot was expected to determine were:

- What operating pressures would be required of each membrane unit process to confirm specific energy requirements;
- What UF backwashing and UF/RO cleaning requirements would be needed to meet this sustainable operation;
- Chemical consumption required for each process;
- Expected unit process membrane life; and
- Evaluate the capability, functionality and maintenance requirements of the pilot system water quality instrumentation for potential use in full-scale AWTF operations.

Pilot UF Operational Targets

Parameter	Target	Units
• Primary/Secondary UF Filtrate	16-21.5 / 0.5-0.8	GPM
• Primary/Secondary UF Flux	30-40 / 10-15	GFD
• Primary/Secondary UF Recovery	96 / 92.5	%
• Primary/Secondary UF filtration cycle	30-40 / 20-30	Minutes
• Primary/Secondary Backwash Duration	30 / 40	Seconds
• Primary/Secondary Air Scour Duration	30-45 / 30-45	Seconds
• Primary/Secondary Drain Duration	40-50 / 40-50	Seconds
• Primary/Secondary CEB Frequency	0.5x / 7x	Week
• Primary/Secondary CEB Chlorine Conc.	300 / 500-800	mg/L
• Primary/Secondary CIP Frequency	6 / 12	Year
• Primary/Secondary CIP Chlorine Conc.	3,000	mg/L
• Primary/Secondary CIP Citric Acid Conc.	5,000	mg/L

Pilot RO Operational Targets

Parameter	Target	Units
• Primary RO System Feed Flowrate	17.9	GPM
• Primary RO System Product Flowrate	15.2	GPM
• Primary RO System Recovery	85	%
• Primary RO System Average Flux	12	GFD
• Stage 1 Feed Flowrate	17.9	GPM
• Stage 1 Product Flowrate	10.1	GPM
• Stage 1 Recovery	56.6	%
• Stage 1 Average Flux	12	GFD
• Stage 2 Feed Flowrate	7.8	GPM
• Stage 2 Product Flowrate	5.1	GPM
• Stage 2 Recovery	65.4	%
• Stage 2 Average Flux	12	GFD
• Third Stage RO System Feed Flowrate	2.7	GPM
• Third Stage RO System Product Flowrate	1.36	GPM
• Third Stage RO System Recovery	51.1	%
• Third Stage RO System Average Flux	10	GFD

The pilot plant summary of performance follows;

- The Primary UF performed very good at 96% recovery with average trans-membrane pressure (TMP) of ~4-5 psi and chemically enhanced backwash (CEB) requirements about once every two weeks. Energy and CEB Chemical requirements were 60% and 25%, respectively, of the targeted consumption.

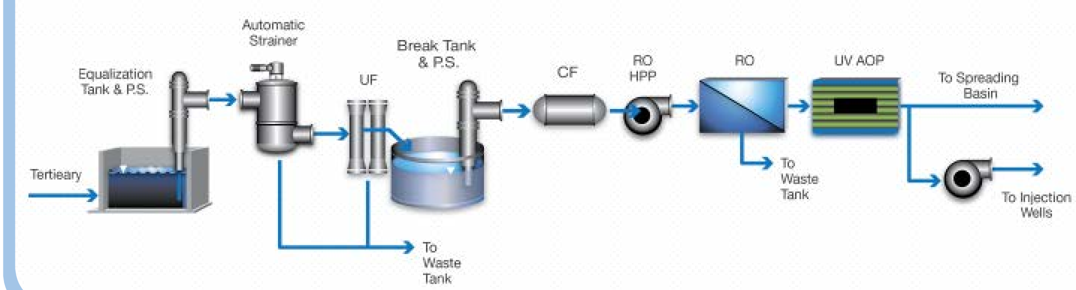
- The Recovery UF performed sustainably at 85% recovery, not achieving the 92.5% desired. Energy was less than the target with average TMP of 5-7 psi and CEB chemical consumption equaling the target. This was considered good performance as the reduced recovery represents an insignificant change to overall plant recovery and attempting to maintain a recovery of 90+% for the Recovery UF would have required excessive chemicals and system maintenance. Overall UF system recovery was still maintained at 99.4%.

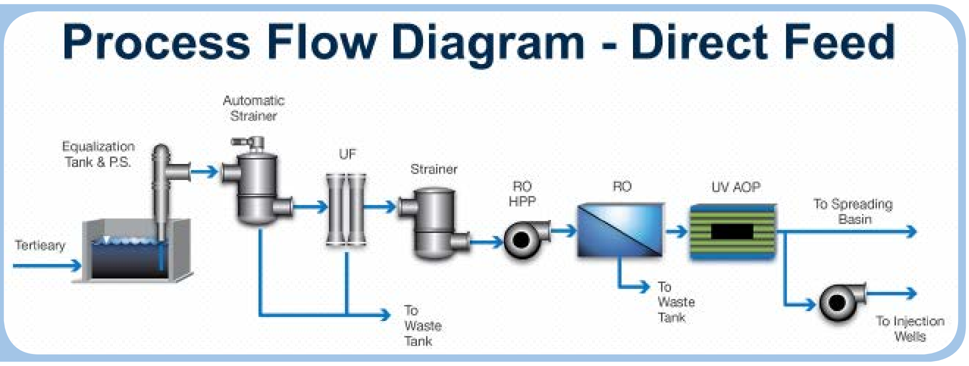
- The Primary RO performed good as well. Once initial organic filming on the membranes and subsequent achievement of a stabilized permeate flow and feed pressure, the energy required equals the targeted specific energy for the Primary RO system. Cleaning in Place (CIP's) were not necessarily required; however, they were performed to see the retrievability of membrane flux and what if any changes could be expected of stabilized permeate flow after a cleaning. Cleaning is expected to be required no more than 1-2 times a year, if at all necessary. RO CIP requirements will be finally determined over a couple years of operations. But, the 7 months of operation suggested cleaning will be minimal for a waste water reclamation RO.

- The Secondary RO or third stage, after achieving stabilized pressures, performed exceptionally well without any observable scaling or unknown fouling as evidenced by its stable operating pressures, differential pressures and autopsy analysis. CIP may be required 1-3 times a year.

The data from the pilot plant provided enough information on unit process performance to validate the consumables assumptions, and most importantly, the energy cost savings attainable with the Biwater proposed design over the baseline design as given in the DCR. The following explains the energy requirements for the baseline design vs. the Biwater proposed design incorporating direct feed UF, second stage booster pumping and third stage energy recovery boost pumping. The baseline design and the Biwater proposed direct feed design are depicted in the following flow schematics.

Process Flow Diagram - Baseline Case





The operational load reduction between operating in a direct feed mode vs. the baseline design utilizing an intermediate tank between the UF and RO systems and the subsequent requirement for re-pumping to supply the required pressure for cartridge filters and the RO HP pumps operation was calculated to be 89 kW. This figure is based on the system losses to pump through the intermediate tank, supply pump and cartridge filters of ~31 feet of head. Operating 24 hours a day, 364 days per year yields 777,500 kW-hr/yr in energy savings, and at $0.15/kW-hr equates to $116,600 per year in savings. Since the baseline design requires 1,200 kW in pumping energy, this direct feed configuration saves ~7.4% in system pumping energy. Not only is there savings in pumping energy for this direct feed configuration, but requiring less equipment also provides savings in equipment capital expenses (capex) and operating expenses (opex), civil works savings for a reduced footprint, and mechanical and electrical works savings for the reduction in supply and installation of extra pipe, valves, instruments, conduit, and controls.

Staged brackish water RO systems are typically designed to balance the system hydraulically to avoid excessive membrane element feed or permeate flow rates and minimum recommended brine flow rates. This design concern is most prevalent when designing low pressure RO systems and systems operating on warm feed water conditions. Quite often the RO system applications engineer may be required to include first stage permeate back pressure to control over fluxing of the membrane elements. This induced back pressure results in the necessity to provide extra feed pressure to attain an optimal membrane differential driving pressure, resulting in a higher energy requirement. A better way to accomplish this while reducing the energy requirement is to use an interstage booster pump. This pump boosts the brine pressure from the first stage to provide more driving pressure for the second stage and hence increase the flux rate and production of water from the 2nd stage and thereby reducing the production required of the first stage membranes. This 2nd stage boost pressure design achieves a lower specific energy system while hydraulically balancing the system without 1st stage permeate back pressure.

Biwater recommended the use of 2nd stage boosting for this design for energy savings. To achieve essentially the same hydraulically balanced system without 1st stage induced permeate back pressure, the 2nd stage feed pressure had to be boosted by 26 psi. This resulted in a 1st stage feed pressure reduction from 134 psi to 110 psi. As the flow to the 2nd stage is approximately 40% of the 1st stage feed flow, the net result is an operational load reduction of 81 kW, equating to ~707,000 kW-hrs/yr and providing a 6.8% savings in pumping energy, ~$106,000 annually. However, as extra booster pumps and controls must be added to achieve these savings, the additional equipment and installation capex and opex must be estimated to determine the payback period for the additional costs. In this case the estimated pay back is ~1.5-1.8 years.

When designing three stage RO systems to achieve high recovery rates, as was necessary for this RO system (92.5%Y), the same design guidelines for attaining hydraulic balancing must be applied. The best way to achieve lowest energy consumption with effective hydraulic control in low pressure three stage RO systems is to boost the feed pressure in each stage. The argument for this is the same as explained above for 2nd stage boosting. However, as always, the extra capex and opex for additional equipment must be examined as does the payback period that may be expected from the operational savings. In this case, the baseline design anticipated the need for 3rd stage conventional pump boosting but left it to the design team to determine if an alternative energy recovery device (ERD) boosting might be advantageous. Because the 3rd stage in the system operates at roughly 50% recovery and requires a boost pressure of ~29 psi for optimal hydraulic balancing of the system, a turbo assisted boost pump was a perfect fit for reducing energy requirements of the system even further. When applying an ERD booster system in this case, it was determined that the system can operate without any additional motor assistance for nearly all cases of membrane age and operating temperature based on the degree of organic fouling and subsequent differential pressures experienced during the pilot system operation. This 3rd stage boosting capability derived from energy recovery provided for minimal power requirement. The calculated load reduction is ~31 kW which equates to ~2.6% pumping energy savings, providing savings of ~270,800 kW-hrs/yr and $40,600 annually. Estimated pay back is calculated to be ~3.3-3.7 years.

The table below summarizes the pumping energy savings attained through value engineering analysis of the GRIP 14.8 MGD Full Advanced Treatment system for water reuse.

Description	Annual kW-hrs	$	Other Benefits
A – Direct Feed RO	777,500	$116,600	Lower Equipment and Construction CAPEX and OPEX
B – 2nd Stage Booster Pumping	707,000	$106,000	Control Flexibility for stage performance optimization
C – Using a Turbo ERD for 3rd Stage Boosting	270,800	$40,600	
Total	1,755,300	263,200	Total pumping energy savings of ~17%

In Summary, the Biwater incorporated design changes will save ~17% in membrane process pumping energy over the baseline design provided in the WRD's Design Criteria Report. These process pumping savings along with the building services design energy savings provided for an AWTF that is optimized for energy usage, saving the owner millions of dollars in operating costs over the useful life of the facility.

The value engineering design not only provides substantial opex energy savings, but the smaller footprint with less mechanical equipment provides instant capex savings as well. Additionally, the very good performance demonstrated by the membrane unit processes during the pilot operations suggests additional savings will be attained in reduced chemical consumption and longer membrane life than was initially targeted. These reductions in the anticipated capital and operating costs of an Advanced Water Treatment Facility will hopefully help bolster Wastewater Reuse as a solid tool for implementing alternative source water supplies for the people of Southern California and elsewhere.

SEDA Welcomes New Members

JOSHUA ALLEN
CITY OF HALLENDALE BEACH

COREY BROWN
TOWN OF JUPITER

JEREMY BROWN
CITY OF CLEARWATER PUBLIC UTILITIES

DAVID CALLE
KIMLEY-HORN

GREGORY COLDEN
CITY OF MIRAMAR

RONALD COOK
INFRAMARK INC.

GABRIEL DEJESUS
INFRAMARK INC.

EDUARDO DIAZ
INFRAMARK INC.

RAMON DIAZ JR.
INFRAMARK INC.

TOM DINEEN
CITY OF POMPANO BEACH

JACQUELINE DOUGLAS
CITY OF TARPON SPRINGS

DELBERT “MATT” DOUGLAS
CITY OF PORT ST. LUCIE UTILITIES

LUIS M. GARCIA-CASTRO
TSG WATER RESOURCES

JAMES GARNER
CITY OF TARPON SPRINGS

EVAN GHIDELLA
KIMLEY-HORN

TAMMY GOOD
CITY OF POMPANO BEACH

MICHAEL HALLMAN
CITY OF POMPANO BEACH

ROBERT E. HUGGETT
DARE COUNTY WATER DEPARTMENT

AUSTIN JOHNSON
CITY OF DUNEDIN, WATER DIVISION

DUANE LEITZEL
MARCO ISLAND UTILITIES

DERRCIK LESSINGER
CITY OF DUNEDIN, WATER DIVISION

NATHAN LITTERAL
VILLAGE OF TEQUESTA WATER

MASON LYTTAKER
THE ISLAND WATER ASSOCIATION, INC.

SEAN MEEHAN
CITY OF PORT ST. LUCIE UTILITIES

ROBERT MOORE
CITY OF POMPANO BEACH

CHRISTOPHER MURPHY
CITY OF PORT ST. LUCIE UTILITIES

CHAD NOSBISCH
CITY OF NORTH PORT

ALEX PEREZ-SABORIT
CITY OF HOLLYWOOD

KEISHA PHILLIPS-BROWN
BLOCK ISLAND WATER COMPANY

ROBERTO PIERRE
CITY OF HOLLYWOOD

MATTHEW RIOS
CITY OF DAYTONA BEACH

RICHARD RIVERA
VILLAGE OF TEQUESTA WATER

STEVE ROGERS
CITY OF DUNEDIN, WATER DIVISION

JOHNNIE SAFFOLD
INFRAMARK INC.

BRIAN SARR
CITY OF POMPANO BEACH

KEVIN R. SKELLENGER JR.
SOUTH MARTIN REGIONAL UTILITY

JOHN SPURRIER
THE ISLAND WATER ASSOCIATION, INC.

SHELIA STRAMPP
CITY OF POMPANO BEACH

MICHAEL TOWNS
CITY OF POMPANO BEACH

HILARY WEBER
CITY OF TARPON SPRINGS

DIANA WILSON
THE ISLAND WATER ASSOCIATION, INC.

Legislative Update

Author: Pierre Vignier, City of Port St. Lucie and Chris Ballard, Toray Membrane USA/SEDA Legislative Committee

America's Water Infrastructure Act (AWIA) of 2018 (S. 3021) was signed into law on October 23rd, 2018, by President Donald Trump to authorize a wide variety for water infrastructure improvements in the United States for water resources development, assessing public water system risk, addressing resilience challenges, upgrading public water and wastewater systems, financing improvements, and providing technical assistance to small communities among other provisions.

The law also reauthorizes Water Infrastructure Finance and Innovation Act of 2014 (WIFIA) in Section 4201. The WIFIA program accelerates investment in the nation's water infrastructure by providing long-term, low interest supplemental loans administered by the US Environmental Protection Agency (EPA) for regionally and nationally significant large-scale projects. Congress can appropriate funding sufficient to provide $4.5 billion per year or more in loans through fiscal year 2021.

Federal funding of water infrastructure in the United States is via the Clean Water and Drinking Water State Revolving Funds (SRFs) as apart from WIFIA. Smaller projects requiring loans are an emphasis of SRFs. Changes were made by AWIA that facilitate SRF access to WIFIA such as state infrastructure authorities being able to finance up to 100% of project costs using WIFIA compared to 49% for non-SRF projects, EPA must either approve the application or provide explanation of any changes needed for approval within 180 days of receiving an application from a state, and additional environmental or engineering review beyond those otherwise required are not required for projects funded through SRFs.

AWIA 2018 amends WIFIA to authorize EPA to enter into agreements with other closely connected federal agencies to aid in administering and servicing loans or loan guarantees. For example, it allows Army Corps of Engineers to set up a WIFIA program with EPA assistance.

Examples of provisions within the AWIA that revitalize the water and wastewater industry are under Title II and Title IV. Noteworthy provisions are in: Sec. 2005 Drinking Water Infrastructure Resilience and Sustainability, Sec. 2007 Innovation Water Technology Program, Sec. 2008 Improved Consumer Confidence Reports, Sec. 4103 Technical Assistance for Treatment Works, Sec. 4106 Sewer Overflow Control Grants, and Sec. 4304 Water Infrastructure and Workforce for Investment.

The AWIA 2018 is very broad in that it comprises many types of funding mechanisms and authorizes new programs for industry infrastructure projects. For more insight, please check.

www.congress.gov/bill/115th-congress/senate-bill/3021

SEDA QUIZ

By: Brian Matthews, City of Palm Coast

1. What does FlaWARN stand for:
   A. Florida Water and Wastewater Agency Resource Network
   B. Florida Warn – A Hurricane Cleanup Contractor
   C. Florida Weather Alert Resource Network
   D. Florida Writers Association of Regional Newspapers
2. What does FlaWARN do for Utility Systems:
   A. As little as possible
   B. Provide emergency response coordination to Water and Wastewater Utilities
   C. Ask you to become a member for a fee
   D. Monitor your wastewater spills and report them to the FLDEP
3. What Agencies are represented by the members of the Steering Committee:
   A. DOH, ANSI, EPA, SERC, NWS
   B. ABC, NBC, CBS, CNN, FOX
   C. FRWA, DEP, FSAWWA, SEDA, FWEA, FWPCOA
   D. NBA, NFL, NHL, NBL, ESPN
4. How much does it cost to be a FlaWARN member:
   A. $25.00 / mo.
   B. $50.00 / year
   C. It depends on how many customers you serve
   D. $0
5. When is a good time to become a member:
   A. Membership is only available during normal business hours Monday through Friday
   B. Immediately
   C. Once you have a good understanding of how FlaWARN can benefit your system
   D. B and C above
6. Becoming a member allows your system to:
   A. Enjoy all the benefits of being a member
   B. Download an MAA and sign it
   C. Attend Hurricane exercises and lose some weight
   D. Financially support many different member agencies
7. What does MAA stand for:
   A. Mutual Authoritative Attendance
   B. Moderate Archival Analysis
   C. Mutual Aid Agreement
   D. Martial Arts Association
8. When should you have the MAA signed by a senior official in you Municipality:
   A. As soon as possible
   B. Never, not very important
   C. When you get around to it
   D. After your legal staff and elected officials have approved it
9. How does having a signed MAA on file with FlaWARN Benefit your utility:
   A. Provides a high level of comfort for responding utilities that they will be reimbursed for providing their equipment and staff to assist you in your response to an emergency situation
   B. Having a signed MAA guarantees on time delivery of misc. supplies during an event
   C. The MAA entitles you to free vaccinations for life
   D. All of the above
10. What additional benefits does being a FlaWARN member enjoy:
   A. Networking with other Utilities
   B. Attending the Annual FlaWARN Gala in Gainesville, FL
   C. Understanding the needs of the system following a disaster
   D. A and C

Answers can be found on the SEDA website at
http://www.southeastdesalting.com/members-only/quiz/

SEDA Training and Events Schedule

April

April 2nd, 2019
Tuesday
Water Quality and Energy Efficiency
Coral Springs, FL

April 25th, 2019
Thursday
Operation and Maintainence of
Raw Water Supply Wells for
Membrane Treatment
Wellington, FL

July

June 2nd - 5th, 2019
Sunday - Wednesday
Spring Symposium
Daytona, FL

July 23rd - 25th, 2019
Tuesday - Thursday
SEDA MOC II
Town of Jupiter, FL

November

September 10th - 12th, 2019
Tuesday - Thursday
SEDA MOC IV
TBD

November 19th - 21st, 2019
Tuesday - Thursday
SEDA MOC III
Palm Coast, FL

Reminder

The 2019 CEU renewal cycle ends April 30, 2019. All classes taken before that date will apply to the 2019 cycle.

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Dedicated to the improvement of water supplies through desalination and other water sciences.

Inside Recovery Zone