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Joe Underwood
Chief Operator
Muscle Shoals, Ala.

Hands-on *Know-How*

**OPERATOR JOE UNDERWOOD
TAPS HIS CREATIVE SIDE TO
KEEP PLANT PERFORMANCE UP**

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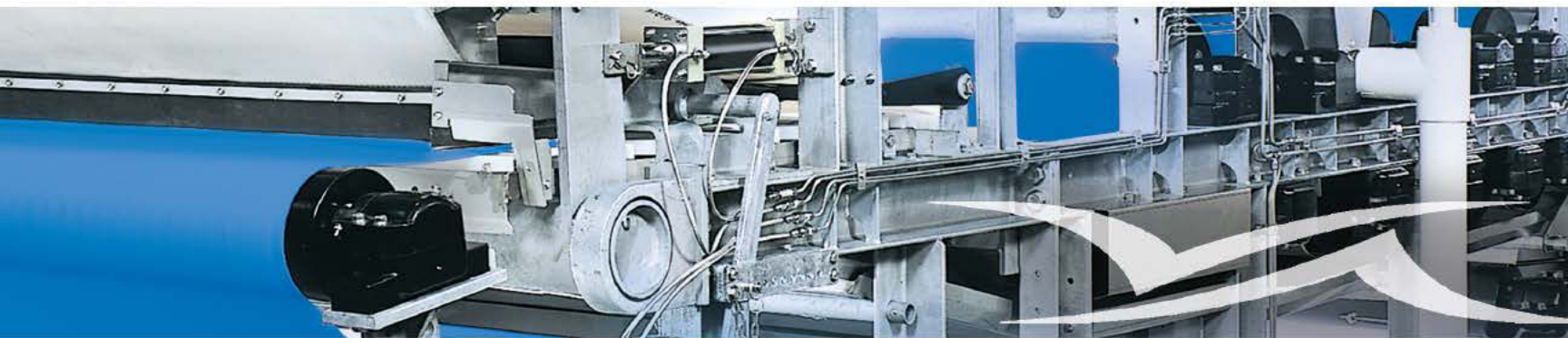
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- Top Performer – Biosolids: Thermal drying in Exeter, Pa.
- Top Performer – Operator: Gary McClure, Loxahatchee River District, Fla.
- Top Performer – Plant: NACWA Platinum Awards in Commerce Township, Mich.
- How We Do It: Nutrient removal for a small-scale plant
- Tech Talk: Understanding sequenced aeration
- Hearts and Minds: Earth Day tours in LaSalle, Ill.
- PlantScapes: Green roofs in Hoboken, N.J.
- In My Words: Biogas: The national picture

on the cover

Joe Underwood and his team in Muscle Shoals, Ala., use ingenuity to solve problems, keep costs down, and produce high-quality effluent. That helped the treatment plant win a Wastewater Excellence Award from the Alabama Water Environment Association. (Photography by Danny Mitchell)



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let's be clear

Names Do Matter

THE SOLID END PRODUCT OF A CLEAN-WATER PLANT IS A BENEFICIAL THING. WE SHOULDN'T PERSIST IN CALLING IT BY AN UGLY AND OFFENSIVE NAME.

By Ted J. Rulseh, Editor



Back in the 1980s while working on a public participation project for a clean-water agency involving land application of what we now call biosolids, I invited a state regulatory official to speak at a meeting of our citizens' advisory committee.

During the phone call, I told him various alternate names this agency was trying out as replacements for "sludge," which was then the only term available. His response: "Call a spade a spade, or I won't come and speak."

In a way, I still respect his position: As a writer I have never liked euphemisms, if defined as nice-sounding words used to make some-

thing awful sound better. But in "sludge," we had an awful-sounding word making something good seem bad.

RESISTING CHANGE

So now we call it "biosolids." In all candor, I have never liked that handle either, but try as I might I can't think of anything better. So, "biosolids" it is — except that a surprising number of people in the clean-water industry still call it "sludge."

Ironically, those ranks include some manufacturers of biosolids-handling equipment. They send press releases that talk about "sludge" processing and, maybe even worse, about "disposal" (and here, of course, the preferred terms are "beneficial use" and "recycling," unless the material is being burned or landfilled).

Some operators still use that old word, too. We run across it now and then in interviews for our stories about exemplary biosolids programs. Why do some of us in the industry persist in using words that make one of the end products of wastewater treatment sound ugly? Is it vestige of the "call a spade a spade" mentality? Does it even matter what we call the stuff?

GRAY AREAS

Well, as a matter of fact, yes, it does. I'll admit it gets a little confusing when you're an insider looking at the treatment process as a whole. Because on the way to clean water, we have primary sludge, waste activated sludge and return activated sludge — terms of art for which substitutes don't exist and aren't really necessary.

But at some point a line gets crossed at which these materials have been changed enough so that we really should not call them simply "sludge." Where is that point? We've argued a little about that here at *TPO* magazine. While I don't claim to be the final authority, for my money it becomes "biosolids" the moment it enters an aerobic or anaerobic digester or some other treatment or stabilization process.

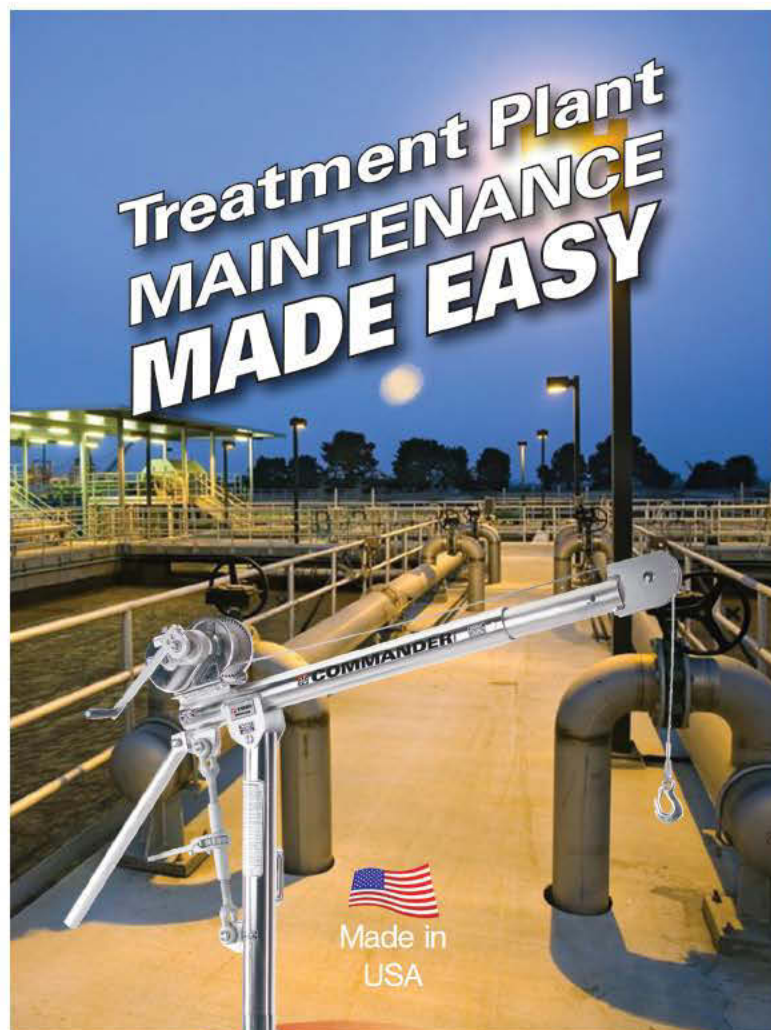
What comes out of the digester is very different from what went in. It is transformed in a fundamental way, even before it enters further steps that dewater it and, in some cases, turn it into Class A material, essentially free of odor and pathogens.

What comes out of a digester is very different from what went in. It is transformed in a fundamental way, even before it enters further steps that dewater it and, in some cases, turn it into Class A material, essentially free of odor and pathogens. If "sludge" goes in, and something very different from "sludge" comes out, why should we still call that end product "sludge"? Doing so does a disservice to the product and the profession.

OUTMODED TRADITION

So, what we apply to cropland, or turn into compost, or spray on forest land, or plow into the soil on reclaimed mine sites, is biosolids. We really should banish the term "sludge" from the clean-water process vocabulary (with the exceptions mentioned above).

The industry should look for unanimity on this. The solids side of the clean-water process is quickly becoming a part of the green-energy movement — digester gas (biogas) is quickly gaining favor as a renewable fuel. As treatment plants look to produce more biogas, they are going to digest more material and make more biosolids. That end product is valuable, too, and we shouldn't devalue it by calling it an ugly name. **tpo**



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Experience with flushing wipes

I just finished your article about flushing wipes ("Driving Home a Simple Point," *TPO*, December 2012). I have had a personal experience with this one. Our municipal sewer line was clogged and started to back up. We called a plumber, thinking it was our line. Luckily, it was in the city main, so we did not have to pay for it.

The plumber told us that there was a clog of disposable wipes in the main that was causing the problem, along with grease. I never put grease into our line, as I know it not only can cause clogs, but can also get the city into trouble with the Department of Natural Resources when there are large amounts found in public sewers.

I hadn't ever thought about those disinfecting wipes that everyone and their brother uses these days. I quit flushing them, although it is doubtful that our neighbors do the same. Homeowner education, SOS signs and a warning on the label on these products would be great ideas!

Janet Murray, R.E.H.S.
Environmental Health Supervisor
Randolph County (Mo.) Health Dept.
President, Missouri Smallflows Organization

Wipes do cause trouble

One of my last jobs before I retired from the Washington State Parks was to design the replacement for the duplex 5 hp pumps in the lift station at one of our parks. The pumps were old, but they were still doing their job of lifting sewage up to a gravity sewer until the baby wipes came along.

Yes, baby wipes are flushable, but as you said ("Driving Home a Simple Point," *TPO*, December 2012), they do not disintegrate, and they are tough. Once that synthetic fabric gets wrapped around an impeller, it's really messy and time-consuming to remove. Meanwhile, the lift station is closed and so are the toilet facilities.

So, after spending several thousand dollars for new and improved pumps that pass the wipes through better than the old pumps, we still get an occasional problem from the wipes, and facilities are again closed. And this says nothing about the associated costs of trouble at the treatment plant, and the cost to dispose of its hazardous trash.

So, yes, these wipes are an issue, and they do not belong in any sewer system, let alone a septic system. This is where Save Our Sewers or Save Our Septic signs can help, along with educating the general public and truth in labeling on wipes product packaging. It also might help if manufacturers and buyers of these products stopped to consider what they were doing for a sustainable future — not just for the bottom or for convenience.

Thanks for your excellent articles and let's expose more issues like this so we all can learn. It's a good start.

Sincerely,
Allan J. Papp, P.E.

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A biosolids sample from the belt filter press (Andritz).

Sowing for Savings

THE CITY OF BOISE GOES INTO BUSINESS FOR ITSELF WITH A FARM FERTILIZED BY DEWATERED BIOSOLIDS FROM ITS TWO WASTEWATER TREATMENT PLANTS

By Pete Litterski

FACING STRICTER STATE AND FEDERAL REGULATIONS for the land application of biosolids more than two decades ago, officials in Boise, Idaho, decided they could save ratepayers money by going into the farming business instead of giving away the byproducts of the city's two wastewater treatment plants.

Before the new regulations, the city was spraying its biosolids (at 2 percent solids) on private lands, giving local farmers first-come, first-served access. Since 1993, Boise has applied biosolids to cropland it owns, harvesting the crops for sale to livestock operations and dairies in southwestern Idaho.

Thanks to favorable commodity prices, the city's Twenty Mile South Farm in 2011 posted record revenues of \$2.79 million from sales of crops that include mainly alfalfa hay, corn for silage and winter wheat. Operating and maintenance costs were \$2.27 million. Revenue from crop sales helps keep sewer rates down and will support investments in wastewater treatment plant upgrades needed to comply with phosphorus limits in the city's new NPDES permits.

HEADING OFF CONFLICT

City leaders were worried about public concerns over the earlier land application program, according to Ben Nydegger, biosolids program manager for the Wastewater Treatment Division. In particular, they felt that continuing to work with contract farmers would lead to more complaints and potential conflicts with neighbors.

"In the late 1980s and early 1990s, as urbanization was taking place in Treasure Valley, we were getting more questions and concerns from citizens in the subdivisions encroaching on land traditionally used solely for agriculture," Nydegger says. "Boise was one of the fastest-growing cities in the nation during that period."

At the time, farmland was still readily available and reasonably priced. When the U.S. EPA adopted its 503 regulations in 1993, Boise was adding belt filter presses and launching its own farm enterprise with the purchase of a 2,300-acre farm 20 miles south of town. Today, the city is awaiting state Department of Environmental Quality approval to apply its dried biosolids on a spread that has grown to 4,000 acres.


TWO SOURCES

The Boise Public Works department operates two wastewater treatment plants. The Lander Street plant, which serves the older part of the city east of the Boise River, was built in 1950 and is permitted for 15 mgd. The West Boise plant, permitted for 24 mgd, was built in 1976. The plants handle a combined average of 28-30 mgd, and operators have some ability to divert flow from one plant to another, if necessary.

The city produces 24,000 to 27,000 wet tons per year of biosolids from its two belt filter presses (Andritz-Ruthner CPF 2.8 SMX-S8) at West Boise. The biosolids from Lander Street are piped under the Boise River to West Boise for pressing.

"In the late 1980s and early 1990s, as urbanization was taking place in Treasure Valley, we were getting more questions and concerns from citizens in the subdivisions encroaching on land traditionally used solely for agriculture."

BEN NYDEGGER

A photograph of two men standing in a field of harvested grain. The man on the left is wearing a blue and white plaid shirt, blue jeans, a brown belt, and a blue baseball cap. The man on the right is wearing a blue and white plaid shirt, blue jeans, and a brown belt. They are standing in front of a large pile of harvested grain. The background shows a flat landscape with distant mountains under a clear blue sky.

Steve Evans (left), farm manager, and Ben Nydegger, biosolids program manager, at the city's Twenty Mile South Farm.

The Boise team includes, from left, Shane Sterling, operator; Marcia Schmelzer, operations manager; and Ben Nydegger, biosolids program manager.



profile

Boise (Idaho) Public Works Department – Operations Division



POPULATION SERVED: 270,000

FACILITIES: Lander Street and West Boise wastewater treatment plants

FLOWS: Total 39 mgd design, 28-30 mgd average

BIOSOLIDS PROCESS: Aerobic digestion; belt filter press dewatering

BIOSOLIDS VOLUME: 24,000 to 27,000 wet tons per year

BIOSOLIDS USE: Land application

WEBSITE: www.cityofboise.org

GPS COORDINATES: Latitude: 43°36'45.69"N;
Longitude: 116°12'39.86"W

The biosolids enter the presses at about 2 percent solids and are dried to 12 to 14 percent solids before being transferred to the farm. The pressed biosolids are hauled on three commodity trailers pulled by two Kenworth T800 semi-tractors. The city ships 15 to 19 loads per week, an average of 450 to 550 wet tons.

PREPARING FOR APPLICATION

On arrival the biosolids are weighed and off-loaded into one of five bunkers, where they are stored until application. The bunkers, covering a total of 3.5 acres, have concrete- or asphalt-lined bases and have Eco Block concrete walls.

To handle the biosolids in the bunkers, the farm staff uses a 2007 Case 921E loader, a 2010 Caterpillar 930H loader, a 2011 Caterpillar 420E backhoe loader, and a 1994 Dresser 525 loader. Most material is spread in spring before planting and in fall after harvest. The bunkers provide six to seven months of storage capacity.

The Boise plants treat the biosolids to Class B quality. Team members test the material for metals, nutrients, pathogens and fecal coliform at least six times a year. "On average, we test eight to 10 times per year," says Nydegger. "From every fifth truckload, we take a handful, and the samples are composited." The composite samples are tested at the Public Works department laboratory downtown.



Shane Sterling checks a clarifier sludge blanket.

TO THE SOIL

The farm has four spreader trucks: a 2007 Mack CV-713 Granite, a 2010 International 7600, a 2009 International 7600 and a 2004 Kenworth T800. All have Kuhn Knight Pro-Twin Slinger Boxes. When all four trucks are in use, farm workers can apply 30 to 40 loads per day.

Nydegger says the city has faced minimal resistance to its biosolids operation. The farm abuts Bureau of Land Management property on one side, and the few neighbors are dairies.

The farm primarily grows alfalfa hay, corn for silage and winter wheat. Other crops can include oats, rye grass and triticale, a hybrid of wheat and rye. The city has experimented in recent years with planting a double crop of triticale with corn to gain more productivity.

Field work at the farm is handled with help from seven tractors, two swathers, two windrowers, three balers and a sprayer. To deal with the area's semi-arid climate, the farm has an extensive irrigation system with 22 quarter-mile center pivots distributing water pumped from an aquifer 300 feet below the surface. There are also hand lines, corner lines and wheel lines to cover areas the center pivots don't reach. The harvest at the farm has "come a long way with the installation of the irrigation," says Nydegger.

LOOKING TOWARD EXPANSION

The city is careful to avoid disrupting markets in its corner of Idaho. "We're a large enough producer that we could set the market for feed, so we are very, very transparent about our operation," Nydegger says. "We use pricing data to keep our prices current with the market." Ranchers and dairy farmers seeking stability in their feed supplies convinced the city to sell its products on three-year contracts, and there are producers waiting to get those contracts.

"We're a large enough producer that we could set the market for feed, so we are very, very transparent about our operation. We use pricing data to keep our prices current with the market."

BEN NYDEGGER

The farm operation has been a winning proposition for Boise. "We can use the sale of our crops — our commodities — to offset the cost of managing our biosolids," Nydegger says. "And with the higher commodity prices we've seen in recent years, it's been a boon to the city."

Boise has used some revenue from the farm to help maintain and upgrade the wastewater treatment facilities, reducing the burden on customers. One planned upgrade involves modifications to meet lower phosphorus limits in the city's new NPDES permits.

Until recently, Boise was operating under NPDES permits last renewed in 1999, before the city acquired a neighboring 1,620-acre farm in 2000 and added another 280 acres in a 2008 land swap. The EPA did not re-issue the city's permits in 2004 or 2009, so the terms of the 1999 NPDES permits remained in effect under administrative extensions.

The old permits mapped the original farm and defined it as the city's site for biosolids application. The new permits issued Aug. 1 do not address biosolids application. "Therefore, once we get Idaho DEQ approval of a Biosolids Management Plan for the entire Twenty Mile South Farm, we should be able to apply on the entire farm," Nydegger says.

EXPANDING THE SITE

The approval of the BMP is a state requirement that Nydegger tackled after the new NPDES permits were issued. He included the original farm, plus a



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DOWN HOME ON THE RANGE

The Twenty Mile South Farm owned by the City of Boise has a staff of 12 full-time employees, including Ben Nydegger, biosolids program manager since January 2011. Before that, Nydegger, who graduated from Boise State University with a major in environmental health and a minor in biology, worked with the city Public Works Department analysis group, "dealing with downstream and effluent issues."



Resident farm supervisor Steve Evans, raised on a ranch/farm in Eastern Oregon, studied at Oregon State University and lives in the original farmhouse at Twenty Mile South. Evans, who oversees the day-to-day agricultural operations, joined the Boise operation in 2006 after working on a large, irrigated farm in the Columbia Basin that also applied biosolids to its fields.

Two farm workers — Juan Galvez Diaz and Lupe Jimenez — also live on site in manufactured homes provided by the city. Administrative office worker Leslie Mack enjoys swathing hay when an extra hand is needed. The team also includes parts and inventory specialist Jim Parle, mechanic Richard Hartley (who officially works for Boise's Fleet Services Division) and two maintenance mechanics for the farm equipment, Thom Meyers and Rafael Medina. Medina works primarily on the irrigation system. There are three equipment operators: Frank Ketchum, Brigham Hurd and Joe Parce. Ketchum is the primary biosolids truck driver, while Hurd is the backup and Parce primarily operates the farm equipment.

The farm also hires up to six seasonal workers during the busiest planting and harvesting seasons. When the city bought the original farm, it used several existing structures for shops and storage. The farm still has corrals, which have been rented at times to livestock owners, and a bunkhouse available to the seasonal workers.

The Boise treatment plant delivers biosolids to one of four storage bunkers. Daily production is 120 to 150 tons.



1,620-acre parcel (the Watkins addition) and a 280-acre parcel (the Nicholson addition) in the application for the updated BMP.

"DEQ had previously approved a BMP for the original farm site and the Watkins property in February 2004, but we were not allowed to apply on the Watkins site because of the definition of our land application site in the 1999 NPDES permit," Nydegger says.

The additional application area should come in handy as Boise tackles the challenges posed by stricter phosphorus limits. The city is considering a

"On average, we test eight to 10 times per year. From every fifth truckload, we take a handful, and the samples are composited."

BEN NYDEGGER

chemically enhanced pretreatment (CEPT) process in which ferric chloride is added to the wastewater to precipitate phosphorus. That would increase Boise's biosolids volume.

The revenue from the additional commodity sales will help Boise if the city finds it necessary to invest in major changes to the wastewater treatment system. As the city looks forward, one option on the table as it makes plans to meet the December 2018 deadline for compliance with the final limits in the new NPDES permits is to decommission the older Lander Street plant and expand the West Boise facility to handle all treatment.

For now, however, Nydegger's focus is on the future operations of the Twenty Mile South Farm and all 4,000 acres he expects to have available for biosolids application. It has been more than a decade since the Watkins farm was added to the city's spread, and Boise's farm workers have yet to apply the first truckload of biosolids to that land. "It's been a long process," Nydegger says. "But we can see the light at the end of the tunnel." **tpo**

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Spreading the Word

MWRD OF GREATER CHICAGO BUILDS AWARENESS THROUGH ITS AWARD-WINNING BIOSOLIDS PROGRAM AND RECEIVES NATIONAL RECOGNITION FOR PUBLIC EDUCATION

By Briana Jones

In the world of biosolids, field trips are not just for kids anymore. At the Metropolitan Water Reclamation District (MWRD) of Greater Chicago, regular Field Days allow the district to get the word out about the beneficial use of biosolids.

"Field Days target users in the Chicago Metro area who are using our dried biosolids as fertilizer and soil amendment," says Albert Cox, MWRD soil scientist. "This includes schools, golf courses and park districts."

MWRD produces about 165,000 dry tons per year of Class A biosolids among four of its seven water reclamation plants. The Calumet, Stickney, Hanover Park and John E. Egan plants distribute the biosolids, mostly on farmland but a small portion locally in the Chicago Metro area.

MWRD received the 2008 National Environmental Achievement Award in the Public Information and Education — Educational Program category from the National Association of Clean Water Agencies.

The biosolids process includes storage of the material in lagoons for a minimum of 18 months, and air-drying on asphalt pads in a process accelerated by mechanical agitation. The district gives the biosolids granules away in bulk.

"It's really important that people understand when they're using our Class A product, which we bring out to park districts, that kids can play on that immediately."

DAN COLLINS

GET TALKING

Field Days are the district's main approach to education about the biosolids program. Each Field Day lasts about three to four hours and includes presentations, demonstrations and awards for people and organizations who have successfully used the biosolids.

Says Cox, "The format of Field Days is to get current users and potential users to meet and interact and share information on how they're able to use the biosolids. The day includes seeing a site where biosolids are being used, or a demonstration on how the material could be spread and the equipment used."



PHOTOS COURTESY OF MWRD GREATER CHICAGO

Lakhwinder Hundal, MWRD senior environmental soil scientist, explains the benefits of biosolids in a greenhouse at the Stickney Water Reclamation Plant during the 2011 Biosolids Field Day event.

Field Days are held at various locations, including suburban villages, park districts and MWRD facilities where users can see the biosolids processes. Greenhouse demonstrations are another aspect of the Field Days.

"Since the use of biosolids in the metro area was relatively new, the greenhouse demonstrations allow people to see how the product could be used," says Cox. "We show comparisons between turf and ornamental plants grown with and without biosolids."

A team of five soil scientists do the technical presentations and provide guidance at the Field Days. "Of the five soil scientists, on average about one-third of staff time goes toward promotion and technical support of biosolids," Cox says.

RESIDENTIAL SUPPORT

At present, biosolids are distributed to larger organizations and on farm fields, but MWRD wants to get residential users involved. "We've attempted to invite residential people, but we haven't had much success," says Cox. "We've had a lot of calls from homeowners asking about using biosolids on their properties."

Under Illinois law, biosolids distribution on residential properties is severely restricted. "We tell homeowners that based on the current Illinois EPA Part 391 rule, we cannot distribute biosolids to homeowners," says Cox. "We let them know that

we are working with the Illinois EPA to change that."

Dan Collins, supervising civil engineer and head of the biosolids program, adds, "While biosolids can be used on residential properties, the way the regulation is set up, you can't apply the material close enough to a dwelling to use it properly. It eliminates many of the users because they don't have that size property with their home."

What's Your Story?

TPO welcomes news about your public education and community outreach efforts for future articles in the Hearts and Minds column. Send your ideas to editor@tpo-mag.com or call 877/953-3301.

(continued)

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The 2011 Chicago Metro Biosolids User Awards were presented at the annual Field Day. UPPER PHOTO: Individual recipient Dan Dinelli, superintendent of the North Shore Country Club, was recognized for innovative use of biosolids for turf maintenance. From left are, Thomas Granato, MWRD acting director of monitoring and research; Debra Shore, MWRD commissioner; Dinelli; and Dr. Albert Cox, MWRD supervising environmental soil scientist. LOWER PHOTO: The Blue Island Park District was honored for use of biosolids in routine turf maintenance. From left, are Cox; John Spizzarri, John Murphy and Chris Sobczak of Blue Island Park District; and Granato.

NATIONAL RECOGNITION

MWRD received environmental management system (EMS) certification from the National Biosolids Partnership (NBP) in 2008. Last year, Collins was selected by the NBP to mentor the City of Houston, Texas, wastewater agency as it implements a similar biosolids program.

"Texas used to do Field Days like we do," says Collins. "They want to get back to that because it's part of the program, to have Field Day events, public participation and communication with outside agencies and residents."

The environment management system Houston will create with Collins' help includes 17 elements. "I'm trying to help them find the 17 elements for their company," Collins says. "A lot of times it's an overwhelming process, and you're trying to teach them that the EMS they're implementing just reflects what they're already doing. It's about documenting what you're doing and continuing to follow and improve on that."

Whether helping residents at home or across the country, MWRD makes sure everyone knows its biosolids are usable. "I'm a big safety



Biosolids processing and drying operations at the MWRD Lawndale Avenue Solids Management Area (LASMA).

guy," says Collins. "From a safety standpoint, it's important that people understand when they're using our Class A product, which we bring out to park districts, that kids can play on that immediately."

Adds Cox: "We want to communicate to the public the district's commitment to the quality of the biosolids and the quality of the program. The district goes beyond what is required." **tpo**



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By Jim Force

Divide and Conquer



WHEN FUNDING WASTEWATER TREATMENT PLANTS, most cities try to get the biggest bang for their buck. In Marathon, Fla., it was more like getting the biggest bang for fifty cents.

Under orders to get rid of package plants and upgrade treatment, Marathon faced a potential bill of over \$181 million for a new plant. Instead, the city and its design firm, Weiler Engineering, came up with a plan for five small treatment facilities that cost about \$90 million, including new sanitary sewers. Staffing costs have been lowered, too.

At the same time, the city anticipated upcoming stormwater regulations and installed storm sewers and treatment swales as part of the overall project. "It was a perfect team effort," says Susan Thomas, project manager for the city. "The city, the financial and design team, and the contract operator (U.S. Water Services) came together. It was awesome."

Ted Yarboro, operations manager with U.S. Water, observes, "What Marathon has done is unique. Other cities may have spent time fighting regulations. The city has given us every tool we need to operate the facilities. It's been fun."

ADVANCED PROCESSES

If you drive from the Florida mainland to Key West, Marathon is exactly half way. And if you stop to use the washroom, the wastewater will travel through a new system of gravity, low-pressure grinder, or vacuum sewers to one of the five advanced wastewater treatment (AWT) plants. The collection system includes 127 pump stations and five vacuum stations, and about 243,000 linear feet of mains.

The plants that serve areas 3, 4, 6 and 7 of the community are small sequencing batch reactor (SBR) plants, with design flows from 200,000 to 400,000 gpd. Incoming wastewater passes through SWECO fine screens ahead of the SBRs, supplied by Siemens Water Technologies. In plant 3, a JWC Muffin Monster grinder is positioned ahead of the SBR to handle wastes from the city jail and hospital.

Siemens multimedia filters follow biological treatment, and the

Marathon's Area 5 plant, also known as Little Venice. (Photography by Johnny White)



Ted Yarboro, operations manager, U.S. Water Services Corp., Marathon, Fla.

"It was a perfect team effort. The city, the financial and design team, and the contract operator (U.S. Water Services) came together. It was awesome."

SUSAN THOMAS

effluent is disinfected with Hach chlorinators. Chlorine and salinity are monitored continuously, and the high-quality treated water is returned to various parts of the community for irrigation and dust control. Any excess — or water exceeding 1 part per thousand salinity — is pumped down one of five injection wells.

The plant serving area 5 was the site of a small SBR installation once owned and operated by the Florida Keys Aqueduct Authority. After purchase by the city, treatment was expanded from 160,000 to 450,000 gpd and improved through membrane bioreactor (MBR) technology (Ovivo), without increasing the plant footprint. "We couldn't build up either because of the nearby airport," explains Weiler Engineering's Ed Castle.

Plant 5 includes coarse screens ahead of an influent equalization tank, fine screens, and then pre-anoxic, pre-aeration, and post-anoxic tanks before the membranes themselves. Dual chlorine contact chambers follow the MBR. A large detention area enhances nitrification.

HIGH-QUALITY WATER

Treatment results are dramatic: All plants meet a permit limit of 5 mg/L CBOD, 5 mg/L TSS, 3 mg/L total nitrogen, and 1 mg/L phosphorus. "During the winter (dry season), we'll probably be recycling 75 to 100 percent of the



The Marathon team includes, from left, Joe Scholz and Andy Diskin, operators; Nancy Brooking, regional administrator; DeWayne Dousay, area manager; Ron Turner, Alex Gajewski and Kevin O'Neill, operators; and Ted Yarboro, operations manager.



Team members watch plant processes closely and pay meticulous attention to maintenance. Here, Ron Turner takes gauge readings.

Marathon Wastewater Treatment Plants PERMIT AND PERFORMANCE (Average of all five plants)

	INFLUENT	EFFLUENT	PERMIT
CBOD	228 mg/L	1.88 mg/L	5 mg/L
TSS	205 mg/L	1.91 mg/L	5 mg/L
Phosphorus	65.33 mg/L	0.936 mg/L	3 mg/L
Ammonia nitrogen	18.71 mg/L	0.37 mg/L	1 mg/L

99% removal of CBOD and TSS

98% removal of total phosphorus and total nitrogen

"During the winter (dry season), we'll probably be recycling 75 to 100 percent of the effluent. During the wet weather, not as much. We're still having people connect up to the system."

TED YARBORO

effluent," says Yarboro. "During the wet weather, not as much. We're still having people connect up to the system."

Biosolids from all five plants are aerobically digested, then dewatered on a mobile centrifuge (Centrisys) to about 22 percent solids. The digester sizes were doubled to give the plants more capacity. Cake is hauled to a mainland Florida landfill.

The dewatering strategy has saved considerable money, according to Castle: "Tipping fees are high. Previously, the city was hauling biosolids at 1.5 to 2 percent solids to the mainland. That's a lot of water. We've cut the volume of water by a factor of 10."

Despite the design economics, the price was considerable for this community of 10,000 (15,000 to 20,000 in the tourist season). Thomas says the city was in the right place at the right time for funding, qualifying for a \$16 million grant from the American Recovery and Reinvestment Act of 2009, \$11 million in state grants, additional money from South Florida for stormwater and reclaimed water treatment, and the state revolving loan fund. As a result, she says the assessment per user household was about \$5,700 for both the plants and the collection system.

LOCATING OPERATORS

Since 2008, U.S. Water has operated and maintained the treatment plants and the collection system under contract with the city. The firm has five full-

profile City of Marathon (Fl.) Wastewater Utility

BUILT:	Five plants, built 2006-2010
POPULATION SERVED:	10,000 (up to 20,000 during winter)
FLOWS:	200,000 to 450,000 gpd
TREATMENT PROCESS:	Four plants SBR, one plant MBR
TREATMENT LEVEL:	Advanced
RECEIVING WATER:	Recycled as needed, excess to injection wells
BIOSOLIDS:	Aerobic digestion, centrifuge dewatering, cake to landfill
ANNUAL BUDGET:	\$5.65 million collections and treatment; \$890,000 stormwater
WEBSITE:	www.ci.marathon.fl.us



PRESERVING THE REEF

A major reason Marathon anticipated new stormwater control regulations is the presence of one of the world's most vulnerable barrier coral reefs just a few miles offshore.

"It's the only living coral barrier reef in the continental United States," says manager Ted Yarboro of U.S. Water Services. "It's endangered, and it's a big part of the reason Marathon has gone to advanced plants for wastewater treatment."

Florida is the only state in the continental U.S. with extensive shallow coral reef formations near its coasts. The reefs extend from

the Atlantic Ocean on the mainland side of the state all the way to the end of the Florida Keys and beyond — about 150 miles long and four miles wide. It is the third largest barrier reef ecosystem in the world and lies mostly within the Florida Keys National Marine Sanctuary.

Local residents and Florida's many vacationers enjoy the reefs for snorkeling, diving and fishing, generating some \$3 billion in sales and income to the state and supporting thousands of jobs.

time operators — Alex Gajewski, Joe Scholz, Kevin O'Neill, Andy Diskin and Ron Turner — one at each plant on six-hour shifts.

Yarboro travels from plant to plant to coordinate and oversee the effort. "We also have four individuals dedicated to maintenance — two on the plants, and two on the collections system," he says.

He has overcome several challenges, one of which was locating operators in the first place. Since there weren't many operators among the resident population, "We imported most of our people, relocating them in Marathon," says Yarboro.

Startup was also challenging: "Flow would go from zero up to 40,000 gallons as we hooked up a whole subdivision or condominium community all at once," says Yarboro. The team keeps communication frequent — everyone appreciates the need to meet the permit consistently.

The system's new SCADA network (Siemens) keeps everyone connected and enables off-site monitoring and control. "I can operate, monitor and troubleshoot the system remotely from my living room," says Yarboro. He can also log into each plant at any time to check on operations or monitor ammonia levels, for example. "I can see things as soon as they happen," he says. "If we have a lightning strike, which is a serious problem for automated treatment facilities, we can switch to manual operations immediately."

MONITORING QUALITY

Marathon also uses a ChemScan system (ASA Analytics) to monitor water quality. "If ammonia or nutrient levels are going up in the effluent, we can adjust our biological process," says Yarboro. His staff also monitors dissolved oxygen and ORP to determine the amount of air that needs to be supplied to the system, avoiding over-aeration.

Since startup of the various plants, the Marathon team has fine-tuned process operations to deal with local conditions and requirements. The carbon source for nitrification in the SBR plants is a case in point. "With a total nitrogen limit of 3 mg/L, we tried several things," Yarboro says. "We started out with methanol as the carbon source, then switched to acetic acid, sodium acetate and molasses." Finally, the operators settled on glycerin, a safer and more cost-effective product that has worked well.

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ABOVE: Ron Turner checks the Area 5 plant control panel (Ovivo). LEFT: Nancy Brooking, regional administrator, uses a mobile office to work at the city's five wastewater treatment plants.

Another wrinkle involves the design of the SBRs. Castle explains that while most SBRs are designed with two trains, the Marathon SBRs have three. "That way we can take a tank down to work on it and still have two in operation," he says. It helps to have three tanks available to handle higher flows during the rainy season. Then during the dry season, the team can take one down for cleaning and operate with two.

TACKLING STORMWATER

This "thinking outside the box" has typified the Marathon project from the start. "With our water system already in place, and our new wastewater system mandated by the regulators, we anticipated the stormwater regulations that are to come and built both the sanitary and stormwater systems at once," says Thomas. That cut overall costs by more than 50 percent.

As a result, the community is prepared and equipped for a three-hour, 25-year storm event. Like the treated wastewater, stormwater is collected but

does not enter the ocean; instead it goes into shallow injection wells and to infiltration trenches or swales for treatment.

If an event results in excessive flow through the plant, the SBRs are switched to storm mode, allowing the facility to process the wastewater faster than normal. "We let the solids settle to the bottom, and the flow runs through our filters, chlorine contact chambers, and into the injection wells," says Yarboro. "You wouldn't know the difference from fully treated effluent."

Last fall, Yarboro's team prepared for Tropical Storm Isaac, which dumped 18 inches of rain in four days — six inches in one five-hour period.

"I can see things as soon as they happen.

If we have a lightning strike, which is a serious problem for automated treatment facilities, we can switch to manual operations immediately."

TED YARBORO

"We had no spillage or overflow," he says, even though many older properties are connected to the new sewer system. Leaks at those properties are common sources of inflow and infiltration, and are being fixed on a continuous basis.

In 2008, the city received the EPA Region IV PISCES award for the forward-looking approach among state revolving funded projects. The city also has received Peak Performance Awards from the National Association of Clean Water Agencies for seven years running. "The city has moved proactively on wastewater and stormwater," says Yarboro. "It took charge and took the lead, and it deserves the recognition it has received for this effort." **tpo**

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Sewage to Energy

PHILADELPHIA INSTALLS AN INNOVATIVE WASTEWATER GEOTHERMAL SYSTEM AS PART OF A LARGER STRATEGIC PLAN TO SAVE ENERGY AND USE MORE RENEWABLE ENERGY SOURCES

By Lisa Balcerak

The City of Philadelphia is using new geothermal technology to harness energy from wastewater to meet energy conservation objectives and save a projected \$15,000 annually.

Mayor Michael Nutter launched the Greenworks Philadelphia initiative in 2008, aimed at making his community the No. 1 green city in America. In alignment with Greenworks Philadelphia, the Philadelphia Water Department (PWD) developed a strategic plan to meet energy conservation and generation objectives and formed a four-person energy team to identify and evaluate green energy opportunities.

“By using the heat source of the sewage, we can extract a lot more energy at a lower cost rate.”

PAUL KOHL



Mathew Varghese, wastewater treatment plant operator, monitors data from the sewage geothermal installation.



PHOTOS COURTESY OF THE CITY OF PHILADELPHIA

The geothermal installation consists of a heat pump, filter and the piping needed to extract thermal energy from the wastewater.

LOOKING AT SEWAGE

The PWD provides water, wastewater and stormwater services for the Greater Philadelphia Region. The utility serves the city's population of 1.5 million along with portions of Montgomery, Bucks and Delaware counties. Its 3,000 miles of sanitary sewers convey wastewater to three treatment plants that process a combined average of 491 mgd.

In 2009, the PWD began discussions with Philadelphia-based NovaThermal Energy about the possibility of installing a wastewater geothermal unit. At the time, wastewater geothermal technology was commonly used in Asia but had not achieved widespread use in the United States.

Traditional geothermal technology is a well-established renewable building climate control method but is not a viable option for densely populated urban centers such as Philadelphia. The drilling required for geothermal well installation can be challenging and cost-prohibitive in a heavily urbanized area.

“It became clear that a traditional geothermal application wasn't the way to go,” says Paul Kohl, energy program manager at PWD. “But when we looked at sewage, we realized that instead of going vertically down, we could go horizontally. We wouldn't have to drill.”

The PWD chose the Southeast Water Pollution Control Plant, its smallest and newest, as the location for the geothermal system. NovaThermal Energy agreed to own and maintain the equipment for five years. The company also provided \$90,000 of the \$240,000 project cost; the balance was covered by an Energy Efficiency Community Block Grant via the Philadelphia Industrial Development Corporation.

POWER FROM WASTEWATER

In 2011, contractor Limbach Company designed the piping and pumping portions of the system and subsequently installed the sewage geothermal system, which is comprised of piping, a heat pump,



A solar energy installation at the Southeast Water Pollution Control Plant consists of 1,012 photovoltaic panels.

"If we get funding, we would like to install sewage geothermal technology in the center so we can let the next generation know that we can extract heat energy from sewage."

PAUL KOHL

and a proprietary filtration device. The system went online in April 2012.

The system taps a small sidestream of graywater, which has already passed through preliminary and biological treatment. The sidestream enters a highly efficient heat pump that extracts 978,000 Btu per hour from the graywater. The heat pump generates four units of heat for every unit of electric power supplied, significantly more efficient than the natural-gas boiler that handles all additional heating needs at the plant.

"A good gas-fired boiler takes 85 percent of the energy you put in to heat the water," Kohl says. "In contrast, using the heat source of the sewage, we can extract a lot more energy at a lower-cost rate. The geothermal unit is basically an amplification machine."

The sewage geothermal system fulfills about 20 percent of the facility's heat load, which translates to a projected \$15,000 in annual energy savings. Although the system can both heat and cool, it is currently used only for heating. Use of its cooling capacity would significantly increase its return on investment.

In order to make the best use of the existing piping system, the sewage unit is tied into the plant heat loop ahead of the boilers, so the boiler controls are still in operation. When the heat pump produces enough water at 130 degrees F, the boilers remain off. If the load exceeds the capacity of the heat pump, then the boilers respond.

"Operationally, it's easier to be tied into the existing heating control loops so the operators don't have to switch from one heating system to another," says

Doug Cowley, assistant plant manager at the Southeast plant. "The standard heating system just comes on automatically so the operators don't have to worry about it. It takes care of itself."

PUBLIC EDUCATION

To increase public interest in the use of sewage as a renewable energy source, the PWD hopes to add a sewage geothermal system display to the Fairmount Water Works Interpretive Center, a department-owned and -operated educational facility that teaches school groups and the general public about aquatic ecology, stormwater control, pollution, and water and wastewater treatment.

That facility is housed in the Fairmount Water Works facility, which was the first successful water pumping station, using water wheels and turbines powered by the river to pump water to a reservoir that provided gravity-fed water to the city as early as 1822.

(continued)

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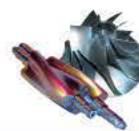
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A NovaThermal unit extracts thermal energy from wastewater in a mixed liquor channel to fulfill the heating needs of the plant's compressor building and gallery.

"We have a rich history of energy management and energy control. What the department has done well for years behind the scenes is now being showcased to the public."

PAUL KOHL

"If we get funding, we would like to install sewage geothermal technology in the center so we can let the next generation know that we can extract heat energy from sewage," Kohl says.

Partnering with consultant Black & Veatch, Kohl and his energy team focus on ways to conserve and generate energy throughout the PWD. Several large energy projects have been implemented over the past few years. A 248 kWp photovoltaic solar array installed at the Southeast plant in

April 2011 generates 350,000 kWh annually, supplying 5 percent of the facility's electrical load and saving about \$30,000 annually.

Funding for that \$1.6 million project was split evenly between the PWD and a U.S. Department of Energy (DOE) Energy Efficiency and Conservation Block Grant. The DOE Solar America Cities program provided technical assistance.

The PWD also partnered with the Philadelphia International Airport in 2009 to co-digest aircraft deicer runoff. Annually, the airport sends 2.8 million gallons of deicer runoff to the Southwest plant to

be added to the anaerobic digesters. "This is a sustainability partnership that meets everyone's needs," Kohl says. "We can provide a cheap alternative method of disposal for the airport, and, in return, we produce more gas."

The digester gas at the Southwest plant fuels a biosolids recycling facility that pelletizes the material from the city's treatment plants. These biosolids pellets are used for farmland application and as fuel at a cement kiln.

A biogas-fueled cogeneration facility at the Northeast Water Pollution Control Plant, designed to generate 40 million kWh annually, is expected to be online in summer 2013. It will be the city's biggest alternative energy system project to date. "The PWD has a rich history of energy management and energy control," Kohl says. "What the department has done well for years behind the scenes is now being showcased to the public." **tpo**

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H A N D S - O N KNOW-HOW

JOE UNDERWOOD HELPED SUSTAIN THE MUSCLE SHOALS WASTEWATER TREATMENT PLANT USING INGENUOUS METHODS UNTIL THE CITY COULD COMMIT TO A \$13 MILLION UPGRADE

By L.K. Williams

SMALL TANKS: OPERATORS ARE FAMILIAR WITH THEM AND KNOW that large tanks often seem too costly in smaller towns. So, like Joe Underwood, they tap into their creative side and often make do with what is on hand.

After the Muscle Shoals Wastewater Treatment Plant's polymer mixing system couldn't keep up with demand, chief operator Underwood and his three-member crew got to work. "We obtained two one-way totes from a local chemical company and used schedule 80 PVC pipe and fittings from previous jobs to hook them up to our polymer pumps," Underwood recalls.

It only took a short time each day to prepare enough polymer manually for a full shift of the Komline-Sanderson belt press run. "Our cost was exactly zero dollars, and this system served us very well for the last 10 years," he says.

That's just one of the projects undertaken over the last few years by Underwood and his team, which includes lead operator David Moore and operator Keith Woodley (Grade IV certifications), and operator trainee Brad Isbell (working toward Grade IV).

The plant used the 1-meter belt press and manual mix polymer system for dewatering since 1995. But by August 2012, the Utilities Board replaced it with an Andritz centrifuge and a Fluid Dynamics polymer system. A Clean Water Act State Revolving Fund grant, a 2008 bond issue and general funds enabled Muscle Shoals to upgrade the facility's solids processing system and much more.

TREATMENT TROUBLE

The original Muscle Shoals plant started up in 1964. In 1986, the city Utilities Board expanded the 0.5 mgd extended aeration activated sludge plant to 1.3 mgd design capacity, in the process adding a new aeration basin and converting the old aeration basins into clarifiers. In the mid-1990s, the board added diffusers and abandoned the old clarifiers for two new ones, increasing capacity to 2 mgd.



Joe Underwood, chief operator, Muscle Shoals Wastewater Treatment Plant.
(Photography by Danny Mitchell)

Underwood mentions the city's "growing spurt," which has been placed at 10 percent per year over the last decade, as a cause for concern. According to the U.S. Census Bureau, the 2010 population was more than 13,000.

"The city outran the plant," Underwood says. "Our treatment fell off as far as capacity and efficiency. We saw this coming. I was trying to inform our previous board of managers that we needed to do something. I don't think they realized how fast the consent order was coming. Finally after we had several violations, it came pretty fast."

The Alabama Department of Environmental Management (ADEM) cited the plant for an ammonia nitrogen violation in the summer of 2007 and assessed administrative and judicial penalties of almost \$12,000.


QUICK TURNAROUND

After changes in leadership, the facility was brought back into NPDES compliance. "The manager we have now [James Vance] and our five-member board were willing to do whatever it took to do things right," Underwood says. A new engineering firm, Engineers of the South in Florence, Ala., had drawn plans for a new plant and put out bids within a year. By 2010, the new 4 mgd facility was up and

running. "We went probably 2.5 years from the time we were under a consent order to the time we were back in compliance," Underwood says.

The upgraded Muscle Shoals Wastewater Treatment Plant uses fine-bubble, fixed-grid aeration diffusers (Sanitaire – a Xylem Brand), centrifugal blowers (Gardner Denver), and a chemical feed system (Grundfos Alldos pumps) for disinfection with 12.5 percent bleach.

Milltronics (Siemens Water Technologies) and Rosemount (Emerson Process Management) flowmeters were installed in open channels and closed pipes. The return activated sludge and waste activated sludge pumping station uses automated valves and screw centrifugal pumps (WEMCO-Hidrosta). Operators now maintain motorized valves (DeZURIK) and use a SCADA system from Revere Control Systems.

A man in a blue t-shirt and jeans is crouching on a metal platform, working on a green Grundfos pump. He is wearing safety glasses and a watch. The pump is connected to a blue control box. In the background, there is a large electrical panel with red and green buttons, a grey trash can, and a white wall with pipes.

"I worked in construction.
I was an ironworker and
I worked in mechanical.
I've done drafting,
worked on engines.
I've done pretty much
everything in my life."

JOE UNDERWOOD

Ingenuity and creativity are hallmarks of Joe Underwood's leadership at the Muscle Shoals Wastewater Treatment Plant (chemical feed pump from Grundfos).

Leading a team and developing members' talents is part of the job for Underwood, shown with Brad Isbell, operator trainee, titrating a sample in the plant lab.



profile

Joe Underwood, Muscle Shoals (Ala.) Wastewater Treatment Plant



POSITION: Chief operator

EXPERIENCE: 24 years

DUTIES: Oversee daily operations and staff, report to general manager, collect information for discharge monitoring reports

EDUCATION: College courses at Northwest Shoals Community College

CERTIFICATION: Grade IV wastewater

GOALS: Keep the plant ahead of city growth; keep up with treatment technology

GPS COORDINATES: Latitude: 34°45'29.92" N; longitude: 87°43'03.24" W

The bleach disinfection system replaced UV disinfection which, while widely accepted, did not work well for the specific conditions at Muscle Shoals. "Our water has high dissolved calcium and dissolved iron content from the Tennessee River and minerals in the ground that basically caked the quartz on the bulbs," says Moore. "A lot of other places that we talked to don't have that problem."

The bleach system has worked well: "Our *E. coli* count is usually very

FREE WATER

Using potable water at a wastewater treatment plant is "water lost" and "money wasted," says Joe Underwood, chief operator at the Muscle Shoals Wastewater Treatment Plant. The plant team had been using city water for washdowns and to curtail foaming on the tops of the clarifiers.

Underwood and lead operator David Moore had a better idea: They proposed an effluent reuse system from SyncroFlo, a pumping systems solutions company. Utilities board manager James Vance and the board's engineering firm ran the numbers and added the system to a recent project bid. The plant team expects a 2.5-year payback on the \$250,000 investment.

The system pulls disinfected effluent back into the plant and saves the cost of using potable water for plant processes. Operators use it for washdown, for the grease and grit system, for the biosolids centrifuge, and for other purposes.

"It's really been worth it," says Underwood. "We use water we've treated and not water from the water plant. It's a freebie, actually. We can also use this water for on-site irrigation — rose gardens and shrubs."

low," Underwood says. Disinfected wastewater is dechlorinated using sodium bisulfite before discharge to Pond Creek.

The plant's two circular clarifiers had also been problematic: "We had an awful time with algae buildup in the trough. We had to go out there every week, get on our boots, get in the trough with brushes and hoses and clean off the algae." The clarifiers were upgraded with fiberglass covers (NEFCO Incorporated) over the troughs.

"In over two years, we have only had to clean the weirs and troughs once," says Underwood. "That was probably some of the best money spent on the whole project. The covers weren't cheap, but they were well worth the money." The lesson, he says, is that product discussions among operators and managers should key in on the potential problems of using any particular system: It's valuable to know up front what can go wrong and figure out how to resolve it.

RIGHT PLACE, RIGHT PEOPLE

If the Muscle Shoals plant has come a long way, so has Underwood, a native of Tuscumbia, Ala., who worked in several industries before staking his future in wastewater treatment. "I worked in construction. I was an ironworker and I worked in mechanical. I've done drafting, worked on engines. I've done pretty much everything in my life," Underwood says.

All this experience, including time in nuclear, coal-fired and hydroelectric power plants along the Tennessee River, prepared him for work at a wastewater treatment plant. Underwood notes that today, most new hires have taken water and wastewater management courses and some have completed degree programs. "I learned the 'hand' work first, and then I learned the paperwork and got my certification," he says. "It worked out."

He recalls that in the 1960s when he was a kid, his uncle had a job at the Tuscumbia wastewater treatment plant: "We would ride our bicycles down there. I didn't really know what was happening or how it worked, but I remember knowing what it was. I never had any idea in the world that I would end up doing this.

"I have always enjoyed a challenge. The water and wastewater treatment field is not a job that everyone can do. You are learning new things and having to meet and solve problems on a daily basis. It takes a lot of training and dedication to become certified as an operator, and the pleasure of knowing I have met these challenges is my reward."

(continued)

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The Muscle Shoals team includes, from left, Keith Woodley, Grade IV operator; Brad Isbell, operator trainee; Joe Underwood, chief operator; David Moore, lead operator; and James Vance, utilities board manager.

"It takes a lot of training and dedication to become certified as an operator, and the pleasure of knowing I have met these challenges is my reward."

JOE UNDERWOOD

Underwood hired Moore, his second in command, about 20 years ago, and Woodley came on board 12 years ago. Isbell has been with the team for two years. "I really don't have to tell the operators their job because they know what they're supposed to do," Underwood says.

The crew of four did all plant maintenance until the Utilities Board hired dedicated employees to maintain equipment at both the water and wastewater treatment facilities in 2009. This staff expansion freed Underwood's team to work on process control.

RECOGNIZING PROGRESS

When issues arise, the team brainstorms possible solutions. "I listen to everybody's ideas and we try to choose the best one," says Underwood. "I'm not hard-headed and saying that we have to do it my way. I enjoy working with my operators. I've been around them for many years and we get along well."

But the Muscle Shoals team is bigger than its operators. Underwood credits Vance, the Utilities Board and the engineering firm for contributing to the plant's success. "That is why I believe we have a well-run plant: they listen to us and have given us everything they could to make it really easy to stay in compliance." In addition, the facility's distribution and maintenance departments keep the lines and pumping stations in order. "Without any of these people, we would be in trouble," he adds.

The Alabama Water Environment Association, of which Underwood is a member, in 2011 presented the Muscle Shoals plant with a Wastewater Excellence Award. Members of the AWEA awards committee actually visit and inspect nominated facilities. What they saw at Muscle Shoals obviously made an impression.

"All of the basins are not new, but if you came to look at the plant, you'd think they were new," Underwood says. He also regards the plant's quick recovery from non-compliance as an important achievement. The inspectors noted that, observed the homemade polymer system, noted how long the team had operated the plant by hand, and appreciated the written standard operating procedures (SOPs) and detailed paperwork. "We just made things work because we had to," Underwood explains.

PUBLIC IMPRESSIONS

One highlight the Muscle Shoals team shared with inspectors was the plant's public tour program. The presentation changes depending on the audience, which often includes school classes and church groups. "We stress how to keep the water clean," Underwood says. "That's all we have, that's what God gave us."

"Ninety percent of them, regardless of age, say the water just goes down that little hole. And then we say, 'Well, if we don't clean it, it goes into the river and the next town down there picks it up and puts it in their pipes.' And then they're sitting there looking at you thinking, 'Well, I live in that next town.' After the tour, they think about that a little bit."

For Underwood's part, he thinks often about the future of his plant and community. "I want to see the wastewater treatment plant and the water treatment plant stay ahead of city growth," he says. "The people are in place. We just need to keep up with all the new treatment technology. That is the key to having a great operation that will always be an asset to the residents of Muscle Shoals." **tpa**

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A REAL-TIME FERRIC CHLORIDE FEED CONTROLLER OPTIMIZES PHOSPHATE REMOVAL, SAVES MONEY, AND EASES PERMIT WORRIES AT A WISCONSIN TREATMENT PLANT

By Scottie Dayton

From July through mid-October, wastewater from vegetable and cheese processing facilities caused phosphorus spikes at the Beaver Dam (Wis.) Wastewater Treatment Plant. Operators sampled phosphorus just before the effluent outfall three times per week and adjusted the liquid ferric chloride feed accordingly.

"We were chasing our tail a little because the adjustment was always after the fact," says utility foreman Rob Minnema. "If we were high one week, we overfed ferric to make sure the average for the month was below our 1.0 mg/L total phosphorus limit." The average dose was 300 gpd at 12.5 gph.

An upgrade completed in spring 2011 increased the plant's average design flow from 3.5 mgd to 5.6 mgd. It also moved the ferric feed points from between the three primary clarifiers and aeration basins to ahead of the secondary clarifiers, increased the size of the insulated ferric storage tank from 8,000 to 12,000 gallons, and replaced the two alternating chemical transfer pumps with new models from ProMinent.

"But we still didn't have a system that automatically controlled the feed rate," says Minnema. "When our Hach representative, Jim Burke, contacted us looking for a plant willing to do a three-month pilot



The ProMinent ferric chloride pump system at the Beaver Dam Wastewater Treatment Plant.

project on their real-time phosphorus control system, we said yes."

The study ran from December 2011 through February 2012. "Based on our effluent flow and influent orthophosphate that varies from 23 to 27 mg/L, we programmed the effluent orthophosphate setpoint to 0.60 mg/L to ensure that we stayed below our limit," says Minnema. "Our average ferric dose of 5.55 gph resulted in a 56 percent reduction in chemicals." After the study, the utility purchased the equipment.

COMPUTER IN CONTROL

The extended aeration activated sludge plant treats an average of 3.5 mgd from 16,000 residents and discharges to the Beaver Dam River. Two to three times per month, a 4,500-gallon tanker truck delivers ferric to the storage tank. The acidic liquid flows through a PVC feed system.

The Hach phosphorus control system included the RTC101 P-module, Filtrax filtration unit, PHOSPHAX sc phosphate analyzer, and sc1000 digital controller. "The analogy Jim used for the RTC is that it's like cruise control for the plant," says Minnema.

The RTC calculates the ferric dose in real time based on plant flow and orthophosphate level, then sends a 4-20 mA signal to the PLC controlling the transfer pump. If the phosphate or flow input is disrupted, the RTC refers to previous profiles to ensure that effluent compliance is maintained until the signal is restored.

Every five minutes, the Filtrax draws a sample and the PHOSPHAX measures it with ± 0.05 mg/L accuracy and reproducibility. The sc1000 controls RTC parameters, signal validation and telecommunications. Operators use a touch screen to program the controller.



LEFT: Rob Minnema, utility foreman, checks the parameters on the sc1000 digital controller, part of the Hach phosphorus control system. BELOW: The system includes a PHOSPHAX sc phosphate analyzer (left), sc1000 digital controller (above), and Filtrax probe in a sample tub.





Operators Travis Walker (left) and Jim Riege enter operations data and monitor the SCADA system at the Beaver Dam plant.

Hach wastewater specialist Bob Dabkowski was instrumental in the setup of the new system and training the plant team to use it. "We installed the hardware with Bob assisting us, and he worked with our programmer," says Minnema. "The RTC mounts in the PLC cabinet and integrates to our PLC/SCADA systems for additional redundancy." The touch screen mounts above the PHOSPHAX unit next to the sample tub.

Operators tapped off the effluent sample line and ran it to the tub with the Filtrax probe. They installed and configured the system and had it working in two days without disrupting plant operations.

"At our current ferric cost of \$1.15 per gallon, we saved \$17,388 during the test period. Estimated annual savings of \$50,000 to \$70,000 have more than paid for the system."

ROB MINNEMA

MEETING THE LIMIT

Dabkowski introduced the operators to the software, showing them how to open certain fields and adjust setpoints. "The touch-screen menu was easy to navigate," says Minnema. "Everyone caught on quickly."

The test period also included software adjustment, quarterly instrument maintenance, remote performance monitoring, and monthly performance reports from Hach. Now Minnema can request reports or ask Hach technicians to log in for technical support if needed.

Twice a month, operators drain and rinse the sample tub and clean the filter probe. They change the two reagents quarterly. During months of higher loading, the ferric feed rate may increase from 5.55 gph to 8 gph. "At our current ferric cost of \$1.15 per gallon, we saved \$17,388 during the test period," says Minnema. "Estimated annual savings of \$50,000 to \$70,000 have more than paid for the system."

While feeding less ferric should produce fewer solids, the plant has too many variable industrial waste-

water streams for Minnema to analyze a reduction in handling costs. "I'm sure there are some savings, but I can't quantify them," he says.

Besides affordability, a major benefit was peace of mind. Previously, Minnema and staff worried about whether the plant was over or at its limit for the month. "Now, the RTC controls the dose and I know we will be within our limit," he says. "We've had the system for a year and it has worked flawlessly." **tpo**

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A HOLISTIC APPROACH TO ODOR CONTROL LOOKS AT KEY TREATMENT PLANT AREAS AND APPLIES INNOVATIVE APPROACHES IN THE COLLECTION SYSTEM

By Ted J. Rulseh

Odors from wastewater facilities can be a nuisance, not just to neighbors but to the operators who need to identify the causes and devise remedies.

There's no surer way for a clean-water agency to lose friends than to generate odors that bring complaints. The problems can be elusive and the solutions are not always obvious. The Mount Holly (N.J.) Municipal Utilities Authority is taking a big-picture approach to odor control with help from BioAir Solutions, a supplier of biotrickling filters.

Mount Holly has deployed the biotrickling filters in its two wastewater treatment plants and at strategic locations in its collection system, which includes 175 miles of gravity sewers and force mains and 42 pumping stations, all serving six towns. So far, the systems are complying with state Department of Environmental Protection (DEP) limits on odor discharges and have eliminated odor complaints from pump station and treatment plant neighbors.

They have done it under a concept BioAir calls Total Odor Solutions. Mount Holly Executive Director William G. Dunn Sr., Deputy Director of Operations Joel Hervey, and BioAir President Louis D. le Roux spoke about the concept in an interview with *Treatment Plant Operator*.

tpo: What exactly is meant by Total Odor Solutions?

le Roux: It means taking a holistic approach to solving odor problems. Many times we see that plant teams are reactive and only deal with symptoms. The concept of Total Odor Solutions is that you can use biological odor control to treat all the various odor sources at the treatment plant as well as in the collection system to provide a comprehensive solution. Biological odor control can be used in the vapor phase for all these applications to provide a reliable, environmentally friendly solution. Mount Holly has used quite a lot of liquid-phase treatment, in which you add chemicals to the sewage to help prevent odor release at pump stations and drop structures.

tpo: What's wrong with simply reacting to problems as they arise in the community?

"If you put one odor-control system in a strategic location, it can help with odor problems at multiple locations, instead of just where the calls are coming from. That's part of what we have done with Mount Holly."

LOUIS LE ROUX

le Roux: Typically, agencies look at where the complaints are coming from and say, "Let's see how we can solve the problem there." It's a very narrow approach, based on the assumption that the cause of the problem is located where the symptom is manifested. Often that is not the case. Sometimes the actual cause is upstream.

We say that if you have a problem in one area of the collection system, for example, let's look at the drawings of the sewer lines and see how can we get



William G. Dunn Sr., left, and Joel Hervey of Mount Holly Municipal Utilities Authority.

more bang for the buck. What we often do is look at the hydraulics of the sewer line, and at the pump stations, siphons and other structures. If you put one odor-control system in a strategic location, it can help with odor problems at multiple locations. That's part of what we have done with Mount Holly.

tpo: Can you give an example to illustrate this concept?

Dunn: We have two main pump stations called Edwards Street and Kelly Drive, both of which, in turn, are fed by several other pump stations upstream. We have lines that have a 10- to 17-hour retention from the time the material leaves a given pump station until it gets to the next one.

The odors generally come in the morning after material in the line has been standing overnight. When the pumps start up, they eject material that has become odorous. We installed biotrickling filters at the two main pump stations that create a vacuum and draw on the lines coming into those stations. The odor is pulled in and treated, rather than waiting for the flow to reach the pump station and taking care of what's in the wet well.

le Roux: If we were taking a symptom approach, we probably would have installed two or three smaller odor-control systems in different locations, and they may not have been as effective. Instead, we installed a single unit at the pump station and created a vacuum into the various branches of gravity sewers.

tpo: How does the biotrickling filter technology work?

le Roux: Whereas a biofilter typically uses organic media such as wood chips, a biotrickling filter uses structured plastic media to which bacteria adhere. The smelly air comes in the bottom of the reactor and flows upward

through the media in countercurrent to water flow in the system.

The system contains zones of autotroph and heterotroph bacteria. As the air passes through the autotrophic zone, hydrogen sulfide is oxidized to sulfuric acid, which is flushed out of the system by the irrigation water. Farther up, in the heterotrophic zone, we oxidize organic compounds, such as methyl mercaptan, dimethyl sulfide and dimethyl disulfide. Then the clean air exits the top.

The system requires some water. At pump stations, we use potable water and add a little nitrogen and phosphorus and some micronutrients to make sure we feed the bacterial growth. At a wastewater treatment plant, we use secondary effluent as the water source.

tpo: What about the wastewater treatment plants? What odor problems existed there?

Dunn: We have two treatment plants, one older plant on Rancocas Road and a newer plant at Maple Avenue. We were looking to kill the odors in the old plant that we'd been fighting for years, and in the new plant we didn't want any to begin with.

Hervey: At Rancocas Road, we commissioned a study by Robert Bowker, a leading authority on odor control. He identified and quantified the constituents that were causing the odors. One was an ammonia-based odor from our leachate storage tank. The other was hydrogen sulfide at our headworks and sludge storage tanks.

Dunn: We have two odor-control units at Rancocas Road. A 4,000 cfm unit draws from some of the sludge tanks and from the channel system at the headworks. A 4,800 cfm unit draws from a 350,000-gallon leachate tank and from the remaining sludge tanks.

tpo: What equipment was installed at Maple Avenue?

Dunn: The Maple Avenue plant is two years old now. One of the mandates we had for that location was zero odor. Right next door to Maple Avenue is a rehab center for the hospital, which is only a couple of blocks away. It was a political battle to get a treatment plant approved for that location. We have an odor-control unit that covers flows coming into the plant from a pump station that serves the area, and another unit that covers our two trains of headworks.

tpo: What results have you seen at the treatment plants? How do you measure success?

Dunn: We measure, first of all, by the fact that we're not getting any odor complaints. For years at Rancocas Road, we had a bad reputation. The systems there are permitted processes. The DEP came in, looked at the processes, and dictated the parameters they wanted us to monitor, and how frequently. For example, they limited our H₂S discharge to 0.5 ppm by volume when the inlet concentration is less than 50 ppm, and to 0.01 times the inlet concentration if that level is greater than 50 ppm.

Hervey: For two years, we've been in total compliance with all the parameters DEP set for us, including discharge concentrations for H₂S and ammonia. There has been almost no odor whatsoever.

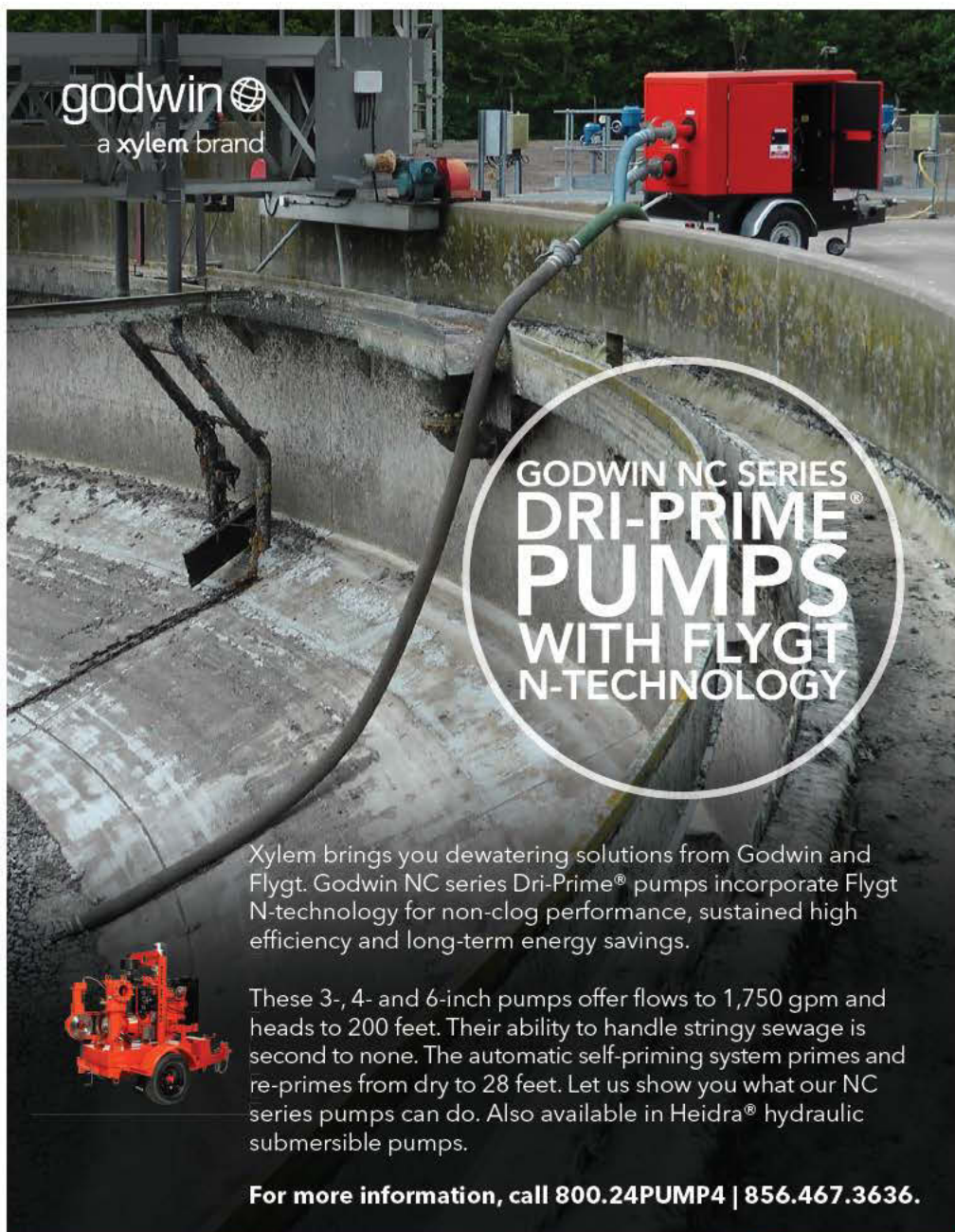
"There are no permits for the pump stations, but I can tell you firsthand that they have made a tremendous difference. When you drive up, you don't detect the H₂S that you typically did before we installed the units."

JOEL HERVEY

tpo: How successful have the units been at the pump stations?

Hervey: There, the effectiveness is determined by our neighbors and our operations personnel. There are no permits for the pump stations, but I can tell you firsthand that they have made a tremendous difference. When you drive up, you don't detect the H₂S that you typically did before we installed the units.

The neighbors can tell. We record and respond to every odor complaint we get. We have not received a complaint at the Kelly Drive pump station since



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the startup of that unit about 18 months ago. At the Edwards Street station we installed the odor-control system during a major upgrade two years ago. That station sits in a wooded area surrounded by homes and within 300 yards of the center of the town, so odors there are not an option. Based on my own observation and those of everyone who has had contact at that pump station, any odors that existed before have virtually disappeared.

We do some periodic checks on the filter discharge stacks at both pump stations and we have yet to measure any detectable H_2S concentrations.

tpo: What has it been like to operate, maintain and service these systems?

Hervey: They have been virtually trouble-free since we installed them. From a maintenance standpoint, they are a dream to work with. They operate well, and the controls and systems are well-thought-out and well-designed. Our operators spend minimal time dealing with them.

tpo: What are the next steps in the odor-control program? Are there plans to add more biotrickling filters in the collection system?

Hervey: The thought is there. We have another pump station in one of our outlying towns that has been troublesome in the past. It takes in wastewater from some pretty distant locations and has some long detention times in its force mains.

le Roux: Part of the uniqueness of the Mount Holly situation is that they have very diverse odor sources. In the sludge tanks, you have ammonia and organic odor issues. At the headworks, you have a lot more H_2S and less organic odor. At the pump stations, again the odors are very different. If you know the source characteristics, you can effectively apply biotrickling filter technology. Mount Holly is taking a systematic approach toward that. **END**



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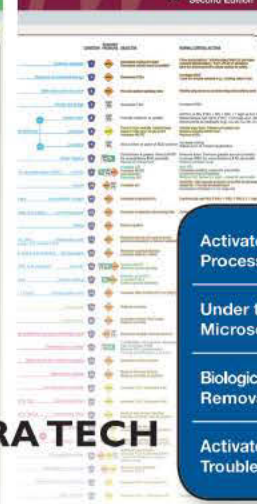
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 See ad page 3	Flygt – a Xylem Brand 14125 S Bridge Circle, Charlotte, NC 28273 704-409-9700 Fax: 704-295-9080 www.flygtus.com		YES		YES	YES			YES
 See ad page 43	Godwin, a Xylem brand 84 Floodgate Rd., Bridgeport, NJ 08014 800-247-8674 856-467-3636 Fax: 856-467-4841 sales@godwinpumps.com www.godwinpumps.com		YES			YES	YES	YES	
 See ad page 35	Gorman-Rupp Company 600 S Airport Rd., Mansfield, OH 44903 419-755-1011 Fax: 419-755-1251 grsales@gormanrupp.com www.GRpumps.com		YES			YES		YES	

	High Pressure	Metering	Peristaltic	Piston/Plunger	Progressive Cavity	Pump Alignment/ Vibration	Pump Controls	Pump Parts/ Components	Pump Repair/ Service	Rotary Lobe	Solids/Sludge	Submersible	Vertical/ Lift Station	Other
	YES										YES	YES		
								YES	YES		YES			
						YES					YES	YES	YES	Speciality
		YES	YES											
										YES	YES	YES		
	YES	YES		YES		YES	YES	YES						
	YES			YES			YES	YES			YES	YES	YES	
							YES					YES		
							YES	YES			YES			Vacuum
						YES								
		YES	YES		YES			YES						
					YES		YES	YES			YES	YES	YES	
	YES					YES	YES	YES	YES	YES	YES	YES	YES	
	YES						YES	YES			YES	YES	YES	

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 Komline-Sanderson See ad page 71	Komline-Sanderson 12 Holland Ave., Peapack, NJ 07977 800-225-5457 908-234-1000 Fax: 800-329-7457 info@komline.com www.komline.com					YES			
 KSB, Inc.	4415 Sarellen Rd., Henrico, VA 23231 804-222-1818 Fax: 804-226-6961 sales@ksbusa.com www.ksbusa.com		YES					YES	YES
 Lakeside Equipment Corporation See ad page 37	1022 E Devon Ave., Bartlett, IL 60103 630-837-5640 Fax: 630-837-5647 sales@lakeside-equipment.com www.lakeside-equipment.com	YES							
 Landia, Inc. See ad page 21	111 Triangle Trade Dr., Cary, NC 27513 919-466-0603 Fax: 919-466-1666 info@landiainc.com www.landiainc.com				YES			YES	YES
 LUDECA, INC.	1425 NW 88th Ave., Doral, FL 33172 305-591-8935 Fax: 305-591-1537 info@ludeca.com www.ludeca.com								
 Lutz-JESCO America Corp. See ad page 65	55 Bermar Park, Rochester, NY 14624 800-554-2762 585-426-0990 Fax: 585-426-4025 mail@jescoamerica.com www.jescoamerica.com		YES	YES			YES		
 Met-Pro Global Pump Solutions	700 Emlen Way, Telford, PA 18969 800-392-7621 215-723-8155 Fax: 215-723-2197 info@mp-gps.com www.mp-gps.com		YES	YES					
 Milton Roy Company See ad page 19	201 Ivyland Rd., Ivyland, PA 18974 800-693-4295 215-441-0800 Fax: 215-441-8620 info@miltonroy.com www.miltonroy.com			YES			YES		
 Moyno, Inc. See ad page 30	PO Box 960, Springfield, OH 45501-0960 877-486-6966 937-327-3200 Fax: 937-327-3177 info@moyno.com www.moyno.com			YES	YES	YES			YES
 Neptune Chemical Pump Company See ad page 10	295 DeKalb Pike, North Wales, PA 19454 215-699-8700 Fax: 215-699-0370 neptune.sales@psgdover.com www.neptune1.com			YES					
 NETZSCH Pumps North America, LLC See ad page 53	119 Pickering Way, Exton, PA 19341 610-363-8010 Fax: 610-363-8426 npa@netzsch.com www.netzschusa.com								YES
 Penn Valley Pump Co., Inc. See ad page 41	998 Easton Rd., Warrington, PA 18976 800-311-3311 215-343-8750 Fax: 215-343-8753 info@pennvalleypump.com www.pennvalleypump.com			YES			YES		
 Pentair	1101 Myers Pkwy., Ashland, OH 44805 888-416-9513 419-281-9944 Fax: 419-281-9980 enewsreplies@pentair.com www.pentair.com		YES		YES	YES	YES	YES	YES
 ProMinent Fluid Controls, Inc.	136 Industry Dr., Pittsburgh, PA 15275 412-787-2484 Fax: 412-787-0704 sales@prominent.us www.prominent.us			YES			YES		
 Pulsar Process Measurement Inc. See ad page 44	4565 Commercial Dr., Ste. 105, Niceville, FL 32578 850-279-4882 Fax: 850-279-4886 info.usa@pulsar-pm.com www.pulsar-pm.com								

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	YES			YES			YES	YES	YES		YES			
	YES							YES	YES		YES	YES	YES	
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	YES	YES		YES			YES	YES						
							YES	YES				YES	YES	Dry Pit
	YES	YES		YES	YES		YES	YES	YES					
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		YES												
		YES			YES			YES		YES	YES			
				YES							YES			
	YES			YES			YES	YES	YES		YES	YES	YES	
	YES	YES	YES				YES							
							YES							

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// The team members are the greatest resource at this plant. They know it. They've been here forever. They do the work. I'm support staff. I coordinate what they do, and the best way for me to do that is to listen to what they have to say."

Nate Tillis, Operations and Maintenance Supervisor
Beloit (Wis.) Water Pollution Control Treatment Facility

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					YES								
						YES	YES		YES				
				YES	YES	YES	YES		YES	YES			
					YES	YES	YES		YES			YES	Grit
YES	YES		YES		YES	YES	YES	YES	YES	YES			Positive Displacement
					YES	YES	YES		YES	YES		YES	
YES					YES	YES	YES						Packaged Pump System
YES		YES		YES		YES			YES	YES			
									YES	YES		YES	
	YES							YES	YES	YES			
YES	YES	YES							YES				Positive Displacement
				YES				YES					Positive Displacement
YES									YES	YES		YES	

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THAT HELPS A PLANT TEAM CORRECT OPERATING
ISSUES AND ACHIEVE PERMIT COMPLIANCE

By Ron Trygar

The Lab Detective was asked to provide some informal training about nitrogen removal in wastewater treatment plants, including a discussion of the various flow schemes used to remove nitrogen from the waste stream and return it to the atmosphere.

Always one to oblige, the detective launched into a lengthy description of the various forms of nitrogen in raw wastewater, how it got there, and where it goes. “Nitrogen enters the waste stream mostly from human beings in the form of urea,” he explained.

“This organic form of nitrogen experiences some changes through the wastewater collection system, since it is combined with water to help carry it to the treatment plant. As the mixture of urine, fecal material, food waste, paper products and other flushable items make their way through the pipes, the organic nitrogen in the urine converts to ammonia and ammonium, the amount of each depending on the water temperature, pH and time in the collection system.”

An operator asked, “So, which is it — ammonia or ammonium?”

The detective thought for a moment before replying, “I’m glad you asked, James. Great question! If the influent wastewater temperature stays between 15 to 30 degrees C and the pH is between 6.5 to 8.0, then ammonium ions dominate and we are really seeing ammonium at the headworks.”

James replied, “OK, so what does all that mean?”

“Well,” replied the detective, “it means the form of nitrogen expressed as ammonium ion is present in the liquid as a part of the liquid, a charged particle containing one part of nitrogen and four parts of hydrogen. It’s expressed as NH_4^+ ; the plus sign designates it as a positively charged ion. Some folks call it ionized nitrogen. When nitrogen is in the un-ionized form, we call it ammonia, or NH_3 , and it exists as a dissolved gas in the water, like oxygen.”

The “light bulb” came on above James’ head and he replied, “Oh, like when I started up my aquarium and most of the fish I put in died. The salesperson at the fish store said they probably died from too much ammonia, a result of their own waste overwhelming the tank, now I get it!”

NITRIFICATION

The detective continued, “Once the ammonium reaches the wastewater treatment plant, it continues to change. When oxygen is used to treat the wastewater entering the plant, some bacteria begin



FIGURE 1: A properly operating anoxic basin is gently blended with no aeration.

PHOTO COURTESY OF RON TRYGAR

to use the ammonium as a source of energy. We call these specialized bacteria nitrifiers, and they use the energy gained from splitting the NH_4^+ along with calcium and other components in the wastewater to continue producing more nitrifying bacteria. Since these bacteria are normally strict aerobes, they do this process called nitrification in aeration tanks, or in tanks that contain enough dissolved oxygen.

“Nitrifying bacteria are pretty specialized. Several species live in our treatment plants, and this culture grows when the mixed liquor suspended solids (MLSS) environment is favorable to them. One species, *nitrosomonas*, can use oxygen during the oxidation of ammonium to a compound called nitrite. The second species, *nitrobacter*, carry on the oxidation of the nitrite to a fully oxidized form of nitrogen called nitrate.”

The detective reminded the operators that this occurs under aerobic conditions with a favorable liquid temperature, slightly basic pH, and a good supply of alkalinity present as a carbon source for the nitrifying bacteria.

DENITRIFICATION

During the description of denitrification, the detective explained, “A very large percentage of the bacteria present in activated sludge systems are facultative anaerobes, which means they can survive and reproduce in environments that contain free oxygen or alternate forms of oxygen, like the one found in the nitrate compound (NO_3), sulfate molecules (SO_4) or even molecules of carbon dioxide (CO_2). Denitrification takes place best in a tank considered anoxic — not oxic, or free of dissolved oxygen.” (Figure 1)

The operators seemed to understand. One said, “So now that we have a better grasp of the theory of nitrogen removal, tell us how this is supposed to work in our little treatment plant. It seems that our plant is built backwards, if the process works the way you say it does.”

“Great observation John!” the detective exclaimed. “The facility you operate is known as a Modified Ludzack-Ettinger (MLE) process.” (Figure 2)

THE MLE PROCESS

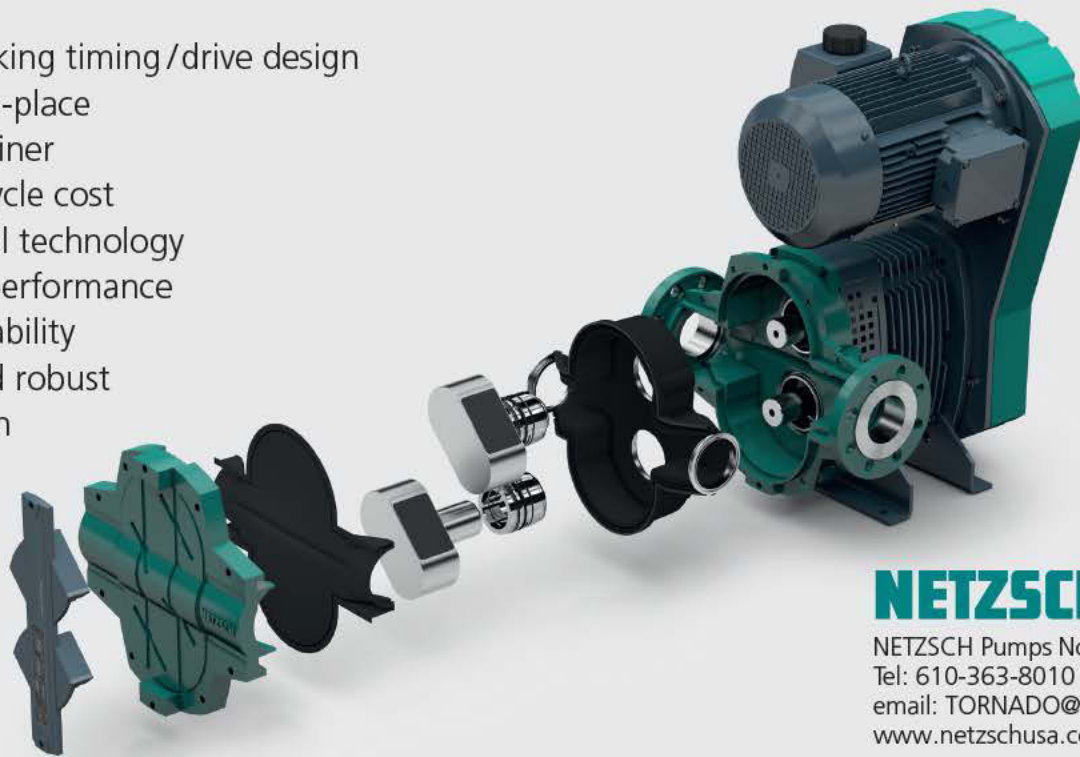
The detective went a little further. “Does anyone recall the environmental conditions required in the description of nitrification?” A young operator named Jared offered a correct list of the items needed for successful nitrification.

(continued)

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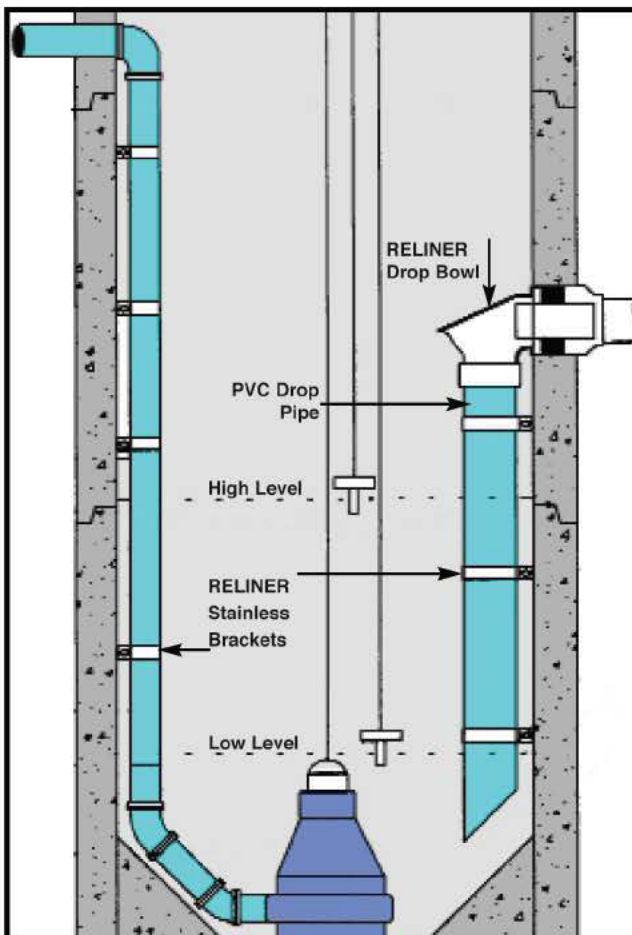
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“Great job Jared! That’s correct!” the detective said. Using the plant’s flow pattern description shown in Figure 2, he then asked, “If it takes all those necessary conditions to nitrify, then what is really happening to the ammonium that entered the plant during its time in the anoxic zone?”

James replied, “I guess, since it takes all that oxygen and stuff to nitrify, then probably nothing is happening to the ammonium in the anoxic tank, right?”

“Yes, correct James!” said the detective. “Theoretically, the ammonium is staying intact through the denitrification (anoxic) zone, then converting to nitrite and nitrate in the aeration tank (oxic zone).”

James added, “It’s like putting the cart before the horse, so to speak, isn’t it?”

The detective laughed. “Yes, it kind of is, James.”

During the training session, the detective asked that samples be brought in from various places around the treatment plant. He asked for screened influent, anoxic basin effluent, oxic basin effluent and clarifier effluent liquid samples. In the small lab at the plant, he performed a few process control tests with the samples, which included ammonia, nitrite and nitrate, alkalinity and pH, and orthophosphate.

The Lab Detective was stunned. The results did not reflect or confirm the material he described in his lecture on the MLE Process. Repeat analysis and accuracy checks with known standards only perplexed him further, since the QA/QC tests were all in line. The results (see Table 1) indicated that nitrification was occurring in the anoxic zone!

The detective used these results in a talk about using the data and applying it to the actual operation, turning the discussion into a makeshift troubleshooting session. He explained his hypothesis of nitrification occurring in the anoxic basin, looking for feedback from the operators.

Finally, James spoke up. “You know, it does seem to be quite aerated at the point where the return activated sludge (RAS) enters the anoxic basin,” he said. “I have seen some dissolved oxygen present in that area, but I figured the meter must be incorrect, since there shouldn’t be DO at that point. Sometimes I get a reading over 1.0 mg/L there.”

OUT TO THE PLANT

The detective calibrated his portable meters and lab equipment, did standard checks, and headed out to the treatment plant with the operators. Donning nitrile gloves, he began taking readings. The results confirmed the hypothesis conceived in the lab/classroom: nitrification was indeed occurring in the anoxic basin! Results of field testing showed that there was indeed dissolved oxygen in the anoxic basin in sufficient quantities to allow nitrification to occur and to greatly interfere with denitrification. Readings taken included:

- Dissolved oxygen (DO), mg/L
- Oxidation/reduction potential (ORP), millivolts
- pH
- Temperature, degrees C

The operators were particularly interested in the DO and ORP readings. Jared asked why the ORP was so low in the influent structure, yet the DO was over 1.0 mg/L.

The detective explained, “Remember that DO and ORP are not the same parameter. DO is a measurement of the amount of oxygen in solution, whereas ORP measures the liquid’s ability to be either more oxidative (positive mV readings), or more reductive (negative mV readings). When the ORP reads zero, we have a balance of oxidizing and reducing chemical constituents.”

Jared asked, “Isn’t that like pH then? A 7.0 pH is a balance between acids and bases, right?”

“Yes,” the detective confirmed. “Here in the influent wastewater, we have dissolved oxygen, an oxidizing agent, present from all the splashing and air entrainment. However, there are more reducing agents present than oxidizing agents, since the ORP reflects this. The

TABLE 1. Results of wastewater sample testing

Parameter	Influent	Anoxic Effluent	Aeration Effluent	Clarifier Effluent
Ammonia Nitrogen, mg/L	28	2	1	1
Nitrite Nitrogen, mg/L	0	1	0	0
Nitrate Nitrogen, mg/L	0	19	17	17
Total Alkalinity, mg/L as CaCO ₃	300	102	110	110
pH units	7.7	7.2	7.2	7.2
Orthophosphate, mg/L as P	8	-	-	7

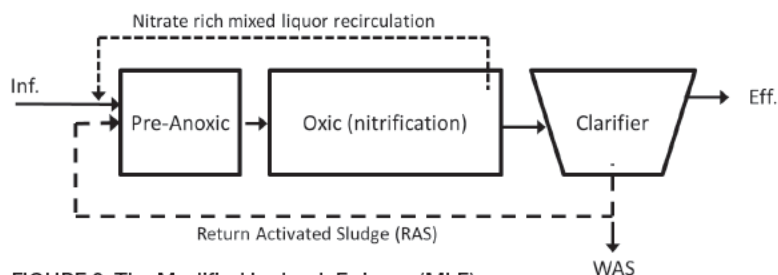


FIGURE 2: The Modified Ludzack-Ettinger (MLE) process.

most common reducing agent we encounter in influent wastewater is ammonia.” Even in the afternoon sunshine, that proverbial “light bulb” lit brightly over Jared’s head.

WHAT NEXT?

For this facility to properly remove the nitrogen from the wastewater and return it to the atmosphere, the anoxic basin needed to be optimized, and further readings indicated some level of DO throughout the basin. The Lab Detective worked with the operators to develop an action plan, including where and when to collect samples and take in-plant readings.

During the next week, the operators re-plumbed the RAS pump discharge and anoxic recycle discharge to be below the anoxic tank surface, eliminating the excessive splashing. Mixing of the anoxic basin contents was optimized by de-ragging the mixing pumps and redirecting the discharge flow to provide more thorough tank blending.

Re-piping of the influent flow stream to be in direct contact with the RAS and anoxic recycle flow helped the denitrification greatly. Since the piping at the facility was PVC, the modifications were relatively easy.

DO and ORP values decreased by the next day or so, and effluent nitrate results declined several days after that, achieving discharge permit compliance within two weeks. Since the Lab Detective’s informal training session and visit, the plant remains in compliance with its total nitrogen parameters, and the operators have been able to use the knowledge from this experience at other local treatment plants, enabling them to achieve compliance, too.

ABOUT THE AUTHOR

Ron Trygar is senior training specialist in water and wastewater at the University of Florida TREEO Center and a certified environmental trainer (CET). He can be reached at rtrygar@treeo.ufl.edu. **tpo**

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PUMP STATION MANAGER

The MultiSmart pump station manager from Multitrode is designed for fast and easy deployment. It uses pre-programmed logic to reduce operating costs and prevent failures, blockages and spills. It provides preventive versus reactive control, calculates pump efficiency,

and decreases pump station electrical consumption by leveraging the most efficient pump. Remote control programming reduces maintenance and troubleshooting costs and site visits. It includes PID controls for booster pumps and built-in local SCADA without HMI hardware and software. 561/994-8090; www.multitrode.com.

PLUNGER PUMP

Komline-Sanderson plunger pumps are self-priming, handle sludge with entrained gases, and have high volumetric and hydraulic efficiencies. Flow rates are not dependent on sludge concentration. The units are easy to clean and have large internal clearances. They have replaceable connecting rod liners and a packing arrangement that reduces leakage. 800/225-5457; www.komline.com.



Plunger pumps from Komline-Sanderson



Vertical Turbine Pump from Ruhrpumpen

VERTICAL TURBINE PUMP

The Vertical Turbine Pump from Ruhrpumpen has multi-stage capability, enabling high discharge heads. Because the suction is in the fluid being pumped, no efficiency is lost on the suction side of the pump. Site suction head can be increased by lowering the pump in the fluid being pumped. Systems can be designed to pump

fluids from deep levels. The pumps can be installed in areas where space is a problem and can be fitted with submersible motors to minimize noise. 918/627-8400; www.ruhrpumpen.com.



TORNADO T2 rotary lobe pump from NETZSCH Pumps

ROTARY LOBE PUMP

The TORNADO T2 rotary lobe pump from NETZSCH Pumps uses lobes running inside a metal housing with a replaceable elastomer liner. The design requires no O-rings or gaskets, yet has robust construction and is simple

to maintain. A single, synchronous-toothed timing belt replaces a gearbox. A pulsation-reduction sys-

tem of channels molded into the rubber walls of the pumping element releases lobe energy and dampens pulsation. The housing design permits full flange-to-flange access when servicing the pump and provides space to access pump internals without disassembling piping. 610/363-8010; www.netzschusa.com.

SOLIDS HANDLING PUMP

The Flowserve MPT self-priming solids-handling pump passes solids up to 3 inches and handles dirty, gritty water as well as free-flowing slurries, sewage, sludges and many trade effluents. It includes a back pull-out design, belt drive protection, quick-disconnect clean-out and external impeller adjustment, an abrasion-resistant mechanical seal, dual sight glasses, high-temperature capability, portability, oversized shaft and bearings, a solid one-piece flap valve, run-dry capability, oil-lubricated double mechanical seal, and externally adjustable clearances without shims. 800/728-7867; www.flowserve.com.



MPT self-priming solids-handling pump from Flowserve



Rotary Lobe Pump from Vogelsang

COMPACT ROTARY LOBE PUMP

The Rotary Lobe Pump from Vogelsang allows in-place maintenance and repairs without removing the pump from the baseplate or disconnecting the piping. Wet-end wear parts such as wear plates, lobes and seals can be replaced in about one hour. The pump has a compact footprint. Easy inline maintenance and small

wet-end parts allow the pump to be placed in locations without access to cranes or heavy moving equipment. Forward and reverse pumping capability simplifies pump systems for applications requiring backflushing or pipe stripping. 800/984-9400; www.vogelsangusa.com.

AUTOMATED ALARM SYSTEM

The StationComm automated alarm system from Smith & Loveless provides wireless pump station monitoring and control with a cellular-based automated alarm texting system that provides two-way communication between user and pump station. Users can text pump stations to remotely operate and maintain the control panel. Supervisors receive simultaneous messages while the system wirelessly sends sequential service messages to up to 10 operators with alarm messages. Various status checks include wet well level, pump run time, station temperature, flow rate and motor amperage. 800/898-9122; www.smithandloveless.com.



StationComm automated alarm system from Smith & Loveless

(continued)

VERTICAL PUMP MOTORS

TITAN II 5812 and 5813 frame vertical motors from Nidec Motor Corp. have a cast iron frame and insulated bearings with shaft grounding provisions. Bearing and winding temperature detectors are available. Both frame sizes are custom-built. The 5813 includes WPI and WPII (weather-protected) enclosures ranging from 250 hp to 1,750 hp. The motor is available as hollow or solid shaft in both low and medium voltages. The 5812 has a fan-cooled enclosure for applications in severe-duty industries. Speeds range from 400 to 1,800 rpm and power ranges from 200 to 1,250 hp. **888/637-7333; www.usmotors.com.**



TITAN II 5812 and 5813 frame vertical motors from Nidec Motor Corp.



Vacuum-Assisted Trash Pump from Thompson Pump

VACUUM-ASSISTED TRASH PUMP

The Vacuum-Assisted Trash Pump from Thompson Pump provides flows up to 11,000 gpm, heads up to 340 feet, and solids handling up to 4 inches. It provides fast dry-priming and automatic re-priming with high-pressure capability. The vacuum priming system operates with no oil lubrication, low maintenance and high air handling for faster priming.

The unit includes an end-suction centrifugal pump end with a heavy-duty cast iron casing and brackets, stainless steel shaft sleeves, cast iron impeller and wear rings, and an abrasion-resistant tungsten carbide mechanical seal. **800/767-7310; www.thompsonpump.com.**

PUMP CONTROL SYSTEM

The Eco Smart Station AB Control System from SJE-Rhombus provides a safe, simple, energy-efficient solution for optimum pump control in municipal lift stations. The 700-color display helps users monitor and configure the pump station. The controller provides energy-efficient level control, automatic pump alternation, flow monitoring, data logging, alarm logging and historical trending. It comes with an SD memory card for data storage and download. The control and power circuitry are isolated in separate compartments, protecting operators from high-energy circuits and arc flash. **888/342-5753; www.EcoSmartPanel.com.**



Eco Smart Station AB Control System from SJE-Rhombus



SCADAPack E Smart RTU pump station controllers from Schneider Electric

PUMP STATION CONTROLLER

SCADAPack E Smart RTU pump station controllers from Schneider Electric suit many water and wastewater applications. When used with ClearSCADA critical infrastructure remote management software, centralized SCADAPack E configuration and security management integration saves on total cost of ownership for geographically distributed water and wastewater assets. Encryption protects DNP3 data transmission using unique security keys, ensuring data confidentiality and integrity for revenue metering data and critical operations. **888/778-2733; www.schneider-electric.us.**

CONTROL PANEL

The OLS Series control panel from Orenco Controls contains integrated variable-frequency drives that optimize system operation, reduce energy usage, and prolong pump and system life by reducing hard starts and water hammer. Multiple drives can be configured through one simple human-machine interface. Engineers can pre-program user interfaces to site-specific needs. The outdoor-rated control panel, housed in a weatherproof enclosure, has circuit protection, heat dissipation systems, phase and voltage protection, and level controls. **877/257-8712; www.orencocontrols.com.**



OLS Series control panel from Orenco Controls



Sludge pumps from Schwing Bioset

SLUDGE PUMP

Sludge pumps from Schwing Bioset can pump dewatered biosolids from belt presses, centrifuges, plate and frame presses and screw presses. The pumps have a volumetric capacity

exceeding 300 gpm and operating pressures up to 1,885 psi. Along with non-flowable materials, they pump scum and grease. The pumps operate with a single-circuit, open-loop hydraulic system. A hydraulically actuated poppet valve works with the pump to prevent material back-flow and ensure proper sequencing of operations. **715/247-3433; www.schwingbioset.com.**

PIPE FLOW MONITOR

The Flow Pulse pipe flow monitor from Pulsar Process Measurement monitors flow rates for pump efficiency in sewage pumping stations. Ultrasound is fired through the pipe wall and reflected back from bubbles, particles and vortices in all directions. A digital signal processing system analyzes and integrates received signals over a wide frequency range, then slices them for real-time analysis and flow rate calculation. It operates in a flow range from 1 to 13 feet per second. The system provides repeatability and accuracy of ± 5 percent. **850/279-4882; www.pulsar-pm.com.**



Flow Pulse pipe flow monitor from Pulsar Process Measurement



Cake Pump System from seepex

CAKE PUMP SYSTEM

The piping-contained Cake Pump System from seepex replaces the open-air cake transfer method using conveyors. The pitch, diameter and speed of the auger can be adjusted to match the application, while load cells automate the process. The hopper is fitted with sensors that detect the increase in weight and adjust pump speed accordingly, saving energy. The system includes a pressure sensor, a dry-running protection sensor, a boundary layer injection system, and an engineered control panel. **937/864-7150; www.seepex.net.**

SCREW CENTRIFUGAL PUMP

The Triton screw centrifugal pump from Vaughan Company has an open-channel impeller that handles thick sludges, large or stringy solids, and delicate or highly abrasive materials. **888/249-2467; www.chopperpumps.com.**



Triton screw centrifugal pump from Vaughan Company



DIAPHRAGM METERING PUMP

The PHP-800 diaphragm metering pump from Omega Engineering has PVDF double ball valves, pumps up to 42 gph and handles output pressures up to 175 psi. The pump has a digital touchpad and backlit LCD display that shows the output percentage and diaphragm failure alarm status. A diaphragm failure detection system shuts off the pump head if a chemical leak occurs. **800/826-6342; www.omega.com.**

PHP-800 diaphragm metering pump from Omega Engineering



SUBMERSIBLE PUMP

The KRT series of submersible pumps from KSB includes a closed-loop cooling jacket that does not use the pumped media for cooling the motor. This cooling system provides optimal heat dissipation even if the submersible motors are exposed to the air, allowing the pumps to work continuously at low water levels. They are offered with several impeller types, and include mechanical seals and hard metal wear rings and sensors to monitor the motor windings, bearings, and mechanical seals.

KRT series of submersible pumps from KSB

The pumps also feature epoxy-sealed cable glands along with additional material variants. **804/222-1818; www.ksbusa.com.**

AC PUMP, FAN DRIVE

The 100 FLOW AC drive from Vacon is optimized for pump and fan applications and designed for water and wastewater applications. Features include Multimeter and Multifollower for simultaneously controlling multiple pumps, multilingual graphical display, configuration wizards for easy setup, and intuitive built-in block programming function for special needs, including retrofits. The drive has a power range of 0.75 to 250 hp and voltage range of 230 to 500. **717/261-5000; www.vacon.com.**



100 FLOW AC drive from Vacon



SUBMERSIBLE SHREDDER PUMP

S4SHR and S4SHR-LP 4-inch hydraulic submersible shredder pumps from Hydra-Tech continuously rip and shear solids with a 360-degree shredding action. A carbide-tipped impeller and hardened macerator suction plate produce a violent shredding action that keeps the discharge open. The pump's 21.5-inch diameter allows it to fit through most man-

S4SHR and S4SHR-LP shredder pumps from Hydra-Tech

holes. **570/645-3779; www.hydra-tech.com.**

METERING PUMP

MRoy Series metering pumps from Milton Roy offer application flexibility for efficient performance at capacities from 0.46 to 170 gph. The pumps have a design life of 30 years for the drive and 96,000 hours for the pure PTF0E diaphragm. Turn-down flexibility and the ability to accept process signals enable technicians to tune the pump to the application. **215/441-0800; www.miltonroy.com.** **tpo**



MRoy Series metering pumps from Milton Roy

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By Scottie Dayton

Sewage pump handles clogging solids

Problem

Vacuum trucks discharged septage to a clarifier scum pit at a New Jersey wastewater treatment plant, but the pump in the pit clogged daily and had to be pulled for service. The problem continued even after operators installed a basket to trap larger solids.

Solution

The plant agreed to test the **XFP 100E-CB1 submersible sewage pump with Contrablock Plus impeller from ABS/Sulzer Pump Solutions**, for 60 days and then run a comparison test using a chopper pump.

RESULT

At the end of the test period, the pump had not clogged. The customer bought it and cancelled the comparison test. The pump has remained clog-free. 203/238-2700; www.sulzer.com.



Pump with adapter relay resolves pump station issues

Problem

Seal failures on the 6-inch discharge pumps at the Wise Street Pump Station in Bradford, Ohio, frustrated primary operator Jay Roberts. Replacing the proprietary seals cost nearly \$3,000 per pump and took weeks, straining the maintenance budget. Roberts needed a pump that would warn of impending seal problems and be faster and less expensive to repair, while maintaining high clog resistance.

Solution

The village purchased a **4SHMD pump from Crane Pumps & Systems** with 25 hp motor from Barnes. A 4- by 6-inch slide rail adapter fit the station's 6-inch base elbow, and a MiniCAS adapter relay connected to the control panel and warned of impending seal issues with an alarm connection to the SCADA system.

RESULT

The station has been free of seal failures since the installation. Roberts plans to purchase another 4SHMD pump to replace a different failing unit. 937/778-8947; www.cranepumps.com.



Aerators eliminate odors

Problem

Waste streams traveling several miles from food processing plants to the Juelsminde (Denmark) Wastewater Treatment Plant arrived with serious odors.

Solution

Operators selected four **AirJet aerators from Landia**. They draw liquid into a chopper pump, also from Landia, that reduces solids to pieces.

RESULT

The aerators eliminated the odors. "They're very efficient and reliable," says operations manager Ulrik Folkmann. 919/466-0603; www.landiainc.com. tpo



VISITORS

A cow alligator tries to climb the fence behind the Manatee County Biosolids Dryer Facility in Bradenton, Fla.

PHOTOS COURTESY OF CHRIS HUGHES

Daredevil Gator

By Scottie Dayton

Raccoons, possums, armadillos and deer populate the rural property of the Manatee County Biosolids Dryer Facility in Bradenton, Fla. They become prey for alligators living in lakes that hold reclaimed water from three wastewater treatment plants.

A cow alligator is a frequent visitor. On one occasion, the maintenance supervisor found her lying in front of the chlorine pump room door. Fearing operators would step on her on their way out, he herded her across the street and into a stormwater retention pond — the same pond in which she has raised broods in the past two years.

"We had hatchlings, and one visited my plant," says Chris Hughes, Biosolids Utilities maintenance technician II. "He was lying underneath a crate on blocks and I thought at first it was a snake." Hughes took the baby back to the pond.

The winter temperature in the facility is 90 degrees F. One night, operators on their way to the control room found the cow alligator warming herself at the door. "She's always going back and forth across the property between the pond and lakes," says Hughes.

There is a hole in the chain link fence behind the building; Hughes has seen raccoons walking along the fence or going through the hole. Last November, he saw the alligator ambling along the fence, possibly following the scent of a meal.

"My approach startled her and she began climbing the fence," says Hughes. While he ran for his smartphone to capture the scene, she came down and resumed her journey. When Hughes returned, he found the alligator lying beside the hole in the fence like a cat waiting for a mouse. His presence frightened her, and she began climbing again.

"She almost made it to the top rail, but lost her footing and fell," says Hughes. "Her actions appeared evasive, so I returned to work, allowing her to walk away. But she'll be back. She always comes back." **cpo**

Show us your visitors

TPO invites you to show us the wild creatures that visit your plant property. Mammals, birds, reptiles, amphibians — send a picture or two and a brief description of when and where the visitor appeared to editor@tpomag.com.

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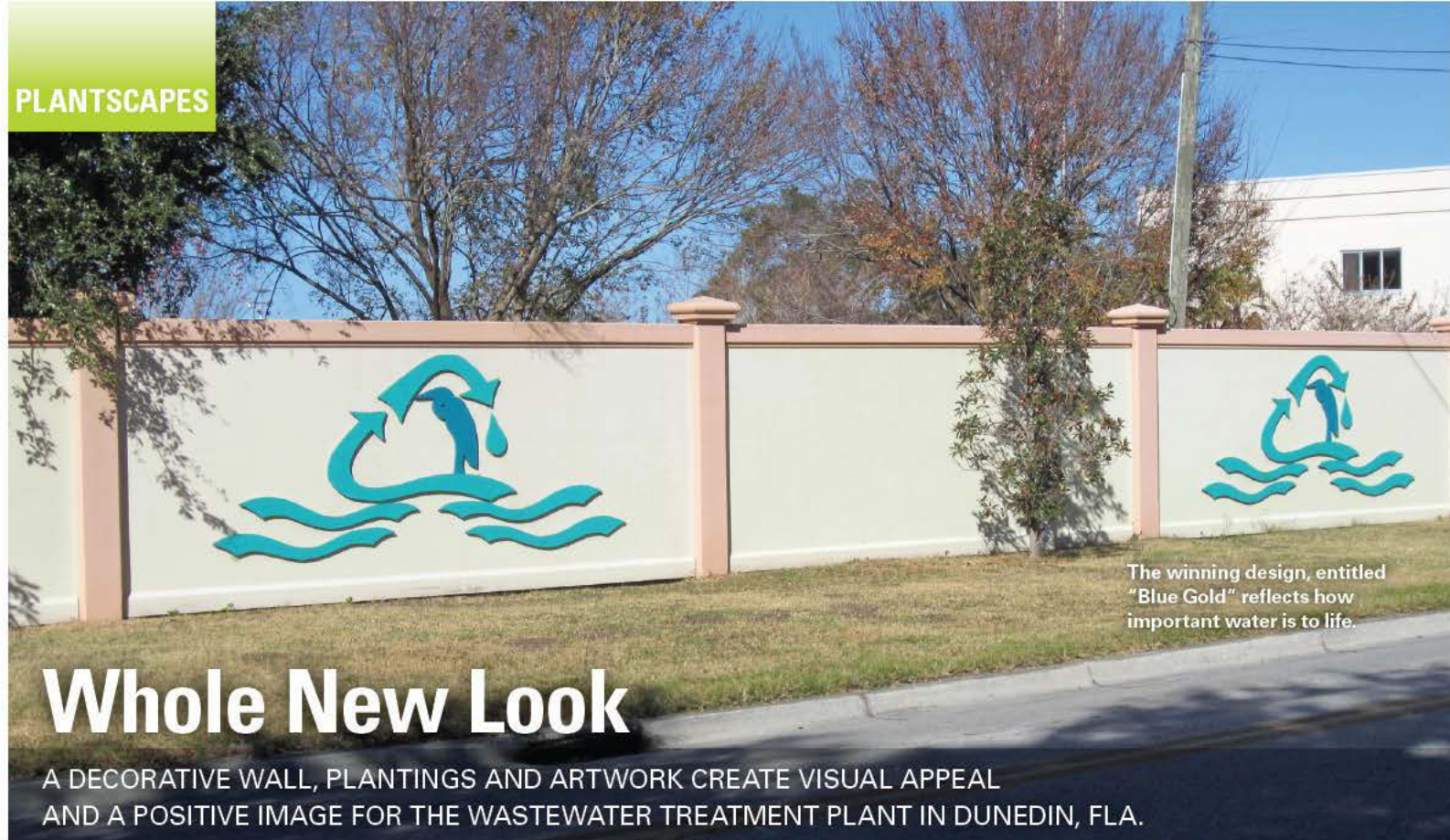
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The winning design, entitled "Blue Gold" reflects how important water is to life.

Whole New Look

A DECORATIVE WALL, PLANTINGS AND ARTWORK CREATE VISUAL APPEAL AND A POSITIVE IMAGE FOR THE WASTEWATER TREATMENT PLANT IN DUNEDIN, FLA.

By Jeff Smith

Before 2009, anyone passing the advanced wastewater treatment plant in Dunedin, Fla., saw a rusting and damaged chain-link fence in front of a facility with its clarifiers and processing equipment in full view. Today, they see a site that is a source of civic pride and an icon of the city's concern for aesthetics.

"For several years the city wanted to improve the facility's appearance," says plant supervisor Brian Antonian. Transformation of the image began with construction of an 8-foot-tall wall that nearly encloses the entire plant (6 mgd design/4.5 mgd average).

ENCOURAGING ART

Built in 20-foot sections separated with decorative square columns, the concrete block wall was covered with Sherman-Williams Loxon primer and a coat of French white acrylic latex to give it a finished look. Each column is topped with a precast concrete decorative cap and painted with an accented Sahara rose color to provide the appearance the city was seeking. "The wall has really improved the appearance, and even though it wasn't the goal, it has added to plant security," says Antonian.

In 2011, the city commission allocated funds to encourage public art in Dunedin, says assistant city manager Matthew Campbell. In partnership with the city Arts & Culture Advisory Committee, a call to artists was made for creative artwork to enhance the wall. "The unique part of our requirements was that the artist had to not only be creative, but also had to be a fabricator," says Campbell. "Our budget limit of \$10,000 created some challenges."

CELEBRATING WATER

The winning design chosen by the committee represents the mission of the treatment plant. Entitled "Blue Gold" and built of welded steel pieces painted with ocean blue acrylic enamel, the scene shows recycling of water and waves surrounding a seagull. Artist Gus Ocamposilva of Clearwater, Fla., says the name reflects how important water is to life. Eight of the identical water-related 3-D sculptures were installed on separate wall sections in high-visibility locations.

"It's a very different visual appeal as you drive through the area now," says Campbell. Twelve Little Gem Magnolia trees, each 9 feet tall, were planted to enhance the artwork. The trees produce a fragrant white flower in spring and will mature to about 25 feet tall. That height will further block a view of the plant from two nearby housing areas. Funds for the trees were provided by a state-sponsored Urban Forestry Grant. The plant maintenance team makes sure the trees are trimmed and the grass is mowed.

It took cooperation between the city Parks and Recreation and Public Works Departments, along with the Arts & Culture Committee to make the project a success, says Campbell. Even Building Engineering got involved to ensure that the artwork was properly secured to the wall. "We're close to the water and experience some pretty strong winds and occasional storms," Campbell says. "It has to stand up to the elements."

BIG IMPACT

The wall looked good by itself in meeting the city's goal of camouflaging the plant, says Campbell. But now the focus is on the artwork and the landscaping, as well as the wall. Unassuming motorists would not know there is a wastewater treatment plant behind the wall until they got to the entrance.

Campbell adds, "The combination of the wall and the artwork has had a tremendous impact on the community in a positive way." tpo



Share Your Ideas

TPO welcomes news about interesting features of your facility's grounds, signage or buildings for future articles in the PlantScapes column. Send your ideas to editor @tpomag.com or call 877/953-3301.

PHOTOS COURTESY OF DUNEDIN WASTEWATER TREATMENT PLANT

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Smith & Loveless release pumping system catalog

Smith & Loveless released Pumping SOLUTIONS 4.0. The pumping systems catalog includes specifications, technical drawings and literature, including its 6-inch X-Peller pumps impeller, SAWS station advance warning system and Station Comm two-way text communication. The catalog can be ordered by calling 800/892-9122 or visiting the company website at www.smithandloveless.com.

Denso offers training videos, product gallery

Denso released petrolatum training videos and an online product gallery. The videos show different methods of applying petrolatum tapes on straight pipes and irregular surfaces. The videos and product gallery can be viewed at www.denso.com.



Hach sensor receives FDT certification

Hach Co. received certification from the FDT Group for its multi-sensor device type manager, available as a free download (www.hach.com/sc200) for the sc200 Universal Controller with Profibus DP.

Flowserve names vice president, treasurer

Flowserve Corp. named John E. (Jay) Rouche III vice president, treasurer and investor relations. He will be responsible for managing strategies, operations and practices related to corporate finance.

LAN hires director of engineering

Randall C. Hill, P.E., joined Lockwood, Andrews & Newman as director of engineering for the consulting company's infrastructure practice in Southern California. Hill earned a bachelor's degree in civil engineering from Colorado State University, is a registered professional engineer in California and Texas, and serves on the executive committee for the American Society of Civil Engineers pipelines division.



Randall C. Hill

Vacon opens Asian office

AC drives manufacturer Vacon opened an office in Almaty in the southern part of Kazakhstan. The office serves central Asia, including Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan and Tajikistan.

WEF, Department of Labor develop training standards

The U.S. Department of Labor adopted new national guidelines for wastewater systems operator apprenticeship programs. The guidelines, developed as a joint effort between DOL and the Water Environment Federation, define minimum educational and on-the-job learning requirements for operators and establish a clear point of entry into the profession. The guidelines suggest a two-year schedule of 3,520 work process hours and 480 instructional hours. The new standards are a model for developing local apprenticeship programs registered with the Office of Apprenticeship (OA) or a State Apprenticeship Agency (SAA) for the wastewater treatment plant operator occupation.

Fluid Metering expands website

Fluid Metering expanded its product website, www.fmipump.com. The site includes detailed descriptions, animations and videos of the company's CeramPump valveless piston pump design, news releases, applications, catalogs and technical manuals.

American Water's NPXpress receives technology award

American Water Works Co.'s NPXpress wastewater technology received the Technology Project of the Year award from *American Water Intelligence* magazine. NPXpress helps wastewater utilities reduce costs while improving the removal of nitrogen and phosphorus. Since the technology operates at lower oxygen levels, energy consumption for aeration is reduced by 50 percent.

SCFI forms alliance with Air Products

SCFI formed an alliance with Air Products to streamline its customer offerings and develop commercial opportunities for its environmentally sustainable sludge and wet industrial waste destruction technology. Air Products will operate as SCFI's preferred supplier for all oxygen equipment used in the super-critical water oxidation process, as well as provide the oxygen supply needed to reduce the chemical oxygen demand of waste.

SJE-Rhombus names Thomas CEO

SJE-Rhombus named David Thomas chief operating officer following the retirement of Laurie Lewandowski. Thomas had been president/director of Standard Products. Lewandowski joined the company 31 years ago, serving as president, vice president of marketing, purchasing director and IT director. She has seen the company grow from a garage assembly operation to a global business with six locations and 100-percent employee ownership.



David Thomas



Laurie Lewandowski

VAC2GO opens Richmond office

VAC2GO opened a vacuum equipment rental office in Richmond, Va., serving Richmond, Newport News, Norfolk and Washington, D.C. The branch rents Guzzler Classic and ACE vacuum trucks, as well as Vactor combination units, vacuum truck hoses and accessories.

PSG opens China manufacturing facility

Pump Solutions Group opened a manufacturing plant in Shanghai, China. The 11,000-square-meter facility includes pump manufacturing and testing, hydraulic lab for on-site product testing, training room and product showroom.



TrojanUV system treats water park's stormwater for reuse

The Sherbourne Common water park in Toronto, Canada, features three large art sculptures that combine lights and water, which flows through an artificial river accessible to the public before discharge into Lake Ontario. Water used in the sculptures comes from either Lake Ontario or stormwater collected in underground tanks at the park. Clarified runoff must be disinfected to make it suitable for human contact. The park installed two TrojanUVFit reactors (one duty, one redundant) at its treatment facility. The system is designed for flows of 1.6 mgd, *E. coli* less than 10 cfu/100 mL, *Cryptosporidium* less than 10 cfu/100 mL, *Giardia* less than 0.05 cysts/L and rotavirus less than 0.05 pfu/L. The case study can be accessed at www.tpomag.com/whitepapers/trojanuv. **tpo**



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2. POLYSCIENCE CIRCULATION BATH

The Coliform Bath from PolyScience is designed for fecal coliform and *E. coli* testing. The circulation bath features ambient 10- to 135-degree C temperature range, ± 0.7 -degree C temperature stability, 28-liter reservoir and MX temperature controller. The bath is suitable for APHA, AWWA, WEF and EPA fecal coliform determinations as well as other standard coliform and *E. coli* tests. 800/229-7569; www.poly-science.com.

3. BINMASTER ANALOG OUTPUT LEVEL SENSOR

The SmartBob AO analog output level sensor from BinMaster Level Controls features integrated 4-20 mA output to a PLC for monitoring bin

level data. The sensor has two configurable relays and four relay options, including measurement status (measurement in process), high-level alarm, low-level alarm or error alarm (no measurement taken). 800/278-4241; www.binmaster.com.

4. BADGER ELECTROMAGNETIC FLOWMETER

The M2000 electromagnetic flowmeter from Badger Meter features an open-flow design that reduces pressure loss and achieves an accuracy rate of ± 0.25 percent. Communication protocols include HART, Modbus, RTU and Profibus DP options. 800/876-3837; www.badgermeter.com.

5. FLUID COMPONENTS FLOW SWITCH/MONITOR

The FS10A analyzer flow switch/monitor from Fluid Components International is designed for use with 1/8- to 1/2-inch tubing. Electronics can be integrally mounted or remote-mounted from the sensor element. There are no moving parts to foul or clog and no cavities, orifices or dead-legs to trap or contaminate samples. Applications include liquid or gas analyzer sampling systems with choice of electronic outputs, including open collector, relay and 4-20 mA. Limit alarms are programmable for time delay and/or hysteresis. 800/854-1993; www.fluidcomponents.com.

6. REED PE ELECTROFUSION SCRAPER

The PE scraper from Reed Manufacturing Co. removes dirt and oxidation from the outside diameter of pipe in preparation for the electrofusion process. Features include a non-skid, spring-loaded blade to keep constant pressure on the pipe for a smooth, finished surface. The scraper can be used anywhere along the pipe. A 6-inch clearance is required for turning the scraper around the pipe. **800/666-3691; www.reedmfgco.com.**

7. SURE SEAL AERATION BUTTERFLY VALVE

Two-inch aeration butterfly valves from Sure Seal replace conventional ball valves, eliminate the need for additional components for individual hopper aeration, and are designed not to gall or freeze up. Weighing 3 pounds, valves are made of a lightweight alloy and the seats of FDA-approved silicone. They have a temperature range of -40 to 350 degrees F and maximum operating pressure of 100 psi. **800/382-1604; www.suresealinc.com.**

8. AQUA-AEROBIC PILE CLOTH FILTRATION MEDIA

The OptiFiber PES-14 microfiber pile cloth filtration media from Aqua-Aerobic Systems is designed to remove suspended solids, turbidity and fine particles. It reduces total phosphorus to 0.1 mg/L or less and maintains high filtrate quality, even during backwashing. **800/940-5008; www.aqua-aerobic.com.**

9. FREEWAVE BOARD VERSION WIRELESS DATA RADIO

The FGR2-P board-level version, license-free, long-range wireless data radio from FreeWave Technologies offers industrial serial and Ether-

net wireless connectivity. It can be incorporated into the Rockwell Automation family of PLC solutions. **800/548-5616; www.freewave.com.**

10. ENVIRONETICS TANK COVERS

Defender tank covers from Environetics are custom-manufactured to fit new or existing wastewater treatment or potable water tanks. Odor control covers contain volatile organic compounds at their source. **815/838-8331; www.environetics.com.**

11. ASAHI WAFER CHECK VALVES

PVC wafer check valves from Asahi/America are now available in 4-, 6- and 8-inch sizes. The valve's body, disc and stopper assembly are machined from solid PVC plate stock that conforms to ASTM D1784 cell classification 12454A. The valve conforms to ISO 5752 face-to-face dimensions and is installed by slip-fitting it between two mating flanges. The valve body automatically centers on the mating flanges once the stud pack is installed. The 4- through 8-inch valves operate at up to 150 psi, 10- and 12-inch valves to 90 psi and up to 120 degrees F. **800/343-3618; www.asahi-america.com.**

12. VANAIR AIR N ARC I-300 POWER SYSTEM

The 48-inch Air N Arc I-300 power system from Vanair provides a 40 cfm rotary screw compressor, 7 kW AC generator, 300-amp welder, battery booster and battery charger, and 10.5 gpm hydraulic pump in a single unit. Designed to provide full functionality with the truck engine off, the power system fits behind the cab or on the side pack of a vehicle. **800/526-8817; www.vanair.com. tpo**

product spotlight

Lagoon aerator includes water cannon for foam suppression

By Ted J. Rulseh

A 50 hp **floating aerator designed for lagoon systems by Airmaster Aerator** also includes a rotating water cannon that sprays water constantly from above for foam suppression when required.

The unit functions as both a lagoon aerator and foam suppression system. The high-efficiency Turbo X-Treme Magnum water cannon pumps up to 12.5 mgd. Powered by a separate 75 hp grinder pump, the water cannon rotates 360 degrees in 1 minute, 35 seconds, spraying out more than 100 gpm in a 230-foot diameter. Depending on the application, the device can achieve foam suppression, aeration, evaporation and cooling.

"If you have a lagoon or basin with foaming issues, instead of adding foam suppression chemicals, you can install this unit and have foam suppression incorporated with the aerator," says Dean Caldwell, principal.

An impeller draws water into the unit and pressurizes it in a header. For aeration, a common shaft drives a pump and a turbine air blower so that as water sprays out, air is injected. The water cannon can be activated with a separate switch. A hood protects the motor from the elements. The system uses a synchronous belt drive.

The aerator performs especially well in high-foam applications, according to Caldwell. A chemical injection port for adding enzymes and defoamers is available as an option. Constructed of stainless steel, the device is built for reliable, long-term operation. **888/813-3680; www.airmasteraerator.com.**

Floating aerator by Airmaster Aerator



EDUCATION DAY SEMINARS

MONDAY
FEBRUARY 25TH

NAWT

National Association of Wastewater Technicians

- 8 a.m. Introduction to Pressure Distribution
- 9:30 a.m. Designing Systems, Boundaries and Barriers from a Soils Perspective
- 11 a.m. Pump Choices and Settings: Decisions for Proper Operation
- 1:30 p.m. Operation and Maintenance of Pressure Distribution Laterals
- 3 p.m. Installing with Management in Mind: How to Get the Most out of Your System
- 4:30 p.m. Design and Maintenance of Grease Interceptors

NEHA

National Environmental Health Association

- 8 a.m. What Makes a Professional in Onsite Wastewater Systems?
- 9:30 a.m. Part One: The Science and Engineering of Onsite Wastewater Treatment
- 11 a.m. Part Two: The Science and Engineering of Onsite Wastewater Treatment
- 1:30 p.m. Education and Training: Professionalization of the Practitioners
- 3 p.m. Management Models: Management and Becoming a Management Entity
- 4:30 p.m. The Future of the Onsite Wastewater Industry: How to Make it Work for You!

SSCSC

Southern Section Collection Systems Committee

- 8 a.m. Seven Powerful Tools for CCTV Inspection Perfection
- 9:30 a.m. Easements — A Collection System Maintenance Nightmare
- 11 a.m. Nozzle Science — The Next Generation of Tier 3 Nozzles and Beyond
- 1:30 p.m. Pass or Fail — Is Your Company Going To Make It? How to Ensure Success
- 3 p.m. Social Media and Web-Based Promotion: Is it Right for Your Business?
- 4:30 p.m. Pipeline Relining and Rehabilitation Solutions

NASSCO

National Association of Sewer Service Companies

- 8 a.m. Ultraviolet Manhole Rehabilitation
- 9:30 a.m. Convey Your Stormwater and Plug Your Holes!
- 11 a.m. Jet Up! Sewer and Storm Water Cleaning
- 1:30 p.m. Rethinking Collection Maintenance with Sewer Line Rapid Assessment Tool or SL-RAT
- 3 p.m. Case Study of Cleaning Large Diameter Sanitary Sewers and Siphons
- 4:30 p.m. Pipeline Assessment Certification Program (PACP) 2013 Update Workshop

NOWRA

National Onsite Wastewater Recycling Association

- 8 a.m. Time Dosing ... Why? How? And How Much?
- 9:30 a.m. Loading Rates — How Much Can the Soil Take?
- 11 a.m. Troubleshooting Pumps, Floats and Panels
- 1:30 p.m. The Dirty Dozen — Toxins That Kill Septics
- 3 p.m. How Installers Can Use the Poor Economy to Increase Profits
- 4:30 p.m. Are Seepage Pits Really Bad?
- 8 a.m. Designing Drip Dispersal Systems
- 9:30 a.m. Soil Erosion Control During and After Septic System Installation
- 11 a.m. Decentralized Wastewater Collection System Maintenance

NOWRA Room 2

SCOTT HUNTER

Business Coach

- 8 a.m. - 5:30 p.m. | 2013 - Your Best Year Ever

WJTA/IMCA

WaterJet Technology Association

- 8 a.m. Safety and Efficiency — You Don't Have to Choose!
- 9:30 a.m. Selecting the Best Jetting Tip Doesn't Have to Be Scary
- 11 a.m. Hydroexcavation — The Non-Destructive Solution

PHIL STEIN

Vacuum System Information

- 1:30 p.m. | Understanding the Power: Physics of Vacuum and How it Works

NEXSTAR

Independent Residential Service Contractors Association

- 1:30 p.m. | The Art and Science of Business Management
- 3 p.m. | The Business of Contracting

PSAI

Portable Sanitation Association International

- 4:30 p.m. | GAP: Good Agricultural Practices



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Education schedule subject to change without notice.



FEBRUARY 25-28, 2013

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TUESDAY TRACKS

FEBRUARY 26TH, 2013

TRANSPORTATION AND LAND APPLICATION

- 8 a.m. Driver Compliance and Certification: How to Meet DOT Requirements
- 9:30 a.m. Staying in Compliance with 503 Regulations for Land Application
- 11 a.m. Land Application: Case Study of a Long-Term Operation

INDUSTRY SAFETY

- 8 a.m. One Piece Nozzles Enhance Performance and Safety
- 9:30 a.m. Confined Space Entry Permit and Equipment Review
- 11 a.m. Utility Line Locating

SSCSC

- 8 a.m. Making Emergency Response Your Business
- 9:30 a.m. How to Protect and Maintain Sewer Hose From Mini Jetters to Combination Units
- 11 a.m. How to be Successful in the Cleaning/CCTV Business

GENERAL BUSINESS

- 8 a.m. New Untapped Techniques to Capture Today's Customers
- 9:30 a.m. 10 Steps to Marketing Success
- 11 a.m. Cloud Computing for Small Business and the Field Service Industry
- 8 a.m. Don't Win the Price Game
- 9:30 a.m. Make the Phone Ring with Low-Cost Marketing
- 11 a.m. Local Marketing on the World Wide Web

Business Room 2

SEWER COLLECTION & REHABILITATION

- 8 a.m. Chemical Grouts and Grouting Methods
- 9:30 a.m. Watch Your Assets — Remote Monitoring Can Save You Big Bucks
- 11 a.m. Lateral Connection Rehabilitation: Biggest Bang for the Rehabilitation Buck

SPANISH/ESPAÑOL

- 8 a.m. Floods in Mexico City
- 9:30 a.m. Best Practices for Working in Confined Spaces
- 11 a.m. How to Overcome the Difficulties of Doing Business in South America

WEDNESDAY TRACKS

FEBRUARY 27TH, 2013

SEWER COLLECTION & REHABILITATION

- 8 a.m. Cash for Compliance: The New Boom in Home Sewer Replacement
- 9:30 a.m. Trenchless Point Repairs, a Low Cost Permanent Solution
- 11 a.m. Penn State University Performs Manhole-to-Manhole Lining In-House

GAS, OIL & MINING

- 8 a.m. How to Decide What Dewatering Option is Best for You
- 9:30 a.m. Blower 101: The Basic Operation of the Positive Displacement Blower
- 11 a.m. Principles and Equipment of Hydro-Pneumatic Vacuum Excavation

GENERAL BUSINESS

- 8 a.m. Save Money — Move Your Business to the Cloud
- 9:30 a.m. Morally Bankrupt
- 11 a.m. Measuring Success Matters: Your Ads, Your Agents, Your Technicians

MUNICIPAL

- 8 a.m. Benefits of Digital Side Scanning Inspection Camera Systems
- 9:30 a.m. Application for Sewer and Storm Nozzles
- 11 a.m. Grinder Pumps & Application

PORTABLE LIQUID WASTE

- 8 a.m. A View from the Receiving End: Regulatory Challenges in FOG Programs
- 11 a.m. Now You Smell Me, Now You Don't: Deodorants

NEW TECHNOLOGY

- 8 a.m. Improving Safety and Technology with Wireless Technology
- 9:30 a.m. New Technology for Locating Sewer Line Leaks
- 11 a.m. Solve Decentralized System Malfunction Issues and Site Challenges

ADVANCED INSTALLER COURSE

- 8 a.m. - 5 p.m. Presenters: Jim Anderson and Dave Gustafson
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EDUCATION

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MISCELLANEOUS

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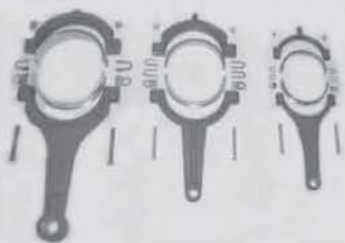
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PO Box 220, Three Lakes, WI 54521

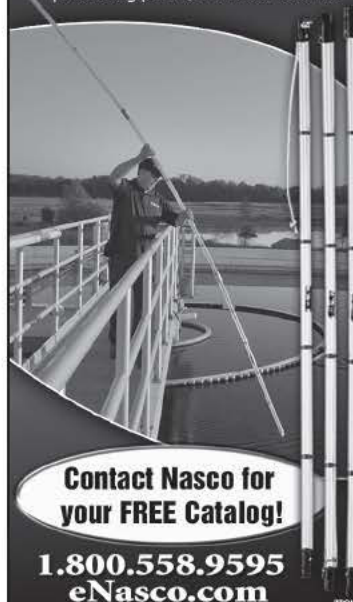
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people/awards

The **City of Iowa Falls (Iowa)** River Interceptor Siphon Sewer Replacement Project received the 2012 Grand Place Award from the American Council of Engineering Companies of Iowa. The project, by FOX Engineering Associates in Ames, uses a new 4,000-foot, two-pipe siphon sewer that eliminates four raw wastewater bypasses.

The **Clayton County Water Authority Wastewater Collection System** received the Wastewater Collection System Gold Award from the Georgia Association of Water Professionals.

Dawn McCoy, Class IV operator and project manager for the McComb (Miss.) Regional Wastewater Treatment Facility, received the Don Scott Award for Outstanding Wastewater Operator of the Year from the Mississippi Water and Pollution Control Operator's Association.

Gary W. Hanson, superintendent of the Town of Yorkville Wastewater and Water Utility, received the Koby Crabtree Award from the Wisconsin Wastewater Operators Association. The annual award is presented to a person who has demonstrated excellence in the transfer of technical information and conducting training in the wastewater field.

The **City of College Place, Wash.**, was recognized by the state Department of Ecology for having a flawless record for wastewater treatment in 2012.

TPO invites your national, state, or local association to post notices and news items in the Worth Noting column. Send contributions to editor@tpomag.com.

The Florida Department of Environmental Protection Water Division announced that these locations received 2012 Plant Operations Excellence Awards:

- **Military Point Advanced Wastewater Plant, Panama City**
- **City of Winter Park Estate Wastewater Treatment Plant**
- **Bonita Springs Utilities East Water Reclamation Facility**
- **Richard A. Heyman Environmental Pollution Control Facility, Key West**
- **City of Marathon Area 5 Wastewater Treatment System**
- **Northlake Estates RV Park, Moore Haven**
- **City of Dunedin Wastewater Treatment Facility**

TPO welcomes your contribution to this listing. To recognize members of your team, please send notices of new hires, promotions, service milestones, certifications or achievements to editor@tpomag.com.

education

Alaska

The Alaska Department of Environmental Conservation is offering a Pumps and Pump Systems: Specifications, Installation and Operation Course May 22-23 in Anchorage. Visit www.awwma.org.

Florida

The Florida Water & Pollution Control Operators Association will hold its annual Spring State Short School March 25-29 at Indian River State College in Fort Pierce. Visit www.fwpcoa.org.

CALENDAR OF EVENTS

March 10-13

American Water Works Association and Water Environment Federation Utility Management Conference, Renaissance Phoenix Glendale Hotel & Spa, Phoenix, Ariz. Visit www.wef.org.

March 18-21

Illinois Water Environment Association and Illinois Section-AWWA WATERCON 2013, Crowne Plaza Hotel, Springfield. Visit www.isawwa.org.

March 23-27

Missouri Water Environment Association/American Water Works Association Joint Annual Conference, Osage Beach. Visit www.mwea.org.

April 7-9

Water Environment Association of Ontario Technical Symposium, Toronto Congress Centre. Visit www.weao.org.

April 7-10

Alabama Water Environment Association Annual Conference, Perdido Beach Resort, Orange Beach. Visit www.awea-al.com.

April 14-18

Kentucky Water and Wastewater Operators Association Annual Conference, Galt House Hotel & Suites, Louisville. Visit www.kwwoa.org.

April 16-17

Georgia Association of Water Professionals Spring Conference and Expo, Macon. Visit www.gawp.org.

April 16-19

California Water Environment Association Annual Conference, Palm Springs Convention Center. Visit www.cwea.org.

April 18-19

Nebraska Water Environment Association Great Plains Spring Conference, Embassy Suites La Vista. Visit www.ne-wea.org.

April 20-24

British Columbia Water and Waste Association Annual Conference and Trade Show, Kelowna. Visit www.bcwwa.org.

April 28-May 1

Arkansas Water Works and Water Environment Association Annual Conference, Hot Springs. Visit www.awwwea.org.

April 29-May 2

Alaska Water Wastewater Management Association Annual State Conference, Anchorage Hilton Hotel and Conference Center. Visit www.awwma.org.

May 5-8

Residuals and Biosolids 2013: Emerging Opportunities for Sustainable Resource Recovery, Nashville Convention Center, Nashville, Tenn. Visit www.wef.org.

May 14-17

Central States Water Environment Association Annual Conference, Monona Terrace, Monona, Wis. Visit www.cswea.org.

June 3-5

New York Water Environment Association Spring Technical Conference and Exhibition, Sheraton Syracuse University Hotel & Conference Center. Visit www.nywea.org.

June 9-12

Water Environment Federation/California Water Environment Association Collection Systems 2013: Gold Nuggets of Knowledge, Sacramento Convention Center. Visit www.wef.org.

June 12

American Public Works Association-Washington State Chapter Northwest Fog Forum, Greater Tacoma Convention and Trade Center. Visit www.apwa-wa.org/chapter.

June 18-20

Ohio Water Environment Association Annual Conference, Great Wolf Conference Center, Mason. Visit www.ohiowea.org.

June 23-26

Michigan Water Environment Association Annual Conference, Boyne Mountain Resort, Boyne Falls. Visit www.mi-wea.org.

July 14-17

Georgia Association of Water Professionals Annual Conference and Expo, Savannah International Trade and Convention Center. Visit www.gawp.org.



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Kansas

The Kansas Water Environment Association is offering these courses:

- March 6 – Intro to Water and Wastewater Conveyance, Phillipsburg
- March 6-7 – Topics in Wastewater, Kansas City
- March 14 – Small Wastewater Systems
- March 15 – Special Topics-Membranes, Dodge City
- March 19 – Special Topics-Corrosion, Medicine Lodge
- March 21 – Special Topics-Ultrasound and Ultraviolet, Medicine Lodge
- April 9 – Applied Math for Wastewater Operators, Garden City
- April 12 – Wastewater Certification Preparation, Hays
- April 16 – Special Topics: Ultrasound and Ultraviolet, Cheney
- April 19 – Wastewater Treatment, Scott City
- April 24-25 – Math for Operators, Pittsburg
- April 24-25 – Collection Systems, Topeka
- May 3 – Wastewater Stabilization Lagoons, Dodge City
- May 7 – Intro to Water and Wastewater Conveyance, Ulysses
- May 9 – An Examination of Your Ethics, Scott City
- May 15 – An Examination of Your Safety, Scott City
- May 21 – Small Wastewater Systems, Liberal
- May 23 – Special Topics: Ultrasound and Ultraviolet, Dodge City
- May 23 – Certification for Collections, Distribution and Maintenance, Newton
- May 30 – Wastewater Stabilization Lagoons, Cheney

Visit www.kwea.net.

Michigan

The Michigan Water Environment Association has a Lab Practice Seminar on May 14 in East Lansing. Visit www.mi-wea.org.

Ohio

The Ohio Water Environment Association is offering these courses:

- March 7 – Government Affairs Workshop, Lewis Center



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- May 9 – Collections System Workshop, Grove City
- Visit www.ohiowea.org.

Wisconsin

The Wisconsin Department of Natural Resources is offering these courses:

- March 5-6 – Anaerobic Digestion, Stevens Point
 - March 7 – Anaerobic Digestion Advanced, Stevens Point
 - March 12-13 – Phosphorus Removal Intro and Advanced, Green Bay
 - March 14 – Paper Industry Wastewater Treatment, Green Bay
 - March 19-20 – Trickling Filters and RBCs Intro and Advanced, Chippewa Falls
 - March 20-22 – Wastewater Pumping Systems and Lift Stations, Madison
 - March 25-29 – General Wastewater Treatment Intro and Advanced, Green Bay
 - April 1-5 – General Wastewater Treatment Intro and Advanced, Madison
 - April 8-9 – Activated Sludge Intro, Stevens Point
 - April 10-11 – Activated Sludge Advanced, Stevens Point
 - April 16-18 – Lab Intro, Tomah
 - April 22-23 – Lab Advanced, Appleton
 - April 23-25 – Nutrient Removal Engineering: Phosphorus and Nitrogen in Wastewater Treatment, Madison
 - April 24-25 – Ponds and Lagoons, Intro and Advanced, Appleton
 - April 26 – General Wastewater Treatment Intro and Advanced, Green Bay
 - April 30 – General Wastewater Treatment Intro and Advanced, Madison
- Visit <http://dnr.wi.gov>.

The University of Wisconsin Department of Engineering-Professional Development is offering these courses:

- March 20-22 – Wastewater Pumping Systems and Lift Stations, Madison
 - April 23-25 – Nutrient Removal Engineering: Phosphorus and Nitrogen in Wastewater Treatment, Madison
- Visit <http://epdweb.engr.wisc.edu>. **tpo**

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The crew at Lake County's NCT Wastewater Treatment Facility makes serving their community the #1 priority. According to Plant Supervisor Edward Haley, they're "working hard to minimize expenses to the community in these austere times, even in the face of increased requirements from regulatory agencies."

"Working hard to minimize expenses."

One of the ways that NCT is increasing their efficiency is by upgrading their treatment process. For the facility's 2013 overhaul, their traditional extended aeration process will be replaced with a more cost-conscious, environmentally friendly biological nutrient removal process. With the new setup in place, they'll reduce chemical consumption, therefore lowering overall costs.

Another way NCT maintains their efficiency is by acting quickly and effectively in emergency situations. When NCT experienced a rupture in one of their lines, and needed a repair clamp FAST, they turned to USABlueBook. Even with almost half of their system down, USABlueBook was able to get them the specialty repair clamp they needed, allowing them to have things back up and running in less than 12 hours! "Thanks to USABlueBook's 24/7 Emergency Service, most of our community probably didn't even realize there was a problem," said Edward.

USABlueBook is proud to support Edward and the entire team at NCT. They are a prime example of a facility evolving to better serve their community.

Edward Haley
Plant Supervisor
Lake County NCT WWTP
Vernon Hills, IL



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These pumps are perfect for applications where "air-lock" occurs in traditional diaphragm-type chemical feed pumps. The peristaltic design automatically pushes air bubbles through the pump head and will not lose prime from gas bubbles when pumping sodium hypochlorite or hydrogen peroxide. Pumps are completely self-priming up to 25 feet, can operate dry and will not clog from dirt and minor debris. Pumps feature a unique feed rate control module for precise measurement with a turndown ratio of 20:1. Mount vertically or horizontally without any effect on priming. UL, CSA and ETL approved.

Includes: mounting bracket, spare tube assembly, injection check valve, 20' of tubing, ceramic weight for suction tubing, connecting nuts, ferrules and operating manual.



MFR #	LEAD TUBING	MAX GPD	PSI	PUMP TUBE	STOCK #	EACH
45MJH1A1S	1/4"	3	100	# 1	76449	\$ 425.95
45MJH2A1S	1/4"	10	100	# 2	76455	425.95
85MJH7A3S	3/8"	40	100	# 7	71414	450.95
85MJL5A3S	3/8"	85	25	# 5	76469	435.95

See page 122 in Master Catalog 124 for more information.



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