RECOVERY ZONE

APRIL 2021

Potable Reuse Implementation in Northeast Florida

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Summary

JEA has embarked on a phased project investigating potable reuse as an option to meet future water demands by purifying reclaimed water as an alternative water supply. The initial phase consisted of pilot testing O3/BAF/AOP vs. UF/RO/AOP at two different water reclamation facilities with significantly different source water quality: one with a predominantly domestic/commercial customer base, and the other, which has a significant industrial component. Due to the characteristics of the waters tested, the UF/RO/AOP system produced higher quality water compared to O3/BAF/AOP, exhibited more reliable operation and was less subject to variations in source water quality. Based upon the water quality results, as well as factors including operational flexibility and lifecycle cost estimates, UF/RO/AOP was selected for future phases of the program, which include demonstration-scale testing followed by full-scale implementation. By direct comparison piloting of industry leading purification systems and demonstrating the safe and reliable application of purification technology, JEA is paving the way for the implementation of potable reuse in Florida and beyond.

Introduction & Background

JEA is the eighth largest community-owned utility in the United States and Florida's largest community-owned utility that provides water, sewer, and power services to more than 400,000 customers throughout the Jacksonville area. JEA's traditional water supplies are met through groundwater withdrawals from the Floridan aquifer and the current water use permit extends past the year 2030. As JEA approaches the limit of the consumptive use permit, alternative sources of water will be needed to meet future demands are being considered.

Currently, JEA owns and operates 11 water reclamation facilities (WRF) at advanced nutrient removal levels for return to the St. Johns River, and has built one of the largest interconnected reclaimed water systems in the state serving conventional reclaimed irrigation water in areas of new growth. The remaining uncommitted reclaimed water in built-out areas of the city has little conventional reclaimed demand. In order to expand utilization of the available reclaimed water resource, potable reuse is one option to expand the future water supply portfolio.

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Figure 1. As JEA continues to evaluate alternative water supplies for meeting long-range planning demands, a variety of options are being considered.

Message From Our New President

Greetings to everyone! As we move forward into the second quarter of 2021, I hope you all are doing well. Last year was a very challenging year… to say the least, with many obstacles to overcome and lessons to learn in both our professional work and personal lives. As an essential industry, I would say we have shown once more how resilient and adaptable we are. So to all the water and wastewater professionals, congratulations on a job well done! We are not out of the woods yet, but we have implemented changes in our routines and processes to deal with the COVID-19 pandemic and we will continue to overcome the challenges presented to us as we serve our customers and clients with excellence, providing necessary services of high quality standard, while protecting the safety of our employees and the public. I am proud to work with you!

As a professional organization, SEDA worked hard to continue to provide training to our members. We successfully transitioned to an online training platform, we held our first virtual symposium, and currently, we are offering numerous webinars.

SEDA is looking forward to hosting live events again as soon as this is possible so we can see you face to face again. We will do so following the latest CDC guidelines that may be required; it is our goal to resume live Technology Transfer sessions and MOC classes around the second quarter of the year. If you are interested in hosting an event or teaching a specific topic, please let us know.

Our 2021 SEDA Spring Symposium in Cape Coral, FL is scheduled for June 6 - 9, 2021. Watch for eblasts and the SEDA events calendar at www.southeastdesalting.com. Registration is now open. We are excited to see everyone!

As a reminder, the new renewal cycle for our membership started in January 2021. Memberships for 2020 have expired as of February 28, 2021, so please renew your membership to continue to enjoy all the benefits that SEDA has to offer. Operators, the license renewal cycle ends on April 30, 2021; if you still need your CEUs, you can register to any of the online webinars. For more information regarding training events, please visit our website www.southeastdesalting.com.

Please continue to provide your comments and suggestions so we can improve our services 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.

Stay safe and keep up the good work!

Sincerely,

Karla V. Berroteran Castellon
Village of Wellington
Water Treatment Facility Superintendent

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Conservation and conventional reclaimed water are part of JEA's integrated water resource portfolio, but those steps alone are not sufficient to meet long-range projected demands. As JEA continues to protect the water resources of the region and equalize demand across wet and dry seasons, alternative water is needed to meet long range planning demands. Potable reuse is an option that provides technical and cost competitive advantages over other options such as surface water or desalination to meet future water demands (**Figure 1**). Potable reuse also has a multitude of other benefits including aquifer sustainability, increased resiliency, and water surety for future growth.

Methodology

In 2017, JEA embarked on a phased Water Purification Technology (WPT) Program evaluating potable reuse as a means of diversifying the future water supply portfolio. The program includes a Research & Development (R&D) pilot-scale evaluation of two industry leading purification systems as well as development of a communications plan. The primary objective of the R&D phase was to collect a robust technical data set through rigorous pilot testing to observe and compare performance and purified water quality of the two different purification systems. The R&D phase demonstrates the technical and financial feasibility of potable reuse in Florida while providing a roadmap for future phases of the program.

The next step in the WPT program will utilize the purification system selected from the results of the R&D testing and implement this approach for a demonstration facility. The purpose of the demonstration facility is to showcase the advanced water purification technology while amassing a considerable foundation of trusted technical data. Water quality data is essential for further demonstrating the safety of purified water to the public and regulators. Operational data from the demonstration facility will also inform a more efficient design for the planned final phase of the WPT program, which considers full-scale implementation at one or more water reclamation facilities.

In the R&D phase, two industry leading purification systems were pilot tested side-by-side and compared based on performance, cost and reliability. The purification systems were: coagulation, flocculation, sedimentation, ozone, biological active filtration (BAF) and advanced oxidation, (referred to as O3/BAF/AOP) vs. ultrafiltration (UF), reverse osmosis (RO) and advanced oxidation (referred to as UF/RO/AOP). These purification systems are presented in **Figure 2**.

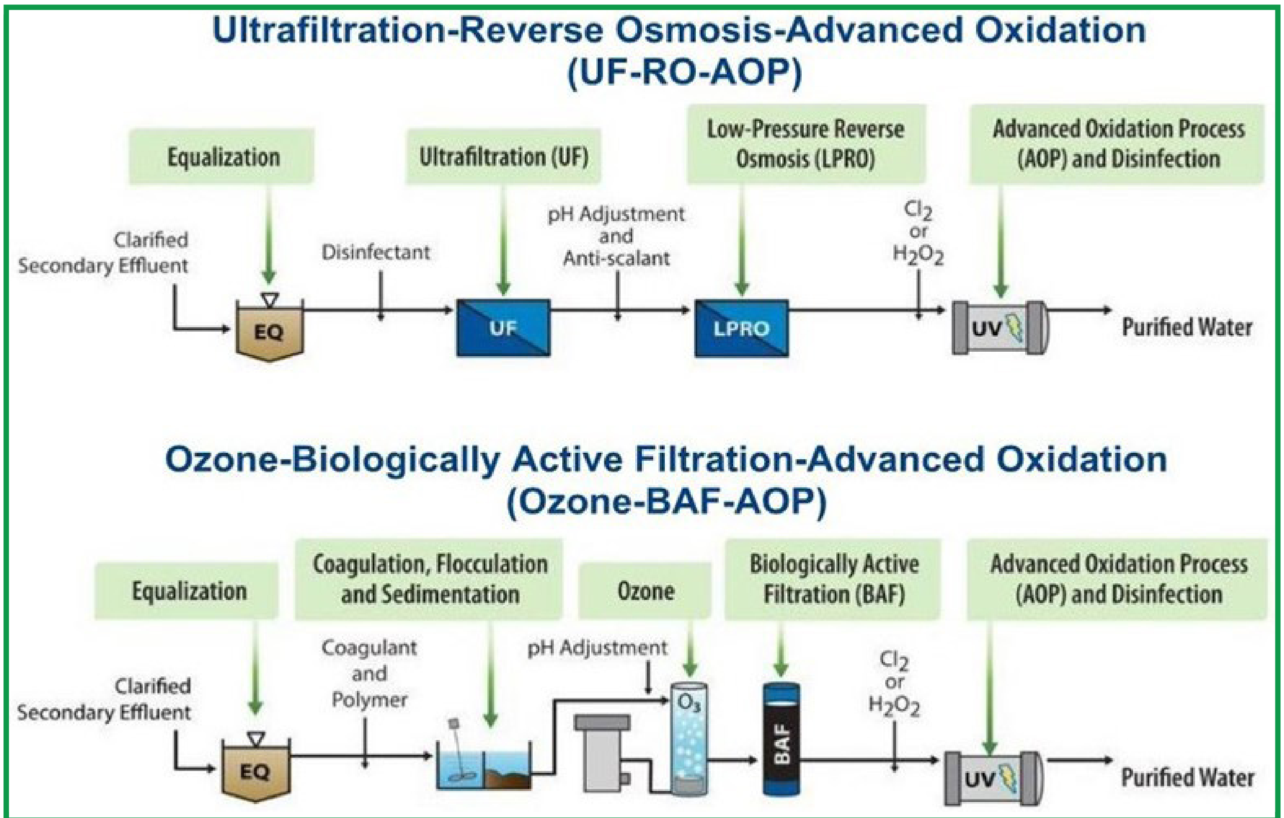

Figure 2. R&D testing was conducted on two different water purification process systems, UF/RO/AOP and Ozone/BAF/AOP.

The reason for comparing the two purification systems is that the UF/RO based system has become the preferred potable reuse application in the western United States, while the O3/BAF system has been successfully employed in areas including Georgia and Virginia. JEA wanted to compare both systems side-by-side to fully evaluate treatment capabilities, operations and economics. The primary drawbacks of the RO-based system are managing the concentrate and relatively high operating costs associated with RO energy requirements. **Table 1** summarizes anticipated advantages and disadvantages of an O3/BAF system compared with UF/RO.

Table 1. Anticipated Advantages and Disadvantages of O3/BAF Compared with UF/RO

Advantages of O3/BAF	Disadvantages of O3/BAF
Potential for lower capital cost	Does not reduce total dissolved solids (TDS) or chlorides
Effective at removing trace organic compounds (TrOC)	Limited removal of nitrogen compounds
Elimination of concentrated brine waste	Will not reduce total organic carbon (TOC) as low as RO and may require TOC polishing
Potential for reduced energy requirements and lower overall O&M cost	Currently no record of operation in direct potable reuse (DPR) applications

Both purification systems were tested side-by-side at two different WRFs with significantly different water quality: Southwest WRF with a predominantly domestic/commercial customer base, and Buckman WRF, which has a significant industrial component. These WRFs were selected for the R&D phase evaluation because they encompass the broad range of water qualities from each of JEA's 11 WRFs and bracket the basis of implementation if future facilities were to be located at different WRFs. The R&D source water tested from both WRFs was highly treated clarified secondary effluent prior to disinfection.

Primary Goals & Objectives

The primary goal is ensuring the protection of public health. Purified water quality goals include meeting all U.S. Environmental Protection Agency primary and secondary drinking water standards, Florida Department of Environmental Protection water quality standards for indirect potable reuse (TOC < 3.0 mg/L, TOX < 0.2 mg/L), as well as monitoring for more than 250 unregulated compounds. Currently in Florida, there are no regulatory requirements for potable reuse. The water quality goals for R&D testing were based on current potable reuse goals in California, which was the first state to develop and adopt these additional standards. These standards have served as a basis for other states and will be re-evaluated as FDEP develops a regulatory framework for potable reuse in Florida. The Florida Potable Reuse Commission (PRC) has drafted a regulatory framework for implementation of potable reuse in Florida. As such, the addition of potential new treatment goals will be evaluated on an ongoing basis to ensure that new and potential regulations can be safely met.

The primary objectives of the R&D phase were two-fold. First, determine which of the aforementioned purification systems is best suited for demonstration testing based on factors including treatment performance, reliability, future permitting, ease of implementation, as well as capital cost and operation and maintenance cost. Second, determine appropriate design criteria and operational parameters for future implementation of the WPT program. Developing materials for a comprehensive and cohesive public outreach campaign was also considered a primary focus of the WPT evaluation in the R&D testing phase. JEA initiated an outreach program that included tours of the facility, presentations in the community, production of an informational video that was shared by JEA on social media, and JEA earned several local media coverages on the R&D testing project.

R&D Testing Plan

The R&D technology evaluation phase included testing at Southwest WRF and Buckman WRF. Testing started at the Southwest WRF and after approximately five months of testing the entire package of pilot equipment, shown in **Figure 3**, was relocated to the Buckman WRF where testing continued for approximately five additional months. The reason for testing Southwest WRF before Buckman WRF was to start with the predominantly domestic/commercial customer base, with fewer anticipated variations in source water quality, before moving to Buckman WRF which presented greater challenges in source water quality. In addition to the differences in the upstream customer base, other factors impacting hourly, daily and monthly water quality are the travel times from each customer to the WRF, WRF treatment processes, biosolids processing, recycle streams and weather.

Figure 3. The two purification systems were tested side-by-side in this trailer set up. The O3/BAF system was tested in the blue trailer on the left and the UF/RO system was tested in the white trailer on the right.

Prior to piloting, a detailed operating test protocol was developed to outline specific set points and conditions for each week of testing. The plan was detailed but allowed for process changes based on monitoring results and changes in source water quality. Each system was optimized starting upstream and working through the purification process.

R&D testing equipment included instrumentation and controls, which allowed for remote monitoring and continuous monitoring of key parameters. The sampling plan included weekly routine monitoring of water quality in between each individual system and monthly testing of hundreds of parameters of the source water and purified water from each system.

A significant benefit to the project was that the equipment was specifically chosen to allow for flexibility. Throughout piloting, the team had the ability to test a number of different conditions, including coagulants and dosages, clarification rates, ozone to TOC ratios, BAF column media and filtration rates, filter columns in parallel or series, UF module manufacturers, UF and RO flux rates, advanced oxidation chemicals, and UV dose. With two significantly different water qualities being evaluated, flexibility in equipment operating criteria was essential.

R&D Testing Results

This section provides a comparison of the performance of each purification system. Understanding what constituents are in the source water helped compare the effectiveness of both technologies.

For the O3/BAF testing at both WRFs, jar testing established the coagulant, dosage and pH for each WRF. At Southwest WRF, the coagulant used was ferric chloride at a dose range of 60 to 80 mg/L and a target pH was 5.5. Ozone dose was adjusted from 1 to 5 mg/L. Four BAF columns were tested in parallel with different media consisting of 1) sand/anthracite,

2) sand/anthracite, 3) spent granular activated carbon, and 4) virgin granular activated carbon. The BAF columns were allowed to acclimate for 3 weeks at the beginning of the pilot testing and a 1-week acclimation period was allowed after each process change before water quality samples were considered representative of the new conditions. The flow rate through all BAF columns were the same except the duplicate sand/anthracite (column 2) was high rate. Southwest WRF O3/BAF TOC data is presented in **Figure 4**. The figure does not include results from Columns 1 and 2, which averaged only 7 to 8 percent TOC reduction from the settled water.

At Buckman WRF, the coagulant used was ferric chloride at a dose range of 200-300 mg/L and a target pH was 5.5. Ozone dose was adjusted from 11 to 16 mg/L. Four BAF columns were tested, with two in series 1) spent granular activated carbon followed by 2) virgin granular activated carbon, and two in parallel 3) spent granular activated carbon, and 4) virgin granular activated carbon. The flow rate through all BAF columns was roughly the same. Buckman WRF O3/BAF TOC data is presented in **Figure 5**. The figure does not include results from Columns 3 and 4 which did not consistently meet the TOC goal of 3.0 mg/L.

For the membrane-based system, chloramines were dosed upstream of the UF system. The UF system allowed for parallel testing of two different membrane manufacturers. The flux was increased over time to determine the optimum range for each manufacturer at each WRF. UF permeability data from both WRFs are presented in **Figures 6 and 7**.

The UF manufacturer "B" exhibited better performance at Southwest WRF than UF manufacturer "A". When the system was moved to Buckman WRF, UF manufacturer "A" was replaced with UF manufacturer "C". Similar to the results at Southwest WRF, UF manufacturer "B" exhibited better performance at Buckman WRF.

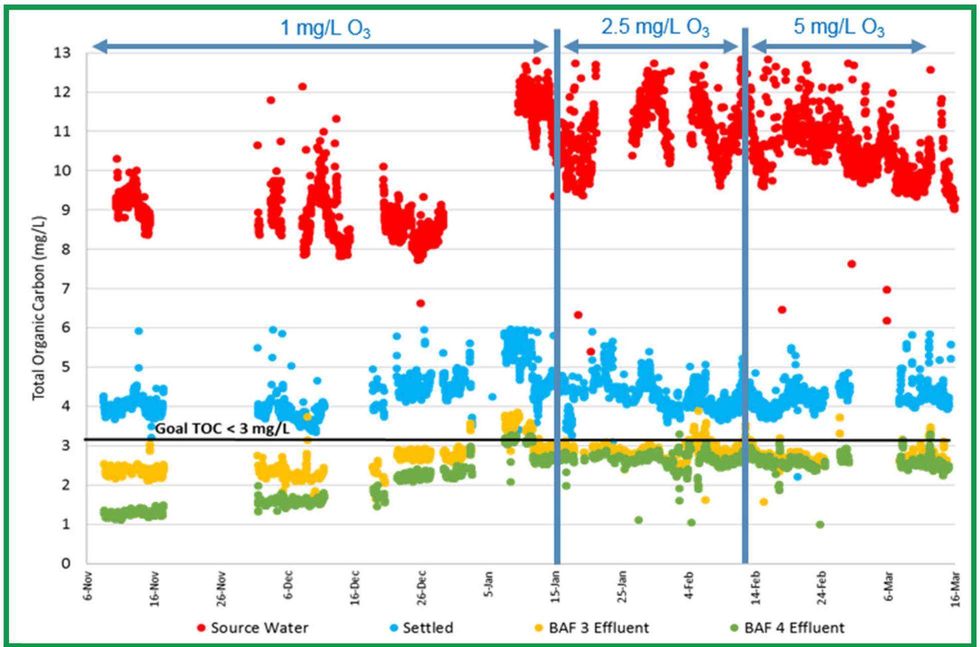

Figure 4. Southwest WRF Total Organic Carbon with O3/BAF

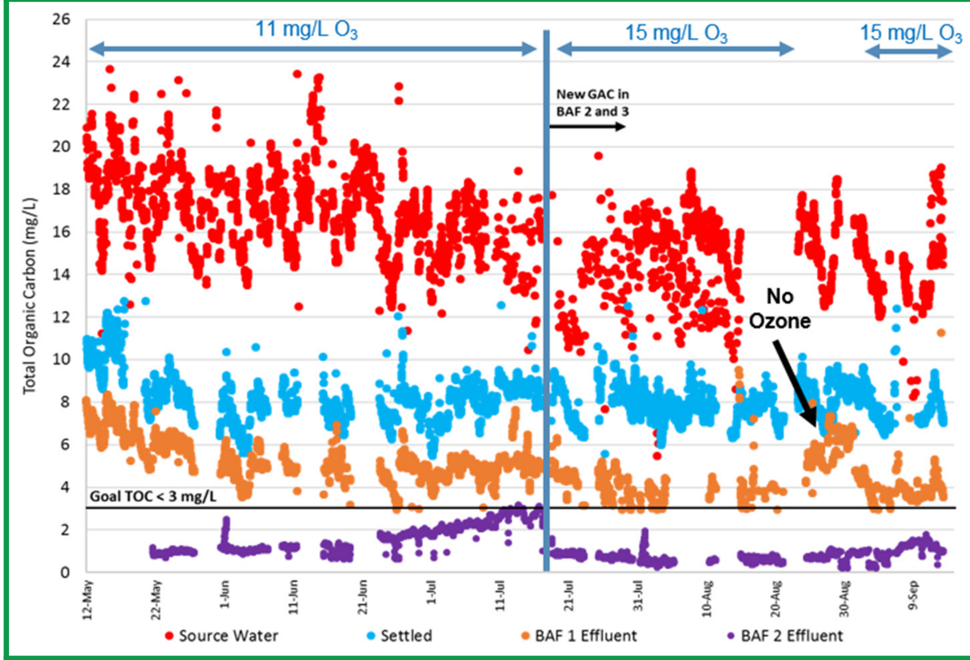

Figure 5. Buckman WRF Total Organic Carbon with O3/BAF

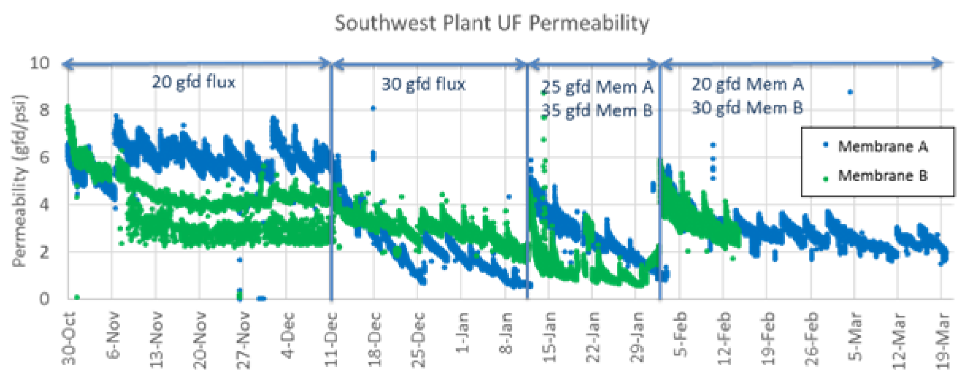

Figure 6. Southwest WRF UF Permeability

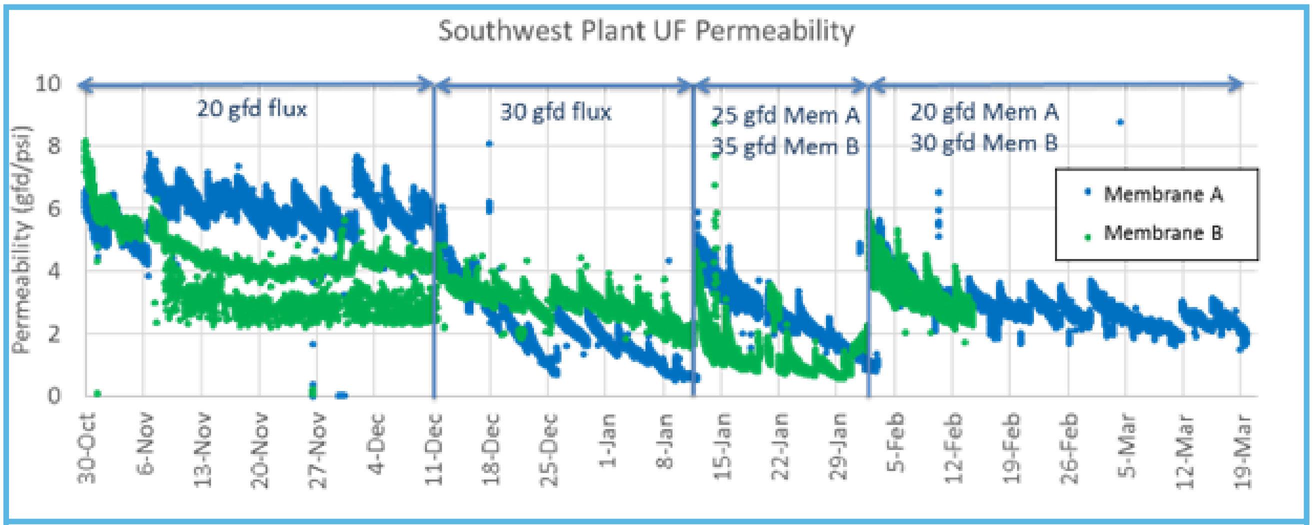

Figure 7. Buckman WRF UF Permeability

The same RO membrane manufacturer was tested at both WRFs. The system was generally operated at 85% recovery and a pH of 7. The flux was increased partway through testing from 12 to 14 gfd at each WRF. **Table 2**(on pg.8) summarizes water quality data for RO performance limiting parameters. RO permeability data from both WRFs are presented in **Figures 8 and 9**.

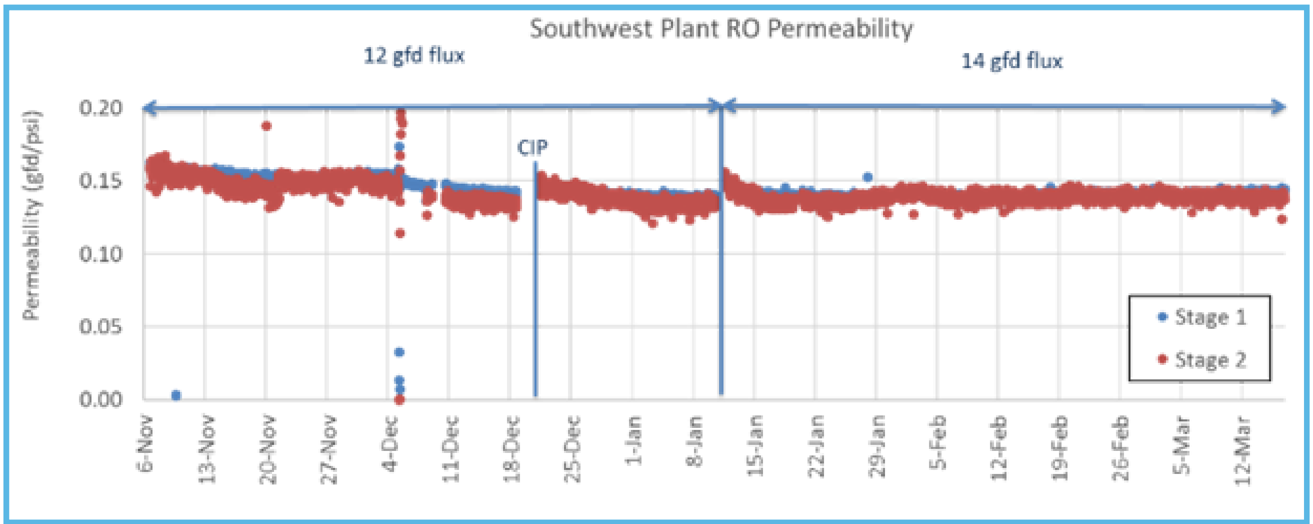

Figure 8. Southwest WRF RO Permeability

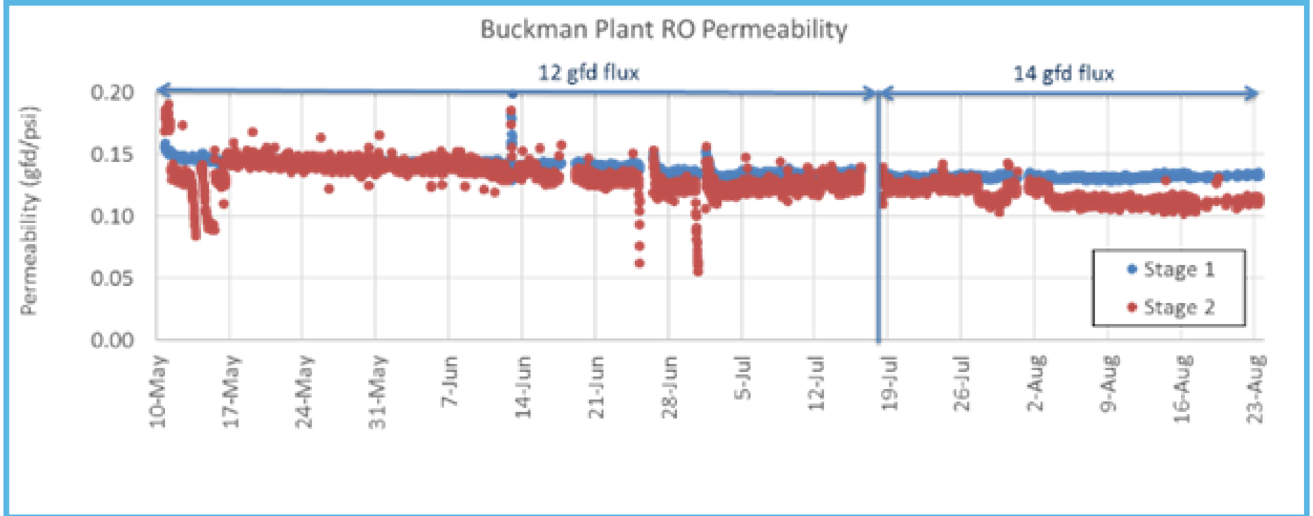

Figure 9. Buckman WRF RO Permeability

Table 2. Key Constituents That Can Limit RO Recovery

Parameter Name	Unit	Southwest WRF		Buckman WRF	
		Max	Avg	Max	Avg
Alkalinity (as CaCO3)	mg/L	120	178	240	217
Calcium	mg/L	38	37	72	70
Silica	mg/L	18	16	25	24
Strontium	mg/L	2	2	2	2
Total phosphate	mg/L	5	4	83	38
Turbidity	NTU	2	2	3	2

As a result of R&D testing, both purification systems generally met or exceeded purified water goals at both WRFs. Results from key parameters from each purification system at both WRFs are presented in **Table 3**. Note the more domestic source water from Southwest WRF contained approximately 8.6 mg/L TOC, while the more industrial source at Buckman WRF contained nearly 15 mg/L TOC. In the purified water from the O3/BAF/AOP process, the concentrations of total dissolved solids (TDS) and chloride did not consistently meet the water quality goals at Buckman WRF.

Table 3. Water Quality Results from Pilot O3/BAF and UF/RO Pilot Testing

Parameter	Limit	Feed	O3/BAF/ AOP	UF/RO/ AOP	Feed	O3/BAF/ AOP	UF/RO/ AOP
		Southwest WRF			Buckman WRF		
TOC (mg/L)	3	8.6	2.6	ND	14.8	1.6	ND
TOX (mg/L)	200	91	47	28	122	44	21
TDS (mg/L)	500	350	440	11	740	900	38
Chloride (mg/L)	250	55	110	4.1	170	355	9
NO3+NO2 (mg/L)	10	0.4	2.6	0.2	ND	1.2	0.3
T.Coliform (MPN/100 mL)	ND	>8,000	ND	ND	>8,000	9	ND

Figure 10. During startup of the RO system, new reverse osmosis elements were installed, as well as an in-line TOC analyzer. In-line TOC analyzers are not widely-used, and this innovative instrument helped operators monitor treatment performance in real time.

In addition to meeting primary and secondary drinking water standards, one of the key project treatment goals was Florida's groundwater injection requirement for TOC concentrations of less than 3 mg/L. JEA made a significant investment in laboratory analytical tests, including weekly TOC samples of the source water, purified water, and at several intermediate locations throughout the treatment trains. Along with the weekly grab samples, two in-line TOC analyzers were used to monitor the TOC concentration in the source and treated water 24 hours a day, 7 days a week. Monitoring TOC data continuously helped operators understand variations in source water quality and make adjustments to the treatment processes, as necessary.

As shown in **Table 3**, the concentration of certain parameters increased throughout the O3/BAF process. Unlike RO-based treatment, O3/BAF is not intended to address high TDS concentrations and increases TDS due to the addition of ferric chloride and required pH adjustments. The TDS concentration in the O3/BAF process predictably increased throughout the process due to these chemical additions (i.e. ferric chloride, sulfuric acid, and sodium hydroxide). It was understood prior to testing that the O3/BAF system would not remove these constituents, but the purpose of testing the O3/BAF system at Buckman WRF was to see how well the system performed at removing other parameters such as currently unregulated compounds. The O3/BAF results were used to determine if that system would be selected based on the water quality from any of JEA's other WRFs. The UF/RO system removed TDS and produced water that met all drinking water quality goals established for R&D testing.

Another goal of testing was to minimize disinfection and oxidation byproduct formation. Based on the results, there were no maximum contaminant levels or purified water goals exceedances from either purification system with the exception of bromate at Buckman WRF for O3/BAF/GAC/AOP. These results are presented in **Table 4**. In some cases, intermediate levels exceeded those in both the feed and the final product, as NDMA was formed by both ozone and chloramines, and was subsequently removed by downstream processes. Note that chromium 6 is not commonly considered a disinfection byproduct, but is included in this table, as both the ozone and AOP resulted in its oxidation from chromium 4.

Table 4. Disinfection and Oxidation Byproduct Pilot Testing Results

Parameter	Limit	Feed	O3/BAF/ AOP	UF/RO/ AOP	Feed	O3/BAF/ AOP	UF/RO/ AOP
		Southwest WRF			Buckman WRF		
TTHMs (µg/L)	80	ND	1.1	0.63	ND	2.7	1.4
HAA5 (µg/L)	60	ND	4.1	ND	4.7	7.9	ND
Bromate (µg/L)	10	ND	ND	ND	ND	15.6	ND
Cr-6 (µg/L)	10*	0.04	0.22	0.16	0.1	2.3	0.45
NDMA (ng/L)	10	3.3	2.5	3.2	25	ND	ND

Approximately once per month, hundreds of trace compounds were tested for in the source and purified waters from each system. Both purification systems were highly effective at removing a wide array of compounds. An example of the results of some of the trace compounds monitored during Phase I tested is presented in **Table 5**.

Table 5. Non-Regulated Trace Organic Compound Pilot Testing Results

Parameter	Feed	O3/BAF/ AOP	UF/RO/ AOP	Feed	O3/BAF/ AOP	UF/RO/ AOP
	Southwest WRF			Buckman WRF		
Total TrOC* (ng/L)	87,400	18,400	160	90,800	195	121
1,4-dioxane (ng/L)	0.8	ND	ND	3,900	ND	ND
Amoxicillin (ng/L)	2,650	ND	ND	ND	ND	ND
Diclofenac (ng/L)	860	ND	ND	94	ND	ND
Iohexol (ng/L)	10,150	ND	ND	29,000	ND	ND
Lopressor (ng/L)	835	ND	ND	690	ND	ND
Sucralose (ng/L)	54,500	16,000	ND	37,000	ND	ND
Sulfamethoxazole (ng/L)	1,115	ND	ND	650	ND	ND
TCPP (ng/L)	1,600	497	ND	1,000	ND	ND

Comparing the UF/RO and O3/BAF systems, although both were able to meet the TOC goal of 3.0 mg/L, UF/RO consistently produced water with lower TOC. A comparison of TOC results from Southwest WRF is presented in **Figure 11**. Similar results were found with removal of unregulated compounds as the UF/RO results were nearly all non-detect. Results comparing unregulated compound removals at Southwest WRF are presented in **Figure 12**.

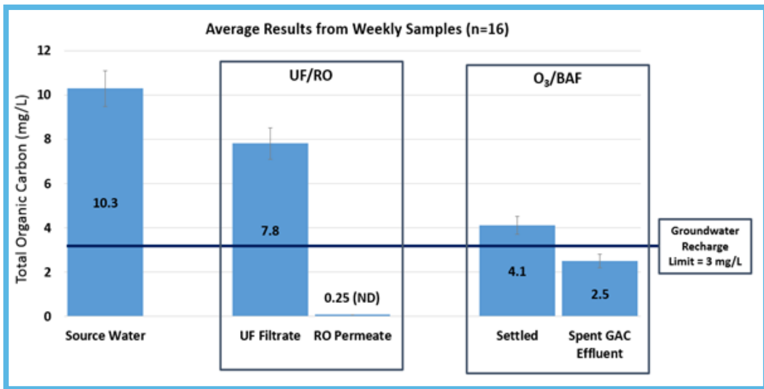

Figure 11. Southwest WRF Total Organic Carbon Results UF/RO vs. O3/BAF

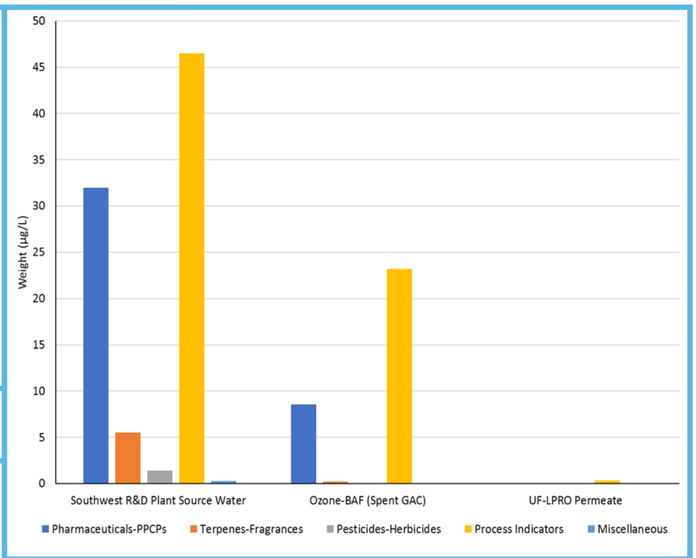

Figure 12. Southwest WRF Unregulated Compound Removal Results O3/BAF vs. UF/RO

Using the results from the R&D testing, capital and O&M costs were developed for a full-scale 10-million gallon per day (mgd) facility. The costs were escalated to 2026 which is potentially when a full-scale facility could be implemented. The estimated capital and O&M costs for a 10-mgd facility for UF/RO/AOP vs. O3/BAF/AOP are presented in **Figures 13 and 14**, respectively. AOP costs were significantly more expensive for the O3/BAF system due to lower UV transmittance and higher hydroxyl radical scavenging demand in the O3/BAF treated water. The O3/BAF O&M costs were higher than UF/RO primarily due to the large dose of coagulant needed to meet the purified water TOC goals.

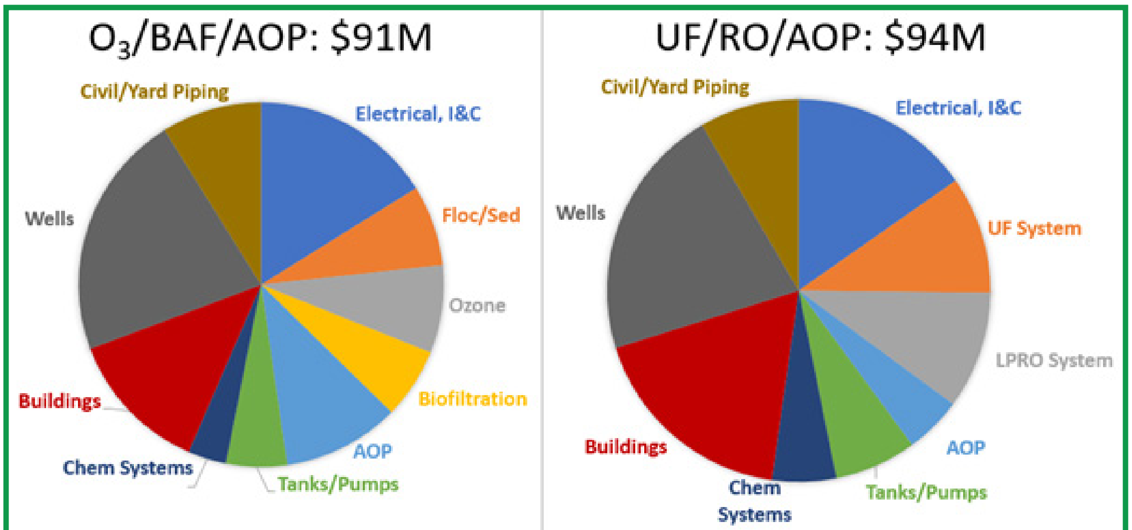

Figure 13. Capital Cost Estimate Comparison of O3/BAF/AOP vs. UF/RO/AOP for a 10-mgd facility escalated to 2026

Public Outreach & Acceptance

Earning and maintaining the community's trust as it relates to water supply and public health is essential for future success of the overall project. To prepare for future implementation of the Water Purification Technology program, JEA is taking a proactive approach to public outreach and communications with this project. When the R&D plant was in operation at Southwest WRF and Buckman WRF, more than 250 people toured the facilities, including JEA staff, elected officials, university students, staff from regulatory agencies, and water operators from neighboring counties. JEA staff led the tours and used exhibits to demonstrate the quality of the purified water. Local news agencies featured the WPT program several times over the course of the R&D study and visited the plant to interview operators and learn about the technologies.

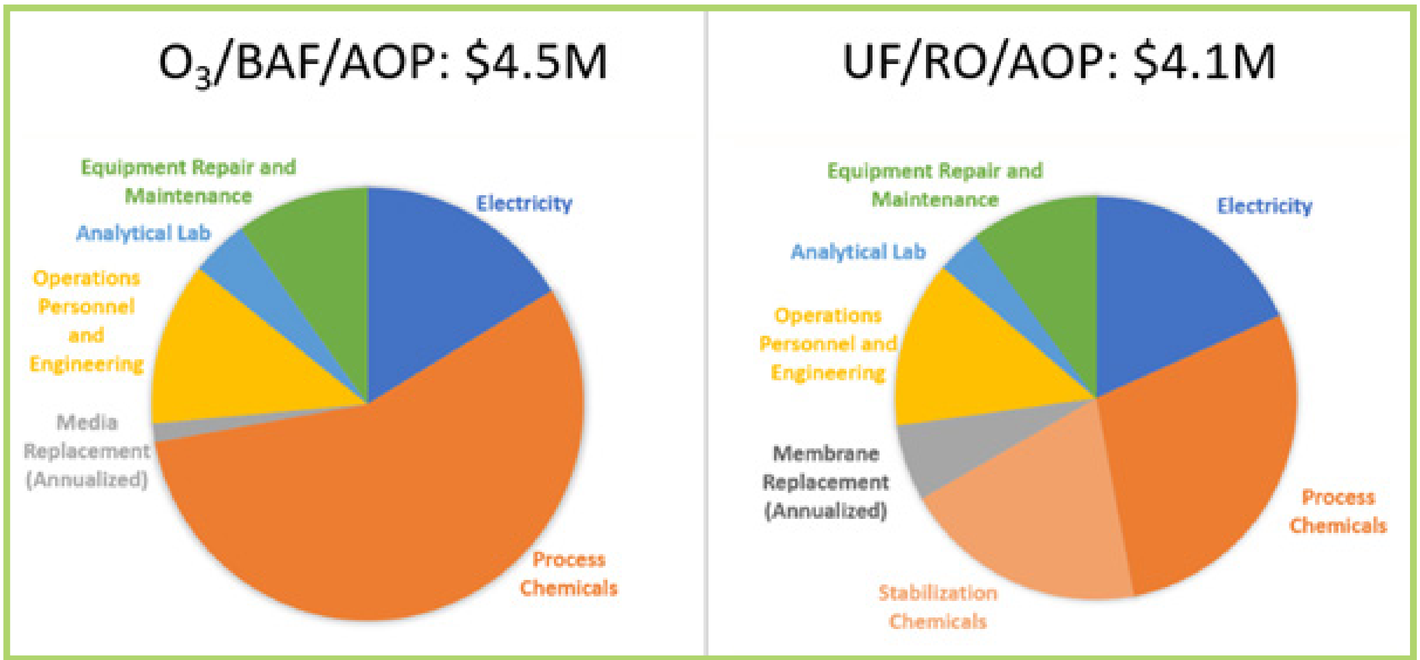

Figure 14. O&M Cost Estimate Comparison O3/BAF/AOP vs. UF/RO/AOP for a 10-mgd facility

Additional materials developed to reach JEA's target audiences as part of the outreach campaign included the following:

- Overarching Communications Plan developed
- JEA customer survey on the topic of sustainable water reuse (excerpt from Communications Plan shown in **Figure 15**)
- Infographic, fact sheet, presentation materials (example shown in **Figure 15**)
- Informational video introducing JEA's Purified Water program, posted on JEA website and shared on social media

A rigorous multi-year public outreach campaign will be further developed to clearly explain the treatment processes and safeguards for public health, and provide consistent, readily-available information to the community.

Conclusions & Next Steps

Operational data and water quality monitoring results from this study demonstrated the feasibility of industry-leading water purification technologies to produce purified water that meets drinking water quality standards and goals established for the R&D testing. For this evaluation, both treatment processes generally met the water quality goals at both WRFs. Due to the higher TDS and chlorides in the source water, the UF/RO/AOP process produced higher quality purified water compared with the O3/BAF/AOP process. The UF/RO/AOP process also exhibited more reliable operation and was less subject to variations in source water quality. Additionally, the project team felt confident that there was enough capacity in JEA reclaimed/wastewater system to address RO concentrate disposal. Based on this comparison and along with the lifecycle cost estimates provided in the other reports associated with this project, UF/RO/AOP was selected for future planned implementation in the WPT program.

The results of R&D testing will help in long-term planning of implementing UF/RO/AOP at any of JEA's 11 WRFs. R&D testing proved that various sources can be purified for potable use while continually ensuring the protection of public health. A key component to the R&D testing was the pilot test equipment selected. Since a number of different variables were tested, a clear direction with critical design and operational information was developed for demonstration testing.

In the next phase of the WPT program, a demonstration facility will allow for further testing and optimization with full size equipment. In addition to the multi-barrier purification process, the state of the art monitoring and controls program will provide additional protection of ensuring purified water meets treatment requirements. The brick and mortar facility will be designed as a showcase for public outreach with an education center and tours as the communication plan developed in the R&D phase will be implemented. The demonstration facility is under design using a design-build construction method.

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Member Spotlight

Brian Matthews

Brian retired from the city of Palm Coast on October 23rd, 2020 after more than 40 years of service. He left a talented team of hard-working and skilled utility professionals to follow in his footsteps of water utility providing essential service to residents.

Brian's story in Palm Coast began on April 25, 1979. He was employed by the construction firm that built Water Treatment Plant #1. Soon after construction of the Plant, ITT (International Telephone and Telegraph, Palm Coast's original developer, hired Brian to be a treatment plant operator at the facility he constructed. Brian holds a State of Florida Class "A" Water Operators license and is a certified Reverse Osmosis Water Treatment Specialist. He holds Certifications in Emergency Management from FEMA, is a Class "A" Underground Storage Tank Operator of Regulated Substances and a Florida Water Star Certifier. Matthews truly passed on the knowledge and devotion to the rest of the team to keep everyone moving in the right direction. His groundbreaking work has had a huge effect on the success of the city and city work groups.

Brian became a member of the Southeast Desalting Association (SEDA) in 1996 and was elected to the Board of Directors in 2000, where he chaired the Membrane Operators Certification (MOC) Committee. After 14 consecutive years of service on the SEDA Board, Brian stepped down from the Board, however, stayed active on the MOC Committee and as the SEDA Quiz Questions contributor to the SEDA Recovery Zone newsletter. Brian was instrumental in continued development, improvement, and instruction of the SEDA MOC courses and many SEDA Technical Transfer workshops. He taught "Membrane Separation Systems" and "Membrane Operators Certification" classes to approximately 1000 operators, regulators, engineers and utility managers since 1995. Brian Matthews is a SEDA Lifetime Achievement award recipient with that comes a lifetime membership to SEDA. He received the award in 2015. Brian was recognized for his outstanding ability to educate and convey complex real-world experiences for over a decade to benefit many professionals with different disciplines in the water and wastewater sector and received many awards for doing so, including the SEDA "Educator of the Decade Award" in 2016. Brian also represented SEDA on the steering committee of the Florida Water and Wastewater Agency Resource Network, better known as (FLAWARN), a mutual aid organization of Utilities helping Utilities.

The SEDA Board would like to congratulate Brian on his retirement from the City of Palm Coast after 41 years of employment and thank him for his dedicated 24 years of service to the Southeast Desalting Association, its members, and the water/wastewater membrane industry. Everyone who had the opportunity to work with and get to know Brian, whether in Palm Coast or SEDA, enjoyed working with him and considered him to be a tremendous asset to the City of Palm Coast, the Palm Coast community, the SEDA Board, and SEDA's members.

1. How did your career in the Water or Wastewater Industry get started? And how did it evolve over the years to your retirement?

My wife's family retired to Palm Coast from New Jersey in the mid 70's so we followed in 1979. My brother-in-law was a construction superintendent, building the Palm Coast Lime Softening Water Treatment Plant and he hired me as few other jobs existed. The Plant Chief Operator was able to see me work and needed to hire a trainee. With his endorsement, I was hired by the Palm Coast developer ITT Corporation in April 1979 and immediately enrolled in the water operator course at Daytona Beach Community College, then passed the State exam and at the end of my first year received my State of Florida Class "C" operator's license. I continued my education by taking all the course work available at the time, receiving my Class "A" license in 1995. I worked as a plant operator at the Lime Softening plant from April 1979 until 1989.

I was asked to pilot test a new treatment technology known as nanofiltration in the summer of 1990. The data collected would provide the required design elements for the second treatment plant needed for growth and in expectation of the new Disinfection of the DOW Filmtec Corporation. During the pilot test, I was directly involved with the design review team where I had the opportunity to meet and work with Ian Watson, another industry icon, who was consulting our design engineers. I was asked to be the onsite construction representative for the Palm Coast Utility Corporation during construction of Water Treatment Plant #2. Having the benefit of interacting with the design team and being onsite during construction provided me with a very thorough understanding of the technology and how the facility was to operate. After going online in May of 1992, I ran the plant until 1999 when the Palm Coast Utility System was sold to Florida Water Services (FWS).

The management of FWS decided that I would better serve their customers by helping to establish a technical team to assist with operations and regulatory compliance throughout their water systems in Florida. I was the water quality specialist helping the operators and management maintain compliance with the local, State and Federal regulations contained in their operating permits for systems throughout Florida from 1999 until 2003.

The now City of Palm Coast purchased the Utility System back from FWS in 2003 and hired me as their Environmental Specialist assisting the Utility management and operations teams in several different areas revolving around compliance and water quality. In 2017, I was promoted to the position of Environmental Compliance Manager assisting the Utility and other departments in the City with many different areas of compliance until my retirement in October 2020.

2. 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 working in the Palm Coast Nanofiltration Plant and had just completed the David H. Paul RO Specialist course. I wanted to increase my understanding of the technology and knew several of the members at the time. After joining in 1996 and attending a few Symposiums I knew that this was an organization that I wanted to be a part of. I had been teaching Water Treatment through the FWPCOA and enjoyed helping the operators to better understand how to operate their facilities. Stuart McClellan prompted me to run for the Board of Directors in 2000 and I was elected to serving three consecutive 2 year terms, a 2-year Director-At-Large position and then three more 2 year terms. I was the Chair for the Membrane Operators Certification (MOC) school during my time on the Board. I want to thank the expert instructors that provided the information to the students of the course and manual. I believe that many of the students, including operators, engineers and regulators found the course beneficial to their career. After 14 years I decided it was time to step down and have some new people take over the course.

3. How did being a member of SEDA benefit you? What did you enjoy the most about SEDA?

The people sharing a common interest and being so willing to share their knowledge and experiences. Many of the members in SEDA are experts in the field of water and wastewater treatment and are so willing to help. The operators really know how to make it work no matter what and are truly dedicated to providing safe drinking water to their customers. The thing I enjoyed most at SEDA was the opportunity to learn from all the members no matter their backgrounds.

4. What do you enjoy doing in your free time?

Completing projects on time and in budget, does that mean the time isn't really free? Wait, I thought I retired, lol.

5. What are you enjoying most about retirement?

Working around the house, having time to complete projects, and spending time with family.

6. What advice do you have for the younger generation in the beginning years of their careers in Water/Wastewater and SEDA?

Be a sponge, surround yourself with experienced operators and engineers and listen. The more you understand and learn the further you can go in the industry. This is an industry that will allow you to create a career and have a decent income. Remember you are providing safe drinking water to everyone in your community. How important is safe water you ask? Just watch the news when the water supply makes people sick, you become the most important person there is. I should say that I have had the great opportunity to work alongside of some very talented young professionals in my career and I know these people will be our next group of industry experts. Hopefully, the young professionals will enjoy the same benefits I did. Go out and find your Stuart or Ian and listen.

< continued from Pg.11

Figure 15. Connecting with the local community is key to maintaining the long-term success of the program. Reaching out to the community gives people the opportunity to stay informed, ask questions and learn about the benefits of the WPT program.

The demonstration facility will be fully expandable to full-scale implementation, with plans to produce 5 to 10-mgd. The actual capacity of the full-scale facility will depend on future needs for purified water and may be implemented at one or more locations. JEA also has a number of options for concentrate disposal which will depend on the capacity and location of the full-scale purified water facilities. The end use of the purified water may be direct and/or indirect potable reuse and will be determined during demonstration testing.

Adoption of potable reuse is rapidly expanding and will likely be a key source to bring on new alternative water supplies in Florida. The technology portion of implementing potable reuse is often less challenging compared to what it takes to gain regulatory approval and public support. Advancing public outreach is one of the most important parts of JEA's purified water program. JEA is willing to be an early adopter and accelerate innovation for potable reuse in Florida. With more integrated water resource planning and an informed community, Jacksonville and Northeast Florida are staying ahead of the curve on water supply sustainability.

Acknowledgements

JEA would like to acknowledge the CDM Smith team including Greg Wetterau, P.E., Dave Prah, P.E., Patrick Victor, P.E., Anna Ness, Colin Hobbs, P.E. and Jeremy O'Neal, P.E and the JEA team including Paul Steinbrecher, P.E., Ryan Popko, P.E., Todd Mackey, P.E., Tom Bartol, P.E., Hai Vu, P.E., as well as the operations staff.

2021 SEDA Symposium

Together again for Membranes

Na Cl

June 6 - 9, 2021

Westin, Cape Coral, Florida

SEDA Awards for Outstanding Operator and Outstanding Treatment Plant

Drinking Water Contest

Trivia Night with PRIZES!!!

We can’t wait to see everyone again!

Technical Transfer Updates

The Technology Transfer committee has held ten (10) webinars between June 2020 and January 2021 and has plans for at least 5 more before the CEU renewal cycle closes on April 31, 2021. The Tech Transfer webinars are summarized below and are still available on demand at www.SEDASEDASEDA.com. The Committee is hoping to resume offering live events in July 2021.

SCADA, System Security, and New Trends (0.1 CEU)

Presented by Bryan Sinkler from Trihedral Engineering/ VTSCADA

This webinar covers the various aspects of a successful security plan for a water plant SCADA system. The presenter describe various computer system architectures and layouts that minimize the possibility of an attack. The class will cover some proven technologies to mitigate potential vulnerabilities while still allowing remote users to connect from "outside the fence." Various username, password approaches and schemes are discussed; and lastly the presenter addresses recovery plans should a breach occur. There were 17 participants in the live session.

Membrane Autopsy Case Studies (0.1 CEU)

Presented by Mo Malki from American Water Chemicals

This webinar covers an overview of membrane autopsies and techniques; evaluates multiple case studies and how to interpret membrane autopsy results, questions and answers that can help participants understand and identify similar problems on their membrane plants. There were a total of 17 participants in the live session.

Well Pumps and Well Pump Maintenance (0.1 CEU)

Presented by William Beach from R.C. Beach & Assoc., Inc.

This webinar covers the basics of vertical turbine pumps, their construction and their means of operation. The presenter reviews the elements and design features of a vertical turbine pump (i.e., volute, bowls, wear ring, bearings, couplings, motor, etc.); and the critical items to consider when sizing and selecting a vertical turbine pump. Different motor enclosure classifications are discussed; proper installation techniques and pump system startup testing including vibration monitoring is covered. Typical maintenance practices and the means to accomplish maintenance are addressed. There were a total of 18 participants in the live session.

Concentrate Disposal (0.1 CEU)

Presented by Christine Owen from Hazen & Sawyer and Jarrett Kinslow from Tetra-Tech

This webinar covers the regulatory perspective on concentrate management based on Florida rules and regulations. The webinar also presents different alternatives for concentrate disposal. Presenters provide the details of how concentrate disposal considerations can impact the treatment process design and provide a comparison of inland desalination case studies, including facilities in Florida and Texas. There were a total of 17 participants in the live session.

Five Questions of Membrane Autopsy (0.1 CEU)

Presented by Raul Gonzalez from Avista Technologies

This webinar is an introduction to membrane autopsies, including when and why autopsies are needed. The presenter discusses the initial tests that are done prior to dissecting a membrane. Additional discussion is provided on the different techniques that are used to identify the nature of membrane fouling and interpretation of membrane autopsy results. There were a total of 18 participants in the live session.

Understanding Membrane Rejection (0.1 CEU)

Presented by Ken Robinson from Avista Technologies

This webinar is an introduction to membrane system rejection and its importance for membrane plant operation. The presenter discusses pitfalls causing RO membrane failures and what is happens at the plant level to create these types of environments. Early warning signs signaling potential short membrane life will be discussed. This presentation provides an overview of setting up conductivity profiling as a quick and easy way to check RO system performance; it gives insight into the next steps in making an assessment with other related topics as to how and why membranes fail. Case studies are provided where simple conductivity profile assessments have been beneficial to membrane plants. There were a total of 17 participants in the live session.

Chemical Feed Pumps (0.1 CEU)

Presented by Dowell Sparks from Lutz-JESCO America Inc.

This webinar covers the basics of chemical feed pumps, design, selection, troubleshooting, and pump maintenance. There were a total of 16 participants in the live session.

Reverse Osmosis Principles and Theory (0.125 CEU)

Presented by Mo Malki from American Water Chemicals

This webinar explains how membranes are structured, how permeate production is impacted and the various pressure values that are monitored by the RO plant operator, and it dives into why some of the dissolved solids are rejected better than others. There were a total of 29 participants in the live session.

Scaling and Fouling in RO Systems (0.15 CEU)

Presented by Mo Malki from American Water Chemicals

This webinar covers the importance of water quality, system design and system operations on inorganic scaling, organic and biological fouling in reverse osmosis and nanofiltration systems. It discusses pH adjustments and antiscalants for scale control, and the use of biocides for fouling control. There was a total of 32 participants in the live session.

RO Membrane Cleaning (0.15 CEU)

Presented by Mo Malki from American Water Chemicals

This webinar discusses the most effective procedure for membrane cleaning and describes the role of high and low PH cleaning chemicals. There were a total of 48 participants in the live session.

In Memoriam: Randell (Randy) Brian Hines

Randall "Randy" Hines attended McArthur High School in Hollywood, Florida and thereafter joined the United States Air Force and was assigned to the Tactical Air Command and Tactical Reconnaissance Wing. His USAF service began during the Vietnam conflict and the subsequent war. Although at that time he experienced the political ineffectiveness and citizens unrest and disrespect toward the military and servicemen in Vietnam, he was always very proud of his Air Force service and accomplishments. He belonged to the Air Force's Wild Weasel Group and received several medals and Letters of Congratulations and Letters of Appreciation from superior Officers with the ranks of General; Lieutenant General; Major General and Lieutenant Colonel. After leaving the Air Force he remained in contact with his Air Force buddies and continued his interest and involvement with jet aircraft and flying.

Upon returning to civilian life Randy became involved in the water utilities and treatment industry. He first worked at the City of Pembroke Pines for several years and thereafter move to Jupiter to take a position with the Town of Jupiter at the Water Utilities Department as Superintendent of Water System. While at the Water Utilities Department, using his management and operational techniques, with the support of dedicated employees, they saved the Town of Jupiter millions of dollars within ten years of his employment. During the development of the department's reverse osmosis treatment plant, Randy was involved with meetings of engineers from Belize, Spain, Netherlands, Japan and many other countries that were attempting to learn the Town of Jupiter's treatment methods in order to provide their citizens with safe and clean water. The Town of Jupiter Water Utilities Department was awarded many exemplary awards from State, Federal and Industry organizations for safe and quality water. He remained at the Town of Jupiter for 23 years until choosing to semi-retire.

During semiretirement, Randy took a position at the Florida Keys Aqueduct Authority in which he employed those same operational techniques and treatment methods he used at the Town of Jupiter. Those methods as well saved the Aqueduct Authority several hundred thousand dollars each year. They still used those same techniques years after Randy decided to fully retire. The time spent living in the Florida Keys was a great experience.

Randy was outstanding in the sport of billiards. He played in tournaments in and out of the State of Florida and was well known for his skill and abilities, playing with such notable professional players as Steve Mizerak. He was also well known and had a reputation among friends and local pool players. Randy received many winning trophies for his pool shooting skills, so many they required their own storage cabinet. Randy tried the sport of fishing over the years but was less fortunate. It was a standing joke with everyone that "if you wanted to go fishing to catch fish, don't bring Randy along"! Since leaving the Air Force, he furthered his interest in jet aircraft. He obtained his pilot's license and many of his friends were either pilots in the Air Force or the jet aircraft industry. He was educated in chemistry, physics, astrophysics, quantum mechanics. He greatly enjoyed the space program. Randy was a patriot and gave a lot of attention to politics and the society of today. He said that freedom does not come freely and you have to work at keeping your freedoms. You have to preserve the U.S. Constitution that was written by some very wise men over 200 years ago. Randy was a very intelligent, honorable individual and was respected by many who knew him.

Randy was married to Elaine Hines for 47 years, but together almost 50 years. He is survived by his wife, Elaine Hines; a son, Jeffrey Hines; a daughter, Stephanie Hines O'Sullivan; son-in-Law, Jeremiah O'Sullivan; granddaughter, Savannah O'Sullivan; brother, Michael Hines; sister-in-Law, Jeannie Hines; father-in-Law, Gordon Swenson, and nieces, nephews and many cousins.

Randy is predeceased by his mother and father; recently his sister, Carla Hines Pepper and mother-in-law, Anna Swenson.

AMTA Announces New Executive Director, Administration Management

Author: Kim Shugar, AMTA

The American Membrane Technology Association (AMTA) announced a new executive director and management team, effective January 1, 2021.

Ms. Kim Shugar will serve as AMTA's incoming Executive Director. Based in Tallahassee, Florida, Kim has more than 15 years of senior executive experience in natural resource management, water and environmental policy, program administration and project management. Most recently, she served as deputy director for the Florida Department of Agriculture and Consumer Services and Policy Chief for the Agriculture and Natural Resources Subcommittee in the Florida House of Representatives. Ms. Shugar has an MS in Environmental Engineering Sciences from the University of Florida and a B.S. in Biology from Mercer University.

"We are honored and excited to introduce Kim to our members and the membrane industry. Her skills and experience will provide AMTA with a fresh outlook and a dedicated focus to expand our partnerships and best serve our members," said AMTA President Chris Owen. "As AMTA's Executive Director this past year, Deena Reppen diligently guided the organization through a difficult and unpredictable time, and we are now well-positioned for a successful 2021. We are grateful for Deena's service and leadership."

As part of AMTA's new management team, Nicole Zimmerman will serve as Membership and Events Manager. Ms. Zimmerman has close to a decade of experience in conference and events management, marketing, operations, customer service and volunteer coordination. She previously worked for the American Water Works Association as an Events Delivery Coordinator and for Total Events & Association Management as Events Manager. Ms. Zimmerman graduated from Ashford University with an MBA and has a BA in General Studies from the University of Nebraska. Nicole is based in Nebraska and will work full-time for AMTA.

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The Probability of Advanced Water Treatment Operator Certification for Indirect and Direct Potable Reuse

Author: Pierre Vignier, City of Port St. Lucie

The mission of the Florida Operator Certification Program is to promote public health and safety, protect the environment, and conserve Florida's water resources by ensuring that all persons working in drinking water, water distribution, and wastewater meet the highest standards for certification as determined by the rules and regulations of the Florida Department of Environmental Protection under the guidelines of the United States Environmental Protection Agency.

These are the principles for industry associations to one day establish the Advance Water Treatment Operator (AWTO) certification program for water or domestic wastewater treatment plant operators. Florida governor's signing of SB 712 in June 2020 affirms reclaimed water as a source for public water supply systems, a movement towards embracing the one water concept. The formulation of the Potable Reuse practice creates added value in reclaimed commodities and an important step for direct augmentation of Florida's limited freshwater water resources.

In similar matter, the State of California governor approved a 2013 Senate Bill 322 relating to water recycling is an example of how other states like California and Nevada already have communities diluting purified wastewater directly into reservoirs or in underground aquifers for use as a drinking water resource. While the California Office of Operator Certification has not acted in creating guidelines for AWTO certification, the CA-NV AWWA & California Water Environment Association (CWEA) have adopted a voluntary AWTO certification program This means that beginning in July 2019, the licensed water and wastewater operators of California and Nevada can be tested beyond the typical conventional treatment methods for a higher classification of Advanced Water Treatment processes. AWTO exams consist of adding three certification grades covering subject matters of membrane filtration, membrane desalination, biological filtration, adsorption/exchange, membrane bioreactor, and advanced oxidation.

While the voluntary AWTO certification has a positive effect on operators, the industry is slow in incentivizing operators with pay because the state California Office of Operator Certification has not expanded the current licensing framework. A criteria regulation update is slated for December 2023. Florida's probability of adopting a similar guideline for a novel AWTO certification into the Chapter 62-602 Florida Administrative Code would likely be in a very long time. An organization that has taken on the led in AWTO is the WateReuse Florida Association. Other water and wastewater industry associations are actively surveying operators about their opinions on an AWTO certification structure. One thing that is absolute, membrane treatment methods do very well in removing pathogens and viruses and is a keystone process for the purification of reclaimed water. For more information about the outlook of CA-NV AWTO, please visit:

https://www.awtoperator.org/ca-nv-awwa-cwea-finale-advanced-water-treatment-operator-certification/

SEDA QUIZ

By: Brian Matthews, City of Palm Coast,
Environmental Compliance Manager

1. The phrase "potable water reuse" describes
   A. The process of zero liquid discharge
   B. The process of using treated wastewater for drinking water
   C. The process of reusing potable water
   D. None of the above

2. There are two types of potable water reuse. They are commonly referred to as:
   A. Permeate and Concentrate
   B. Fresh and Brackish
   C. Direct and Indirect
   D. Wastewater and Drinking water

3. The difference between Indirect potable reuse and Direct potable reuse is
   A. An environmental buffer such as a lake, river or groundwater aquifer
   B. The types of membranes that are used
   C. The finished water quality goals
   D. There is no difference

4. Potable water reuse has become a progressively more accepted practice worldwide due to
   A. Impacts of drought
   B. Improvements in water treatment technologies
   C. The scarcity of fresh groundwater supplies
   D. All of the above

5. Which treatment technology is typically not a key component in potable water reuse treatment?
   A. Nanofiltration (NF)
   B. Reverse osmosis (RO)
   C. Microfiltration (MF)
   D. Membrane bioreactor (MBR)

6. What might be a disadvantage of NF membranes to RO membranes for potable reuse systems?
   A. Fouling potential
   B. Less TDS removal
   C. Poor nitrate rejection
   D. All of the above

7. Which treatment technology typically serves a central role in potable water reuse treatment?
   A. Nanofiltration
   B. Reverse osmosis
   C. Microfiltration
   D. Membrane bioreactor (MBR)

8. Membrane integrity assurance is a necessary part of potable water reuse systems. Currently there are no techniques to directly determine RO integrity for more than:
   A. 2 log virus removal
   B. 4 log virus removal
   C. Virus removal is not a concern in potable reuse
   D. None of the above

9. A multi-barrier approach to treatment train design for potable water reuse systems
   A. Provides redundancy to system operations and ensures protection of public health
   B. Means treatment unit processes occur in series
   C. Means treatment unit processes occur in parallel
   D. a and b
   E. a and c

10. In general, positive public perception of potable water reuse is:
    A. Not important
    B. Easy to achieve
    C. The elected officials' responsibility
    D. Critical for a successful project

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

Webinars And Upcoming Events

Webinar

April 13th, 2021
Pre RO Filtration & Gas Exchange
0.1 CEUs/1.0 PDHs

Upcoming

April 20 - 22th, 2021
MOC I - 2.0 CEUs / 20.0 PDHs
Port St Lucie, FL

June 6 - 9th, 2021
2021 Spring Symposium
Cape Coral, FL

For the most current information on training programs visit our website at www.southeastdesalting.com

Welcome to Our New Members

ANDREW FULLER
SAFBON WATER TECNOLOGY

DAVID SMITH
VILLAGE OF WELLINGTON

JASON FUES
NALCO WATER

LLOYD VANHOOSE
CITY OF CAPE CORAL

MERLE MEDINA
WATER AND WASTEWATER ENGINEERING DIVISION

NIGEL HARRIS
VILLAGE OF WELLINGTON

RAMON DIAZ
GS INIMA USA CONSTRUCTION

ROMAN PIKALOV
SAFBON WATER TECHNOLOGY, INC.

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

Inside Recovery Zone

In Memoriam: Richard "Byron" Weightman III

Former SEDA President and Lifetime Member Richard "Byron" Weightman III, of North Fort Myers, Florida passed away on March 9, 2021 after a long journey with blood cancer. He had a successful career working for the City of Fort Myers in the Waater Utility Department for 32 years retiring in 2008 from the City. Donations in his memory can be made to the Halo House Foundation in Houston, TX (www.halohousefoundation.org).