RECOVERY ZONE
AUGUST 2021

CSID Membrane System and Their Improvements Providing Positive Impacts

Authors: Joe Stephens/CSID and Troy Lyn/Globaltech

Background

The Coral Springs Improvement District (CSID) has been operating a membrane plant for over six years and has made advances to improve operations and water quality by continuously looking at implementing better systems and procedures. CSID was recognized for its efforts when the facility received the 2019 SEDA Outstanding Membrane Plant Award for Small Facility. This article provides a brief description of CSID and its treatment processes, as well as information on changes that have significantly impacted operation, maintenance, and water quality.

CSID

CSID was established in 1966 as an independent special District by the State Legislature to undertake a variety of improvements to the land within the District. CSID is run by a Board of Supervisors consisting of three elected officials. CSID is located in Broward County, west of Pompano Beach and northwest of Fort Lauderdale. As one of four potable water purveyors within the City of Coral Springs, CSID serves approximately 40,000 residents spanning approximately 5,000 acres. Additionally, CSID provides water distribution, wastewater treatment, sewage collection, and stormwater management services within the City. CSID has 58 employees, of which there are 10 water treatment plant operators and 7 water distribution operators.

Treatment Facility

CSID's water treatment plant (WTP) was originally constructed in 1972 as a lime softening (LS) facility with a production capacity of 1.8 million gallons per day (MGD), later expanding its capacity in 1978 to 3.8 MGD, and again in 1987 to 7.2 MGD.

Plant Site with Water Plant in Foreground with LS facilities removed and Wastewater Plant in Background.

Entering 2008, the LS facility was approaching the end of its useful operational life and consumptive use permitting at the time suggested the use of the more-brackish Floridan Aquifer groundwater source. Taking the former into account and desiring to further improve their overall water quality, the WTP was designed for a low-pressure reverse osmosis (LPRO) treatment system to treat a blend of surficial Biscayne Aquifer wells and Floridan Aquifer wells. However, as the membrane system construction broke ground in 2009, a consumptive use permit was obtained for the continued use of the Biscayne Aquifer. The need to go to the Floridan Aquifer was not realized and the membrane system design remained unchanged to just treat the surficial aquifer wells. The membrane plant was placed on-line in 2013. Several years later in 2016, the old LS facility was demolished. Currently the WTP's LPRO process incorporates a 10%-15% raw water by-pass, bringing its total finished water production capacity to 7.4 MGD.

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Message From Our President

Greetings SEDA Members,

As I write this message, I have to thank all of the Board members and volunteers that with patience and dedication, serve our membership. As we all try to get back to normal operations, it is good to know that we, Water professionals, are strong together. Thank you to the operators, engineers, administrators, support staff, contractors and suppliers, for their hard work and dedication in providing safe and reliable services even in one of the toughest years in our industry.

The 2021 Spring Symposium was a great success! It was great to see everyone in person. Congratulation to all the awards winners! They will be feature in the next Recovery Zone issue.

I would also like to welcome the five newest Board members, Allan Clum, Fred Greiner, Nate Litteral, Jennifer Ribotti and Kyle Jennings. They will be joining our returning Board members Dave MacNevin, Laura Gallindo, Mo Malki, Jason Bailey, Pierre Vignier, Joey Tippett, Paul Biscardi, Ryan Popko, and Nick Black.

We continue to offer online webinars and have successfully hosted our first MOC I class in Port Saint Lucie. As we try to ramp up our live training events, we welcome water plants that would like to host an event. If you are interested in serving on a committee, Technology Transfer workshop, or teaching a course, please reach out to one of the Board members. Also, continue to check the event calendar on the SEDA website and SEDA App for the latest information on upcoming events as they get scheduled.

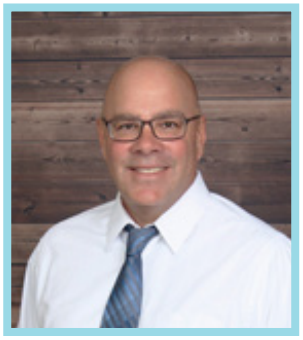
Please continue to provide your comments and suggestions so we can improve our service to the membership. If you want to serve on a committee or have any other questions, you can reach out to any of the Board members.

Take care, and keep up the good work!

Karla V. Berroterán Castellón, Village of Wellington
Water Treatment Facility Superintendent

2021-2022 SEDA Board of Directors

Karla Berroteran
President



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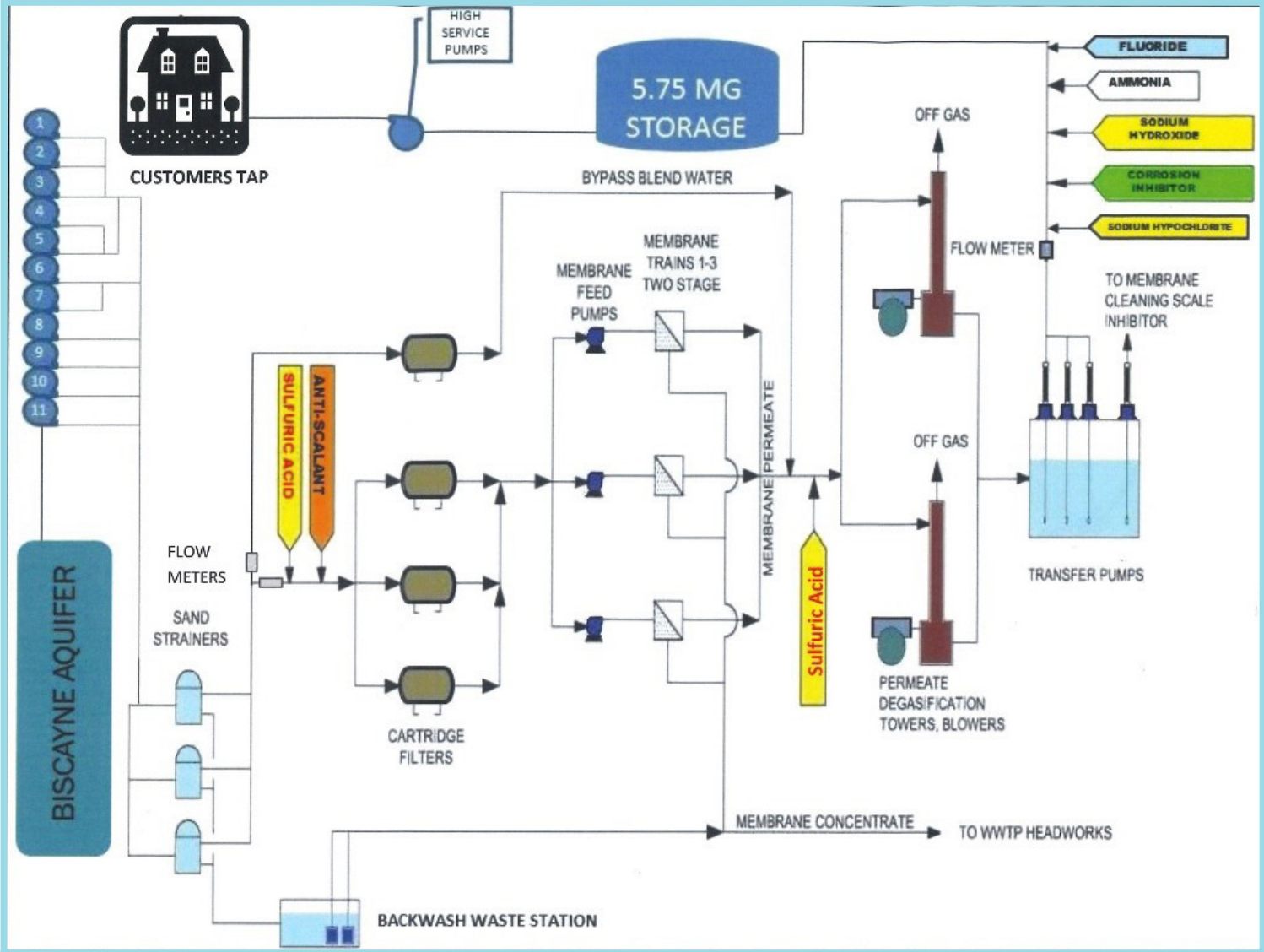

Process Flow Diagram of CSID LPRO Process

Raw Water Supply and Pre-Treatment

CSID membrane system is currently supplied by eleven groundwater wells, pulling water from the Biscayne Aquifer. Eleven wells were also used for the LS plant prior to the commissioning of the membrane system, but several improvements have been made. Two of the original wells have been replaced in different locations. Two others have been reconstructed in place. Many additional modifications to the well heads and pumps have been made to the original wells, conditioning them for use with the new LPRO process and upgrading them to current FDEP requirements.

The WTP pre-treatment process consists of three 50-micron sand strainers, sulfuric acid and antiscalant chemical addition, and three 5-micron cartridge filter vessels which house 176 filters each. Pre-treated water is then fed to the LPRO membrane process through three 250-hp pumps, where it is pressurized prior to entering the LPRO process.

Replacement Well #4R

The WTP's raw water by-pass is pretreated with sand straining and cartridge filtration utilizing 1-micron cartridge filters before foregoing the LPRO process and blending with the LPRO permeate. The 10%-15% raw water by-pass is used to raise alkalinity and hardness to meet water treatment goals.

Membrane Trains

Degasification Vessels

Low-Pressure Reverse Osmosis Process

The WTP's LPRO process consists of three 2.25 MGD 2-stage (36-14 array) membrane trains, each with interstage turbines that increase pressure to 2nd stage pressure vessels. Toray TMG20-430 membrane elements were originally supplied with the membrane trains. In 2018, the membrane elements were changed to Toray TMG20D-440 membrane elements in both stages. The treated permeate water is taken to post-treatment operations and the rejected concentrate water is sent to the headworks of the CSID Wastewater Treatment Facility, located on the same property as the WTP.

Post-Treatment

After the LPRO process, the membrane permeate is dosed with sulfuric acid to lower pH to allow for stripping of hydrogen sulfide by two degasification vessels. From the degasifier, the permeate enters a clearwell where it is then pumped by transfer pumps to three on-site storage tanks, totaling 5.75 MG. On its way to on-site storage, chemical conditioning is carried out through the addition of sodium hypochlorite (free chlorine) for four-log disinfection, orthophosphate for corrosion control, sodium hydroxide (caustic) for pH adjustment, fluoride, and ammonium sulfate for the formation of chloramines to provide residual disinfection. Finally, water is pumped via eight high service pumps out to the distribution system.

Changes Providing Positive Impacts

Conversion of Old Wellfield for Membrane Plant Use

The new membrane process required a higher level of feed water quality that was previously not demanded by the old LS system. To accomplish this, several modifications/improvements were implemented by CSID to improve membrane treatment system performance and reliability.

• An evaluation of the wellfield was conducted to investigate pump hydraulics, well specific capacity (yield), and well draw drawdown. This resulted in the replacement of some well pumps and motors and some lengthening of the pump column pipe to increase raw water pumping capacity and reliability of the well pumping system.

• The wellfield evaluation also investigated sand and fouling potential utilizing a Rossum sand tester, silt density index (SDI) test, cartridge filter fouling, and Biological Activity Reaction Test (BART). This testing resulted in the abandonment and replacement of two wells. It also prioritized well maintenance and established an annual well maintenance program for the other existing nine wells.

Original Well 6 Wellhead

• The evaluation also resulted in the addition of on-line drawdown monitoring level sensors to every well. The automation of the drawdown level sensors alleviated concerns of excessive drawdown that might burn up a pump or create excess air from entering the raw water that might result in elemental sulfur or iron fouling for oxygen reaction to the naturally occurring hydrogen sulfide or iron in the raw water.

• New check valves and air relief valves were also installed on each well and on aerial crossings to help mitigate the negative impacts of air (oxygen) intrusion on the WTP's membrane process as noted above.

• Because chlorine is often used during well maintenance and disinfection, an Oxidation Reduction Potential (ORP) probe was added to the raw water line entering the plant. The ORP probe provides for an emergency shutdown of the system if ORP above +100 mV is detected to prevent the membrane material from being damaged.

• Variable frequency drives (VFDs) have also been added to a few wells to help manage flows to the plant and limit excessive drawdown of those wells without having to throttle valves. With the VFDs, the flows can be reduced remotely without physically going out to the wells.

Modified Well 6 Wellhead

Pre-Treatment Optimization

After the membrane system was commissioned a few pretreatment items were optimized to provide better functionality.

• During startup, the sand strainers were constantly backwashing and being fouled to the point that the stainless strainer elements needed to be removed and pressure washed to remove particulates from the screen. The previously noted well evaluation and upgrades resulted in significantly less fouling. However, the backwashing operations of the sand filters needed to be optimized. The three-sand strainer drain lines were tied together into one common discharge to a pump station. The drain lines were separated and increased in size which, significantly improved backwashing. The timing of the backwashing was also changed to prevent all the strainers from backwashing at the same time.

Modified Sand Strainer Drain Lines

• A Coriolis flow meter was added to the antiscalant system to provide direct feedback and assurance in operation that antiscalant is being added at the right amount at all times. The original antiscalant feed system had a flow switch to detect the presence of antiscalant flow; however, it did not work very well or provide feedback on whether the correct amount of antiscalant was being added.

Coriolis Antiscalant Flow Meter

Post-Treatment Modifications

Since commissioning the membrane system, the following modifications to the post-treatment system were made to improve operations.

• The membrane plant degasifiers do not have odor control scrubbers. Hydrogen sulfide concentrations are relatively low (less than 1.0 mg/L) in the raw water. However, the original installation had "gooseneck" exhausts for each degasifier. The goosenecks directed the hydrogen sulfide laden air toward ground level, which resulted in corroding surrounding metal components. The configuration was changed to a discharge stack design, coupling the exhaust from both vessels together and venting at a higher elevation. The corrosion problem have been alleviated, and there has not been any odor control issues with the water plant.

• When the plant was being designed and constructed, the Ground Water Rule (GWR) provisions were just being implemented. The plant did not have four-log disinfection treatment and utilized groundwater source microbial monitoring to meet the GWR. Several improvements were made to achieve four-log disinfection, which included replacing a portion of pipe where free chlorination occurs with a larger diameter pipe for longer contact time and the addition of equipment (pH, temperature, free chlorine) for compliance monitoring. With the Broward County Department of Health/FDEP approval of the four-log virus treatment, the plant does not have to conduct groundwater source microbial monitoring to meet the GWR.

• With the LS plant and without four-log virus treatment, the plant was able to utilize the naturally occurring ammonia to provide chloramine disinfection residual prior to the membrane plant being commissioned. Once the membrane plant was commissioned, the naturally occurring ammonia was removed/oxidized during the treatment process. Since CSID decided to stay with chloramine for residual disinfection, an external ammonia source was needed. A liquid ammonium sulfate system was added to provide ammonia to form chloramines.

Four-log Treatment Monitoring Equipment: Chlorine & Ammonia Analyzers

• More on-line monitoring equipment (chlorine, ammonia, and fluoride analyzers) were added to provide trimming of chemicals as well as automate monitoring, alarms and shutdowns.

Clean-In-Place (CIP) Systems

The membrane elements are cleaned as needed with a CIP system generally consisting of a tank, cleaning pump, flow meter, and cartridge filter vessel. While the system started with a generic high caustic and low acid pH cleaning, subsequent membrane cleaning studies and autopsies have optimized the cleaning chemicals and procedures. The original CIP cleaning system utilized a constant speed cleaning pump that was used to mix chemicals as well as route cleaning solutions through the membranes and back into the cleaning tank. The constant speed pump was difficult to control via throttling valves, so a VFD was added to the cleaning pump, which vastly improved the mixing and cleaning operations.

The degasifier system did not have a dedicated CIP system installed under the original construction. A portable cleaning pump on a trailer was added to facilitate the cleaning of the two degasifiers by in house staff.

Conversion of LS Plant Operations to LPRO Plant Operations

The change from LS to LPRO required CSID operations staff to get familiar with the new membrane process and rely more on monitoring equipment. With the help of SEDA, the WTP operators toured other local membrane facilities to get acquainted with the new technology. Additionally, operations staff attended SEDA's Membrane Operator Certification (MOC) school, and all have been MOC certified.

Member Spotlight

Sean Meehan
Plant Operator, City of Port St. Lucie

1. **How did your career in the Water or Wastewater Industry get started?**
My father has been in the industry since I was a child. I remember going on plant tours and being amazed by the whole process. After school, I would help my dad study for his licenses, and I knew that it was what I wanted to do when I grew up. After graduating high school, I completed both of my water treatment course books before I managed to get a trainee job with the City of Port St. Lucie. I am now a B licensed water plant operator with three and half years of experience.

2. **How long have you been a member of SEDA?**
I have been a member of SEDA for about 2 years.

3. **What/who prompted you to join SEDA? How did you get involved in SEDA on a deeper level? Explain your history with SEDA.**
I was first introduced to SEDA during my membrane specialist training course. Being at a reverse osmosis plant, my lead and chief operators make it a priority to have all of our operators certified. It was only recently that I started getting involved in SEDA on a deeper level. I am still relatively new to SEDA, but I look forward to any future opportunities it holds.

4. **How does being a member of SEDA benefit you? What do you enjoy the most about SEDA?**
I really enjoy SEDA as it provides operators with a place to meet people in the same field of work. It has helped me make a lot of networking connections with other operators/vendors that I would otherwise not have met. SEDA provides great learning experiences to both old and new operators. I look forward to seeing how SEDA records all the advancements in water/wastewater treatment through the coming years.

5. **What do you enjoy doing in your free time?**
I love trying new things. My hobbies change a lot, but at the moment I really enjoy roller skating.

6. **What is the most recent book you have read or concert you have been to?**
I just finished reading Shadow and Bone. I have always been a fan of YA fantasy novels.

7. **What advice do you have for the younger generation in the beginning years of their careers in Water/Wastewater and SEDA?**
My advice to people around my age would be to stick with the career. Knock the tests out as soon as you can because the experience you get from having these licenses is worth the hours of studying. Being a water treatment plant operator has greatly improved me as a person, and it would benefit a lot of people around my age to join this career path. Before I was in water treatment, I was very timid and would do anything to avoid a problem, but now I am capable of handling any problem that comes my way. I now view every problem in this line of work as a chance to learn something new about the process that I might have otherwise overlooked. I am still relatively new to the field, but I can tell you from firsthand experience that it is an ever-changing field. You need to have a flexible mindset.

Understanding FRP for Long Vessel Life

Author: Taryn Doyle, Protec-Arisawa

Fiberglass reinforced polymer (FRP) membrane housings are manufactured using the filament winding method under ASME code, Section X. Fiberglass fibers are wound on a mandrill according to a winding pattern, covering them with continuous fiberglass and resin. The housing on the mandrill is then heat cured, extracted, sanded, milled, hydrotested, and painted to be ready for use. There are many different ways these crucial manufacturing steps can be carried out and different materials that can be used to add to the strength and longevity of the housing. Each manufacturer differs in many of these steps, but there are key properties and maintenance requirements that are common to all FRP membrane vessels that operators and system designers should know.

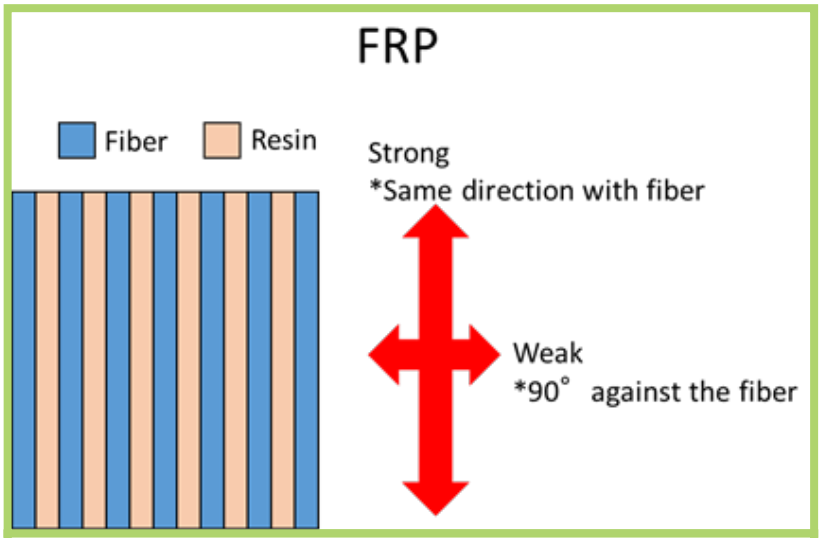

Figure 1. FRP Anisotropic Graphic

It is important to know that FRP is an anisotropic material, which means its strength changes depending on the loading direction. (Figure 1). The anisotropic characteristic generates constant internal strain even while the vessel is not operated. Once FRP gets a crack or water intrusion occurs, that part of the housing will be a weak point, and the crack will continue to increase in size. The damaged part will be more severe even if it is operated at low pressures.

Figure 2. Vessel Crack Lighted

Leaking allows an excessive buildup of salt and other residue and results in the corrosion of components on the vessel heads. This build up further allows more water to accumulate around the seals, causing more extensive corrosion and possible damage to the FRP itself. The FRP can become delaminated from water intrusion. When shining a bright LED light from the outside of the vessel in, dark coloring of the vessel shell is seen when there is water intrusion and erosion. (Figure 2) It may be an area of a crack or not. Vessels with excessive build up and rusted parts should be regularly inspected and opened, preferably by a professional, to inspect for water intrusion damage.

The most common areas of leaking on the membrane housings are at the head and the side ports. All leaks should immediately be investigated and addressed by shutting the system down and inspecting the area. Causes of leaking can be seals not seated properly, torn or damaged seals, cracks in sealing plates or permeate ports. Excessive buildup of corrosion and salt can push seals out of place and allow for the head to not seat properly and water to get around it. All leaks should be immediately addressed and fixed.

Continued leakage of the head can cause extreme damage to the housing, getting more severe over time. The most common on salt water systems is for the head or retaining rings to be stuck on the vessel. Salt and debris can seal up the vessel head, making it impossible to remove without damaging the vessel. If this happens, the vessel may warrant full replacement or at least a new complete end cap.

Long term leaks can also corrode and wear away the bearing plate of the vessel head. Typically, there are small amounts of corrosion seen on the front of vessel bearing plates, but when removing the head, it is seen that the corrosion is even worse on the back and sides. Evidence of extensive corrosion can be found with swelling of material producing an abnormal shape causing the head assembly to be difficult or impossible to remove. Pitting corrosion along the outer edge of the bearing plate, reduces the bearing plates uniform load capacity on the retaining ring and allows it to distort and cause uneven stress on the vessel groove, bell area and head assembly.

Figure 3. Corrosion of Bearing Plate onto Shell

Another vulnerable area of the vessel that should be regularly inspected and can be irreversibly impacted by continued head leaks, is the insert ring of the vessel. (Figure 3) This metal or plastic ring in the vessel head is wound into the vessel shell, and it helps give structure and strength to the end of the vessel holding the head in place. If water is allowed to leak around the vessel head, it can damage this insert ring area and cause water to intrude through the resin and into the fiberglass, damaging the fibers. The groove area of the vessel should be inspected on any vessel that has been experiencing head leaks. This area also can have exposed fibers, allowing for possible water intrusion.

Changing and checking seals and preventing any water from depositing continuously on the FRP housing is the best maintenance practice a plant can do to keep their vessels in good order. Refer to your vessel manufacturer drawing for the parts on your end cap and seals for your side ports. Instructions on changing parts are found in the operator's manual from the vessel manufacturer. Proper and knowledgeable inspection should be done by someone specialized in FRP to look for leaks or fiber damage if there has been a long-term leak or other damage to a housing. For more information on Protec -Arisawa field services and training please call Taryn Doyle at 813-909-3880.

Water Plant Operational Challenges - Key factors to keep in mind before and during construction.

Author: Karla Berroteran, Village of Wellington

While undergoing construction in a water treatment plant, there are numerous factors that management, operators, and maintenance personnel need to monitor to guarantee safe and reliable service to its customers. The Village of Wellington has been undergoing numerous renewal and replacement projects during the last few years, and we got a fair share of excitement as well.

The major renewal and replacement project for the WTP is currently under construction and is planned for completion by 2021. We are in the process of retrofitting all trains, replacing membranes from low-pressure RO to Nano Filtration membranes; the new recovery rate was increased to 85% from 75%; this will help maximize our ground water supply. After this project is complete, the Village of Wellington will no longer use RO membranes. A new control room and laboratory will also be constructed, and complete reprogramming of the Village's SCADA system will be included as part of the project. This will improve the overall water treatment process. The plant is looking into transitioning to a full Nano membrane filtration facility within the next 10 years.

Here in the Village of Wellington, we concentrated our efforts to make sure that we had a backup plan for a backup plant, and that we could stand resilient under all possible scenarios.

While each project is unique, water plant projects experience many common issues. Below is an overview of some key aspects that may affect the outcome of the construction work and plant operations:

2019-2021 Water Plant Ongoing Renewal and Replacement Project

- The most important factor before you even start construction is to involve plant personnel in the design and project execution. Operators and maintenance personnel will provide key points on how to overcome or prevent emergencies and have valuable insight on how to optimize operations as we deal with equipment and process control every day. Keep in mind that sometimes a design on paper does not translate well to reality on everyday operations.

- Finances are the most sensitive topic. The main thing is never select a construction company based on cost. As the old saying states, "you get what you pay for." Do your homework, check references, and then check again. Detailed drawings and specifications generated for bidding provide a high degree of confidence in finalizing cost estimates.

- Drawings and specifications are the foundation documents for construction work. Low-quality documents can create confusion, disputes, and the selection of wrong products, materials, or equipment, and eventually affect project quality. Make sure that your record drawings and standard operation procedures are available and up to date before you start construction.

- Permitting delays – Permits are key elements of water infrastructure projects. Depending upon the project scope, various types of permits may be required. Permits can sometimes be challenging, but timely submissions can greatly reduce worries and project delays. Make sure you keep your local health department and regulatory agencies in the loop. Keep all documents well organized and up to standards.

- Construction sequence difficulties – Sequence of construction is typically conceptualized and visualized during the design phase. Keep in mind that modifications will be required during the actual construction phase. The main goal here is maintaining existing systems running smoothly and in compliance. This becomes a tricky task while continuing with construction work.

- Coordination and communication issues – Make sure to keep plant personnel informed so they can prepare for plant shutdowns I/O emergency repairs. The construction process is intense and involves a lot of coordination and communication between the contractor, sub-contractor, client, engineer, surveyors, regulators, and other members involved with the project. However, lack of communication, miscommunication, ignorance, assumptions and other actions can create conflicts, disagreements, and an unpleasant atmosphere. To meet project needs and keep everyone on the same page at every stage, effective communication and coordination is a must.

- Make an inventory of all plant equipment and assets before you start construction. Be ready. Make sure to have a spare for every important piece of equipment in your plant. You never know when something will break.

- Have plenty of chemicals onsite and have spare parts for each different component on your membrane plant so you can repair or replace them without having to wait for a delivery, as we know some of these parts can take weeks or months before they arrive.

- If needed, set up temporary facilities so the work can continue safely during construction. For our project, we set up a temporary laboratory to ensure operations were not affected while the main lab and pump room were demolished.

- Recordkeeping is crucial during plant construction. Set up a system to keep track of specific manufacturers' requirements for guaranty purposes, especially if you are changing membrane recovery or retro feeding in an existing plant. Follow manufacturers' instructions for required monitoring and testing information. Create a system where you can track membrane operation, normalization data, and troubleshooting and engineering designs drawings. Make sure that everyone in your team understands the new membranes specifications and know the new system limitations.

- Get in touch with your chemical providers to optimize dosing for your new system if needed.

- Make sure you perform membrane autopsies on the old elements, micron filters; try using different vendors. You will learn a lot from this data to improve your overall maintenance of the new system.

- During the start-up, special attention is needed toward system automation, instrumentation, and control aspects. Hassle-free transition can be a satisfying experience as the project nears completion.

- Finally, yet importantly, your raw water quality data must be up to date so you can make decisions on the go. Select well, your water supply consultants; they will be your best friend in case of raw water quality issues.

Overall, the satisfactory completion of the project is a team effort of water plant personnel, contractors and, engineers.

This project has been extremely challenging to operations; however, we continue to produce high quality drinking water that meets all regulated standards and to provide excellent service to our customers without interruptions. As we approach the last phase of this project, we can look back and appreciate our hard work. It has been a great learning experience, which made our team strong and resilient. We look forward to sharing a final update once the project is complete.

A Tribute in Memory of Byron Weightman by a Good Friend

On March 9, 2021, Byron Weightman, a very dedicated, long-time member and past SEDA president lost his extended battle with cancer. His family, I, and many friends are missing Byron but are comforted by the fact that he is now in a better place where he is cancer free and must no longer endure the rigors of chemotherapy.

Byron and I were close friends and most likely a few of those reading this also consider Byron a friend. Byron offered everyone friendship; he was that kind of person.

Byron was courageous and so determined to win in his battle with cancer. Warriors do not easily accept losing a battle.

He was dedicated and just as courageous in his SEDA role. Byron served as SEDA president in 2000 & 2001 after joining SEDA in 1994. Byron led SEDA through a period of tough internal debate on the organization's identity as it moved forward. Not only was Byron an active SEDA member, but he also struggled with City Hall, and won, every budget year to have adequate funds for the Ft. Myers staff to also be active SEDA members. In 2010 Byron was awarded SEDA lifetime membership in recognition of his contributions to the organization. Byron received the prestigious Robert O. Vernon award from AMTA, which recognizes the best operated membrane plant in the country.

I first met Byron about 30 years ago when my firm was engaged as a consultant to work with the Ft. Myers water plant. This relationship continued for about 20 years, and during that period, Byron and I spent way too many all-nighters converting his plant from nanofiltration to brackish RO-on the fly. There were no neighbors able to back up the water plant.

We remained good friends and associates in the water industry, and that friendship grew much stronger in 2014 when Byron was diagnosed with lymphoma. I am a lymphoma survivor, and our bond grew incredibly strong, a bond that only fellow cancer survivors understand. Ironically it was leukemia that took Byron.

Byron was a water professional to the very core. It is about the only job Byron had after entering the work force in Florida following his move from Pennsylvania. He even took his brother Bob into the water industry. Few know that Byron received the top score on the State A Level exam in 1983. Byron knew the water treatment business, he loved the water treatment business, and he contributed greatly to the water treatment business.

Farewell Byron, and may you have favorable winds and following seas as you sail through your life in a new place. All are welcome to send respects to Byron's wife Sandi at Sandraw8man@gmail.com.

I miss your friendship.

John Potts

Membrane Operators Certification (MOC) Update

Author: Jason Bailey, Avista Technologies

The SEDA Membrane Operator Certification (MOC) school Module I, Introduction to Membrane Systems, was held on April 20th-22nd, 2021, at the Port St. Lucie Community Center. Moderators and Speakers included Jason Bailey and Ricardo Avena from Avista Technologies, Nick Black and John Potts from Kimley-Horn, Dave MacNevin from CDM Smith, Mo Malki from American Water Chemicals, Pierre Vignier and Alane Sisilli from the City of Port St. Lucie. Sponsors of the course were Kimley-Horn & Associates, American Water Chemicals, and Avista Technologies. The 2 ½ day course covers 10 Chapters, including topics such as Introduction to Membrane Processes, Membrane Math, Water Supply, Equipment Used in Membrane Processes, and more. City of Port St. Lucie was the gracious host of the RO Plant Tour. The tour of their water treatment plant allowed for the class of seventeen students to ask additional questions to supplement the classroom instruction.

Please contact SEDA's administrator at admin@southeastdesalting.com if you are interested in hosting or have recommendations for future MOC School locations. A minimum of 12 attendees must be registered to hold a class, so reach out to other facilities in your area to see if they are also interested.

Keep an eye on the SEDA Events Calendar for more MOC Schools.

SAVE THE DATE

SEDA 2022 Spring Symposium
Hutchinson Island, FL Marriott
June 5th - 8th, 2022

Legislative Update

Author: Pierre Vignier and Dr. David MacNevin, PhD

Showing up on the Florida Governor's desk was Senate Bill (SB) 64, where the State designates reclaimed water eligible for funding as an alternative drinking water supply and curbs the non-beneficial discharge of reclaimed water and wastewater effluent to surface waters. (https://www.flsenate.gov/Session/Bill/2021/64) The bill passed by both FL House and Senate is another milestone for Florida to embrace Direct Potable Reuse (DPR) as a helpful tool for conserving groundwater resources. Florida Governor Ron DeSantis signed the bill in June, 2021.

As required by Florida's 2020, SB 712 the Florida Department of Environmental Protection is developing new regulations allowing for direct potable reuse. A second draft of the regulations was released in May 2021.

Key changes affecting membranes include a provision allowing utilities to get additional pathogen log removal credits for membranes, by proposing new direct integrity tests, and new permeate quality (TOC and TDS) requirements for RO membranes in potable reuse projects. The current round of regulations are shaped by recommendations from the Florida Potable Reuse Commission's (PRC) 2020 Report on Advancing Potable Reuse in Florida, http://prc.watereuseflorida.com/ and additional comments provided by stakeholders after the first draft of regulations was issued earlier this year. For additional information regarding the latest draft FDEP regulations visit (https://floridadep.gov/water/domestic-wastewater/content/water-reuse-news-rulemaking-information)

SEDA QUIZ

By: Fred Greiner, City of Palm Coast,
Coast Utility Chief Operator

1. Where is the lumen of a hollow fine fiber located?
   A. Top of the fiber
   B. Exterior of the fiber
   C. Center of the fiber
   D. Bottom of the fiber

2. What is defined as the hydraulic driving pressure moving water through the membrane measuring the difference in pressure between 2-sides of the membrane called?
   A. Transmembrane pressure
   B. Recovery rate
   C. Rejection rate
   D. Concentration factor

3. In a properly functioning ultra-filtration system which parameter would you expect to pass through the membrane?
   A. Suspended solids
   B. Calcium hardness
   C. Viruses
   D. Bacteria

4. Which of these are not a common fouling problem of an Ultrafiltration membrane?
   A. Particulate
   B. Biological
   C. Organic
   D. Mg

5. If sulfide is not removed from water, how much chlorine will be required to oxidize 1ppm of sulfide?
   A. 4.0 mg/l
   B. 4.5 mg/l
   C. 2.0 mg/l
   D. 8.33 mg/l

6. What is the concentration factor of Nano-filtration system with a recovery rate of 82%? Formula = 1/ (1- recovery rate)
   A. 5.5
   B. .012
   C. 81
   D. 4.7

7. What is a condition in a UF membrane element in which there is no compromising of feed water into the filtrate due to broken fibers called?
   A. Membrane performance
   B. Membrane integrity
   C. Surface filtration
   D. Luminosity

8. Which of these is not considered membrane integrity testing of an ultrafiltration system?
   A. Bubble point test
   B. Diffusion
   C. Pressure hold
   D. Pressure surge test

9. What is called the number of hollow fiber membranes or the total usable membrane area per unit volume of a module?
   A. Membrane autopsy
   B. Membrane mesh size
   C. Membrane packing density
   D. Membrane coefficient.

10. What is called a grouping of hollow fine fibers or hollow fine membranes placed inside a pressure vessel called?
    A. Membrane element
    B. Membrane mode
    C. Membrane bundle
    D. Membrane coefficient

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

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