FWEA Manasota Chapter

Vol 27 – August 2016

Message from the Steering Committee

By Manasota Chapter Chair
Michael Knowles, PE, Greeley & Hansen

The Florida Water Environmental Association Manasota Chapter kicked off a hot Florida summer with our joint summer social with the Florida Section of AWWA Region X. The Manasota Vice-Chair, Mike Nixon led the event which was held at the Big Top Brewery, a craft brewery located at 6111 Porter Way in Sarasota near I-75 and Fruitville. The brewery opened its tasting room in late 2013 and has strong ties to the Sarasota community. A well-attended event with consultants, vendors and utilities coming out with spouses and friends to learn about the brew master's trade and sample some of their works.

The Manasota Chapter would again like to thank FDEP's Juan Robles and Patty Baron for their May 26th presentation on upcoming rule changes. The Manasota Chapter is organizing our 2nd joint luncheon of the fiscal year with FSAWWA Region X on September 1st. Sarasota County has agreed to host this luncheon and our 3rd luncheon at the BOB Building. FSAWWA Region X is planning the 4th joint luncheon of the fiscal year and this may include a change of venue. The presentation for the next luncheon with be on the Town of Longboat Key Force Main Assessment which included the use of the PURE Technologies SmartBall® among other technologies. This assessment was recently completed by the Town and is the 5th assessment or inspection the Town has pro-actively performed on the 20-inch diameter force main that carries all of the Town's wastewater off of the Key to Manatee County for treatment. Speakers will include Juan Florensa, Public Works Director for the Town of Longboat Key, Tom Wilson, E.O.R. for the project from Greeley and Hansen, Mark Kincaid, Diver and Professional Engineer on the project with Coastal Engineering Consultants and Alan Bair, Project Manager for PURE Technologies (SmartBall®). Please register at the link below by August 25th.

http://mms.fwea.org/Calendar/moreinfo.php?eventid=40606

After the successful turn out FWEA saw at last year's sporting clays event, we'll be planning the 2nd Annual Sporting Clay Tournament in the coming weeks. Last year's participants were 50+ with participants from Sarasota County, City of Punta Gorda, City of Palmetto and many others coming out for lunch and a shoot at the Sarasota Trap, Skeet and Sporting Clays located at 3445 Rustic Road in Nokomis near Laurel Road and Knights Trail. Similar to last year we'll plan on hosting a lunch and awards presentation after the event.

Big Top Brewery , location of summer social

Sarasota Trap, Skeet and Sporting, location of Sporting Clay Tournament

Calendar of Upcoming Events

AUGUST

18 ASCE Suncoast Chapter Luncheon, Sarasota

21 FWEA Day with the Rays

25 FWEA West Coast Chapter Summer Luncheon

27 AWWA Region X Family Fun Night at the Marauders

30 AWWA Region X Young Professionals Summer Seminar

August

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER

1 FWEA/AWWA Manasota Chapter Joint Luncheon, Sarasota

8 9th Annual SW Florida Water & Wastewater Expo, Ft. Myers

15 ASCE Suncoast Chapter Luncheon, Sarasota

22 AWWA Region X MAC New Technology Showcase

September

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER

20 ASCE Suncoast Chapter Luncheon, Sarasota

27 FWEA The Future of Biosolids Process & Management Technology, Orlando

October

SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

Unique Ion Exchange System Reduces DBPs and Hardness for the City of Bunnell WTP

Phillip J. Locke, PE, Senior Project Manager, McKim & Creed, Inc., Mike Nixon, EI, Engineer Intern, McKim & Creed, Inc. , Ryan R. Popko, PE, Process Engineer, JEA

When the City of Bunnell commemorated the opening of its new $4.8-million water and sewer facility on December 9, 2015, FlaglerLive.com heralded, "No more water-boiling alerts. No more weird-looking, cloudy-looking water, or on occasion strange smelling water. No more third-world water and sewer treatment for Bunnell."

The new 0.999-mgd water treatment facility features the first-ever municipal application of the Orica MICo (MIEX® Co-removal) ion exchange process, and was designed, permitted and constructed to remove both organics and hardness with cationic and anionic resins in a common reactor vessel. The new process brings the city into compliance with state regulations regarding total trihalomethane (TTHM) maximum contaminant levels (MCL), produces softer water that prolongs appliance and plumbing fixture life, addresses customer water-quality concerns, maximizes the amount of source water for potable use, and is projected to meet the finished water demands of the city through 2030.

Funding for the $4.83-million project included $1.48 million from the U.S. Department of Agriculture (USDA) Rural Development (RD) grant; $2.8 million as a USDA RD loan, and $1 million as a state revolving fund loan.

Introduction

The City of Bunnell operated a 1.0-mgd water treatment plant (WTP) that treated groundwater and used aeration to remove hydrogen sulfide, along with filtration and disinfection to achieve 4-log virus inactivation. The plant had previously operated as a lime softening facility; however, the lime silo, its associated components, and the softeners became inoperable and had been offline for several years. Due to the inability to achieve the MCLs for TTHMs, a consent order was issued to the city by the Florida Department of Environmental Protection (FDEP) in October 2011. In addition to the consent order, the City's water customers had experienced hardness levels exceeding 300 mg/L as CaCO3 in their water. These levels were causing significant issues with the water customers' appliances and the city was receiving regular complaints about the hard water.

Bunnell needed a solution that would remove natural organic matter (NOM) from the source groundwater supply to minimize the formation of disinfection byproducts (DBPs) that occur when free chlorine is added to water that contains organic material. By reducing the organics in the water, the DBPs could

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be reduced to levels that comply with drinking water regulations. A second goal was to reduce hardness to levels acceptable to the city and which meet secondary drinking water requirements for total hardness.

Alternatives evaluated for treatment included ion exchange, lime softening, and reverse osmosis, along with a combination of these processes. A weighted treatment options decision matrix was developed for these potential alternatives and included:

- Capital and Annual O&M Costs
- Technical Feasibility
- Ability to Meet DBP Requirements
- Ability to meet City Hardness Goals and Hardness Requirements
- Proven Implementation
- Consumptive Use Permit Compatibility/Water Loss
- Minimization of Treatment Waste
- Footprint

Based on the results from the evaluation, ion exchange was selected for implementation to remove organics and reduce DBP formation potential as specified by the consent order. Two ion exchange systems were evaluated for their cost effectiveness. Results from the evaluation indicated that the Orica system had both lower capital and operational costs, and that system was selected for pilot testing. The results from the pilot test showed a 78% reduction in TOC, 46% reduction in hardness, 91% reduction in color, and 98% reduction in H2S.

That analyses and pilot testing served as the basis for the world's first municipal application of the Orica MICo (MIEX® Co-removal) ion exchange process. The single-step process developed by Ixom Water, Inc. simultaneously softens the water and removes organics, and halves traditional two-step capital and operational costs. The process was implemented within the existing water treatment plant and included:

Unique Ion Exchange System Reduces DBPs and Hardness for the City of Bunnell WTP

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1) A new transfer pumping system to convey raw water from an existing tray aerator used for hydrogen sulfide removal to the ion exchange process,

2) The ion exchange treatment, including regeneration of the resin,

3) A new 5,625 ft2 process/operations building,

4) New multi-media filtration system,

5) New clearwell with transfer pumps to convey the water to the existing ground storage tanks, and

6) New chemical storage and feed systems.

How the Co-Removal System Works

The transfer pumps convey aerated water to the base of the high rate contactor reactor vessel where the water is mixed with the dissolved organic carbon (DOC) resin and resin for organics and hardness removal. The raw water is fed into the contactor reactor vessel at an upflow rate of approximately 8 gpm/ft2 and the contact time with the resin ranges from four to 12 minutes, based on the anticipated range of flows that will be treated by the new facility. The ion exchange process removes targeted ions in the contactor reactor vessel using selective ion exchange resins. Treatment in the ion exchange system is complete as the water flows from the contactor reactor vessel. A series of plates (or tube settlers) at the top of the contactor reactor vessel separates the resin from the water, and the treated and softened water overflows into collection launders. From the collection launders, the treated water flows by gravity to the filtration system, while the resin remains in the contactor reactor vessel.

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Resin Regeneration

The unique aspect of this project is the use of both anionic and cationic resins in a fluidized bed co-removal system. Resin regeneration is accomplished using a small amount of resin which is withdrawn from the base of the contactor reactor vessel and sent to a regeneration vessel. Resin sent to the regeneration vessel is accumulated and regenerated in a batch process and is returned to the contactor reactor vessel to maintain a consistent ion exchange capacity.

Regenerating the anionic and cationic resins involves contacting the resins with a brine solution in order to remove the DOC and hardness ions from the resin. The regeneration process starts by draining carrier water from the resin regeneration tank and adding a brine solution that consists of 12% sodium chloride solution. Brine is contacted with the resins to remove DOC and hardness, and then drained. Part of the drained brine is sent to waste while the remainder is returned to the brine tank. Rinse water is added to the resin regeneration tank and then drained, and the resin is returned to the contactor reactor vessel.

Hydrochloric (HCL) acid is used to reduce iron scaling, and scaling is evaluated at regular intervals using resin activity and acid dissolution to determine the extent, if any, of iron fouling present. The acid dosage will be adjusted once a steady state operation has been achieved and resin condition has been monitored for approximately six months.

In order to replace spent resin or any resin lost due to carryover, virgin resin is periodically added to the regeneration system and then transferred to the contactor reactor vessel. Brine waste is conveyed to the existing onsite lined lagoon, and then transferred by an existing pump station to the wastewater collection system. The semi-continuous withdrawal of loaded resin and return of regenerated resin ensures a consistent treated water quality and prevents the chromatographic peaking that can occur with conventional ion exchange columns.

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Finishing

Following ion exchange treatment, the water is conveyed by gravity to a dual media filtration unit to remove particulates and any resin that may carry over from the ion exchange contactor. The filters include automated backwash and air scour systems. Effluent turbidity is measured on a continual basis.

Filtered effluent is conveyed by gravity to a clearwell and transfer pump station. Sodium hypochlorite is injected into a static mixer between the filters and the clearwell. New sodium hypochlorite and ammonium sulfate storage and feed systems provide disinfection of the water prior to conveyance from the clearwell transfer pumps to the existing storage tanks and high-service pump station that feeds the water distribution system.

The facility includes a HCL acid storage and feed system that removes scaling within the ion exchange system on a periodic or as-needed basis. The HCL tank includes a simple scrubbing system to remove HCL vapors, which are both dangerous and corrosive. The scrubber operates using a 2-inch line that vents HCL vapor from the top of the 330-gallon storage tank into a perforated PVC "tee" that is submerged approximately 5 inches in a 55-gallon water-filled drum. Each time the storage tank is filled with HCL, the liquid displaces the vapors and the vapor bubbles into the water in the 55-gallon tank. This reduces the pH and creates a slightly acid solution that is drained after the storage tank is filled each time.

System Performance Testing

Initial results of the performance of the ion exchange system were determined during the system startup and acceptance test performed in September 2015. This testing was conducted over a six-day period and included various combinations of the facility's groundwater supply wells. The intent of the testing was to simulate the full range of anticipated flows and associated raw water quality, and to demonstrate that the effluent quality required for the project could be achieved. The system was operated using flows ranging from 250 gpm to 700 gpm, which approximated the lowest anticipated treatment flows and the WTP design capacity, respectively. Raw water characteristics measured during the testing period are summarized in Table 1 below.

Table 1: Raw Water Characteristics

Raw Water Characteristic	Raw Water Levels		
	Average	Minimum	Maximum
Dissolved Organics	6.92 mg/L	5.95 mg/L	6.52 mg/L
Hardness ($CaCO_3$)	333 mg/L	228 mg/L	382 mg/L
Conductivity	822 µS/cm	681 µS/cm	1048 µS/cm
Sodium	57 mg/L	23 mg/L	104 mg/L
Chloride	110 mg/L	36 mg/L	257 mg/L
TDS	284 mg/L	248 mg/L	371 mg/L
Iron	0.47 mg/L	0.17 mg/L	1.08 mg/L
Sulfate	4 mg/L	0 mg/L	12 mg/L

The range of the respective constituents shown in Table 1 is due mainly to the variation of the water quality in the City's groundwater supply wells.

SCADA

The ion exchange and filtration systems were installed in a new prefabricated metal building that also contains a control/operations room, laboratory, SCADA room, motor control centers, remaining chemical feed systems, and other process equipment. The ion exchange process, in and of itself, is a complex process that needed to be fully integrated between its respective components. Additionally, the entire ion exchange process needed to be integrated into the entire WTP. The existing facility did not have a SCADA system, so a completely new instrumentation and SCADA system was provided to allow for seamless and automated operations, monitoring and control.

Conclusions

As the engineer of record, McKim & Creed provided Engineering, design, bidding, instrumentation and controls, construction and post-construction efforts;

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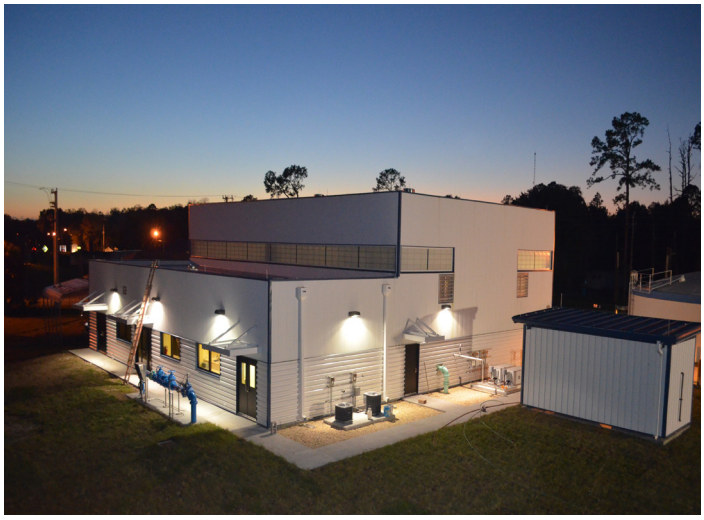
assisted with and helped direct funding efforts; and oversaw system performance testing.

The facility was constructed by TLC Diversified, Inc. and placed into service on October 26, 2015. By mid-November, all City of Bunnell customers were fully on line with the new facility. The City celebrated its success at the commemoration event on December 9, 2015, calling it a "miracle" and describing the water as "the best tasting water ever."

The system is exceeding performance requirements and city goals and has relatively low maintenance requirements. Being the first of its kind facility in the world, the city is working with University of Florida students and faculty for educational tours and to explore further optimization of the process.



Rendering of completed new water treatment facility

FWEA Manasota Chapter Steering Committee Officers

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Mike Mylett (Sarasota County)

Founding Chair
Kristiana Dragash: 941.371.9832

Lindsay Marten (Past Chair)

If you are interested in joining the Steering Committee, please contact us.

We are currently seeking Utility Liaisons and additional At-Large Members.

Joint Luncheon Meeting with FSAWWA Region X – September 1, 2016

Longboat Key Force Main Assessment

Juan Florensa, Town of Longboat Key, Tom Wilson, P.E., Greeley and Hansen, Mark Kincaid, P.E. and Diver, Coastal Engineering Consultants, and Alan Bair, P.E., PURE Technologies

The Town of Longboat Key has been proactively assessing and surveying the condition of the 20-inch diameter ductile iron force main that is the sole transport of the Town's wastewater off of the Key and to Manatee County for treatment. The force main was originally installed in the mid 1970's and the shop drawings detailing the thickness class of the pipe and the presence of a liner were not retained. Before the Town continued with plans to replace the aging infrastructure, the Town advertised for a firm to assess the condition of the force main. The Town selected the Greeley and Hansen Team to complete the assessment which included Greeley and Hansen, Coastal Engineering Consultants, Corrosion Control and PURE Technologies.

Juan Florensa, Public Works Director, Town of Longboat Key

If you attended a professional society event in the Sarasota area, you probably already know Juan. He attends FWEA function regularly over his 15+ years as the Town's Public Works Director. Juan graduated from the Georgia Institute of Technology and also served as the Public Works Director for the City of Northport for 16 years after his start with Sarasota County's Transportation Department. Juan's commitment to his utility and the Town coupled with the critical need for this force main to remain in service meant that a considerable amount of Juan's thoughts and efforts were directed at this project.

Tom Wilson, P.E., Associate, Greeley and Hansen

Tom Wilson participated in two of the Town's previous force main assessments in the 1990's and served as the Technical Adviser and Engineer of Record for the project. Tom has worked for Greeley and Hansen for the past 33 years out of their Tampa office and is the firm's national pipeline expert. Tom's other pipeline assessments and familiarity with this pipeline helped in selecting the team.

Mark Kincaid, P.E., Coastal Engineering Consultants

Mark Kincaid also participated in the two force main assessments in the 1990's and understood the need for obtaining a pipe sample to calibrate the ultrasonic thickness equipment properly. Mark has over 30 years of experience as an engineer and a diver in the southeast region of the U.S. Mark and his co-workers were the hands on divers for this project.

Alan Bair, P.E. Program Manager, PURE Technologies

After graduating from Rutgers University with a B.S. in Mechanical and Aerospace Engineering, Alan obtained his masters in Engineering Management from NJIT while working for PURE Technologies the past 8 years. Alan served as the Project Manager for this project, overseeing the field representatives, data management and reporting.

JOINT FWEA MANASOTA & AWWA REGION X CHAPTER LUNCHEON MEETING

Sarasota County Operations Center (BOB Building)
Conference Room 1
1001 Sarasota Center Blvd., Sarasota, FL 34240
Registration - 11:30 • Lunch and Program - 12:15

Menu: 1) Market Salad, 2) Chicken Parmesan with Penne Pasta and Extra Sauce, 3) Beef Stroganoff, 4) Fresh Fruit Medley, 5) Assorted Cookie Platter

Please register by Thursday, August 25th
Pre-registered Members: $15 • Pre-registered Non-members: $20 • Walk-in: $25
You can register online at www.fwea.org or register by phone, fax, or e-mail to Linda Maudlin
2601 Cattlemen Road, Suite 100, Sarasota, FL 34232
Ph: 941-378-3579 • Fax: 941-378-9489 • E-mail: lmaudlin@greeley-hansen.com

The Manasota Chapter is in search of Project Spotlight articles for future newsletter editions. Chapter sponsors are encouraged to submit an article highlighting a local project. Please contact Samantha Nehme at samantha.nehme@stantec.com or 941-921-4183 for more information.