InFlow-Line

The Magazine of the CT Section American Water Works and the Connecticut Water Works Associations Spring 2022

2022 Buyers' Guide

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Features

InFlow-Line

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Working for Quality Water

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Turning The **Corner**

Although the first months of 2022 started out much like the past two years, it certainly feels like we have 'turned the corner' on COVID-19 with the change in season. We are thankful to those of you who attended our 2022 Annual Technical Conference and Exposition (ATCAVE), which returned to an in-person event this year. We had over 600 attendees, a sold-out vendor area, and provided many our members the first opportunity in a long time to interface with industry friends and colleagues.

ATCAVE is one of many offerings planned in 2022 by the CTAWWA Section. Between April and June, we have six in-person or virtual training sessions on a variety of subjects to help our members catch up on Training Contact Hours (TCHs), and we are planning for a full slate of training this fall.

I'm especially excited about a new offering, our Hydrant Training and Hydrant Training Competition, hosted by Bristol Water and Sewer. Four well-trained teams from Bristol, Meriden, New Britain, and Waterbury will compete in this fast-paced event where participants assemble a hydrant in the fastest time possible. The winning team receives a paid trip to AWWA's Annual Conference and Exposition to represent Connecticut in a national level competition! We intend on making this an annual event and encouraging our utility members to consider participating in Hydrant Hysteria next year.

On the conference front, CTAWWA and CWWA will be holding our 49th Annual Joint Conference in person from May 25-27, 2022, at the Hotel Viking in Newport, RI. We have a strong technical program offering TCHs and plenty of opportunities to network. We hope you can join us this year.

The incoming CTAWWA Board will be officially installed during the Annual Conference, and I'm proud to turn over the Board Chair to Ingrid Jacobs from Aquarion, who will lead the Section for the next year. I'd also like to thank our outgoing National Director, John Herlihy, and outgoing Past-Chair, Gerry McDermott, for their service on the Board.

Most importantly, I want to use this opportunity to thank our operators. While many of us had the option of working from home over almost two years, our operators came into their workplace every day, regardless of the pandemic, to keep the water flowing. You are truly essential workers and a testament to our industry's dedication to providing safe drinking water to our customers!

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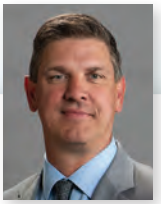
Dan Lawrence



Federal Funding For Water Quality Issues

I hope everyone is enjoying spring, the flowers, and change of the season and hopefully the end of COVID-19 restrictions. So, get out and see your friends, family and colleagues and celebrate and plan to join us at the May 2022 Annual Meeting. This will be a great time to reconnect, enjoy a few meals around the table, and catch up on what is happening in the water industry.

The legislative session has been very active this year. With many bills to review, try to understand the impact to our industry, craft testimony, and make sure each member of CWWA has an opportunity to voice their concerns.

I want to thank the Board, Legislative Committee, Members and our Executive Director, Betsy Gara, for their hard work on each bill and their willingness to work together to find common ground.

This is critical to ensuring that each of your concerns are addressed, as these bills sometimes seem to come out of nowhere with ambiguous consequences.

I hope you all had a chance to complete your State Revolving Fund (SRF) applications to address:

- Service line material inventory.
- Lead service line replacement.
- PFAs treatment and or interconnection.
- Other critical projects to your community or water system.

This is a unique opportunity to take advantage of additional federal funding and work on solving long-term and current water quality issues. If you have questions on funding, reach out and we can help. Also, don't forget that the federal funding will provide the water industry with funding opportunities over the next five years to address infrastructure improvements.

Join us at Legislative Committee meetings and make sure the customers in your water system get the representation they deserve.

If you have questions or want to get involved reach out to Executive Director Betsy Gara at *gara@gmlobbying.com* or 860-841-7350. We look forward to hearing from you and am looking forward to a great 2022.

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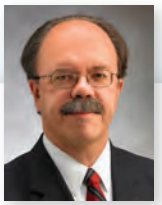

The True Value Of Mentoring

During the last week of April, I accompanied Tom Barger to Washington, DC, to represent the CT Section at AWWA's annual Water Matters Fly-In. Tom serves as Chair of the Section's Water Utility Council and leads the Fly-In effort for Connecticut.

This year, we focused on water infrastructure financing, cybersecurity, and PFAS.

We visited each of Connecticut's seven congressional offices and discuss key water related topics that Congress will be considering during the current legislative session. We explained the industry's needs and concerns and answered any questions they have in order to ensure they are able to make an informed decision on each topic.

As I began my preparations for the Fly-In this year, I thought about how I first became involved with AWWA and how membership has benefitted my career, and I decided it might be worthwhile to share it with you. It's a story about the benefits of membership in the Association, active participation in the work of the Section, and the importance of mentoring.

I started my career in drinking water quality management right out of college as the Microbiologist in Aquarion's laboratory. My manager, Tony Castorina, was an active member of the CT Section AWWA with lots of experience in state level regulatory matters. He recommended I become a member of AWWA, provided me with an application, and I joined.

When EPA and the CT Department of Public Health began issuing new regulations that increased the number of water quality parameters being regulated, it presented challenges for water testing laboratories, and I was by now responsible for the entire laboratory function. Tony, with his greater knowledge and experience, could see this increasing regulatory trend was going to continue for years to come, and he could also see the challenges it would present for laboratory certification and water quality monitoring compliance.

Tony recommended I contact other drinking water laboratory managers and form a new committee within the CT Section that would collaborate on understanding and meeting the new testing requirements. And so, the Laboratory Operations Committee was born, and I served as its first Chair.

Working closely with the other lab scientists on this committee helped me to manage the increasing regulatory requirements, developed my teamwork and leadership skills, helped position me for future career advancement, and formed valuable working relationships that have lasted for decades.

It all started with Tony getting me to join AWWA and providing the guidance and encouragement (mentoring) to set me on a path to success. Thanks, Tony!

Some years later, I was managing Aquarion's water quality function and reporting to Jim McInerney. In addition to being Aquarion's President, Jim was active in the CT Section and also in AWWA at the national level. Jim served as Chair of AWWA's Water Utility Council, which works closely with AWWA's Government Affairs Office, Congress, and EPA, and also sponsors the Water Matters Fly-In.

Jim encouraged me to join national level AWWA water quality committees – I joined committees working on Lead, Radionuclides, and PFAS over time – and also sent me to Washington, DC, to participate in the regulatory negotiations for the Disinfection Byproducts Rule. He could see the benefits these actions would pay for the company and for my career. Exposure to the national level regulation development process helped me to understand the 'big picture' and enabled me to inform long-range water quality management planning and influence the development of regulations at both the state and national level. And again, it all started with my becoming an active member and benefitting from mentoring provided by a more senior member of AWWA. Thanks, Jim!

I succeeded Jim as Chair of the CT Section Water Utility Council, which gained me a seat on the Section Board. This eventually led to me becoming Chair of the Section, and then National Director, which meant I also serve on the National AWWA Board of Directors. As you can see, being an active member of AWWA and the CT Section has been a tremendously beneficial and enjoyable experience for me.

As I approach the end of my term as National Director and complete my service on the AWWA and CT Section Boards, I want to encourage each and every one of you to get at least one other person to join AWWA, and that you invest some time in mentoring someone working in our profession. And you don't have to be a Manager or a President to make a beneficial impact – it is good for the water industry, it is good for our nation and the state of Connecticut, it is good for your employer, and it is good for you, too. Pay it forward. It's all good!

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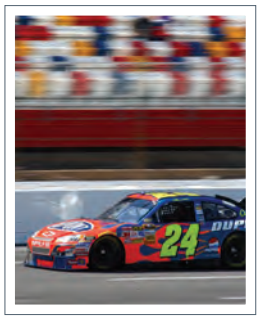
Ron Bamforth



Day Job:
Chief Operator, Connecticut Water Rockville and Stafford Water Treatment Plants

Career History:
This August will mark my 43rd year of service to Connecticut Water. I started at Connecticut Water in August of 1979 as a meter reader. I read meters for just over a year when a job opened at the Rockville water treatment facility. I applied and started the position in March of 1981. In 1982, the Connecticut Water began building the Stafford WTP which went online in 1984, and I continued to work at both treatment plants. In 2011, I became the Chief Operator for both the Rockville and Stafford Water Treatment Plants.

Five years later, in 2016, Connecticut Water started building the new 9 MGD dissolved air flotation (DAF) Plant in Rockville to replace the original 1970 facility. The new DAF Plant went online in 2017 and the old plant was decommissioned.

It has been exciting watching the plant come together in two years' time. The opportunity to work closely with the people involved in the Rockville upgrade was an amazing experience.

Personal Stats:
I enjoy NASCAR Racing. For 40 years, I have been a crew member – specializing in chassis work along with being crew chief and team manager for several of those years. Our team races on Friday nights at Stafford Speedway in the SK Modified division. Our team ran for years on the Modified Tour, which traveled up and down the east coast from Maine to Virginia.

I have immensely enjoyed being involved in my children's baseball and softball travel teams, with many years being a coach and mentor to a lot of the players. Between my fiancé and I, we have five children and 11 grandchildren. Our lives are full of family activities and much fun. When I have time and the weather allows, I enjoy riding my Harley Davidson motorcycle.

Favorite Connecticut Water Memories:
I really enjoyed being involved with the 2016-2017 building of the new water treatment plant in Rockville. Another favorite memory occurred during Hurricane Gloria in 1985, when I climbed up the Rockville WTP clearwell to drop a tape measure in to see how much water was in the tank during a power outage.

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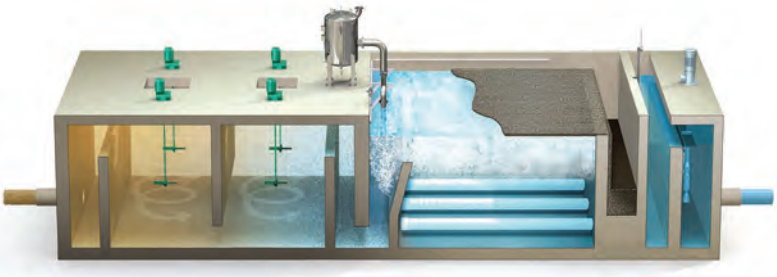

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CLIMATE CHANGE AND CYANOBACTERIA: Coming to a Reservoir Near You

By John Hudak, Environmental Planning Manager, South Central Connecticut Regional Water Authority

Much of the discussion concerning the implications of climate change for water utilities has focused on the headline-grabbing crises brought about by extreme storms and droughts. Yet, there are more subtle consequences that occur over an entire growing season. One of these is the apparent increased frequency and severity of cyanobacteria (aka bluegreen algae) blooms in Connecticut reservoirs.

Often, these booms consist of one or more of three genera, quaintly known as Annie, Fannie, and Mike, for Anabaena, Aphanizomenon, and Microcystis, respectively (casting aside that taxonomists spoiled this memory association trick with the recent renaming of Anabaena as Dolichospermum). Cyanobacteria are known for wreaking havoc on a water treatment process, including shortened filter runs, pH fluctuations, earthy and musty tastes and odors, and the potential to release toxins targeting mammalian nervous systems and liver functions.

Causes

So, what is going on here? Why does it seem that water supply reservoirs are experiencing more frequent and severe cyanobacterial blooms, even those seemingly well protected by forested watersheds? The fact is that cyanobacteria and climate change make ideal partners. Cyanobacteria blooms are mostly likely to occur during warm, sunny, and calm conditions, but it's a little more complicated than just that. It also starts with the physical and chemical changes that result from these seemingly gradual increases in seasonal water temperatures.

Changes to Seasonal Reservoir Thermal Structure

Warming temperatures mean that summer-like conditions start earlier and end later in the year. This includes the period of thermal stratification in reservoirs where the reservoir vertically divides into a warm surface layer known as the epilimnion, and a colder, denser bottom layer called the hypolimnion. These layers are divided by a relatively thin transition zone of declining water temperature known as the thermocline or metalimnion.

Depending mostly on the area and depth of the reservoir, this period of stratification may typically extend from late May or June into October or November until the water column

August 2021 bloom of Dolichospermum (Anabaena) in Lake Hammonasset Reservoir. This source's watershed is over 80% forested.

cools and mixes, known as turnover. A warming climate, however, not only leads to warmer water, but can extend the duration and strength of this summer stratification period.

During stratification, the hypolimnion is isolated from the air overlying the water surface, such that no dissolved oxygen (DO) is replenished from the atmosphere. Once hypolimnetic DO is consumed by decomposition of organic matter, creating anoxic conditions, chemical reactions ensue that solubilize and release phosphorus and troublesome metals like manganese from the bottom sediments.

Strong thermal stratification is also associated with the more stable, quiescent water column conditions preferred by cyanobacteria.

Phosphorus Loading

In freshwater systems, the limiting nutrient for phytoplankton growth is phosphorus. Nitrogen compounds are important, but small increases in phosphorus concentrations can lead to big changes in phytoplankton biomass and species composition.

November cyanobacterial bloom in a RWA reservoir.

A reservoir with phosphorus concentrations of 10 micrograms per liter or less is unlikely to experience nuisance cyanobacterial blooms. In general, the risk of nuisance cyanobacterial blooms increases as phosphorus concentrations exceed 20-30 micrograms per liter. Also, as concentrations of chlorophyll a pigments (an indicator of algal biomass) increase above 10 micrograms per liter, there is an increased probability that a reservoir's phytoplankton community will be dominated by cyanobacteria.

The extreme precipitation events like Connecticut experienced last summer created a large influx of watershed borne nutrients entering reservoirs and their tributaries. These nutrients are readily available to be used by cyanobacteria upon the inevitable return of dry, hot, sunny weather and warm water temperatures. Also important is that many species of cyanobacteria have a competitive advantage through their ability to meet their needs for nitrogen using atmospheric nitrogen gas, a process called nitrogen fixation.

Compounding the consequences of added watershed loading of nutrients from storm events is the phosphorus released internally from anoxic reservoir sediments during periods of strong thermal stratification. If stratification weakens and the reservoir begins to vertically mix in early to mid-fall, these accumulated nutrients are circulated upward to surface waters that are more exposed to sunlight needed for photosynthesis. This combination of nutrient and light availability in surface waters, and the current pattern of increasingly warmer fall weather creates ideal conditions for cyanobacterial blooms late in the year. An additional competitive advantage is that many cyanobacteria can control their buoyancy, allowing them to access internally generated phosphorus near the thermocline, or to vertically migrate to shallower depths to access sunlight.

MANAGEMENT

With the frequency and intensity of cyanobacterial blooms likely to increase going forward, what are some of the tools available to water suppliers to manage or mitigate the impacts on their ability to produce high quality water?

Monitoring

Monitoring in the drinking water profession is often thought of as starting with the influent to the water treatment process and ending at the tap. While this is critically important, effective management of cyanobacteria starts in the reservoir and in some cases the watershed. Sampling for nutrients, including phosphorus at single digit microgram per liter detection levels can reveal information about watershed and tributary sources, reservoir concentrations, and internal loading.

A very simple method of monitoring water clarity and creating a long-term data record is the use of a secchi disk, where a black and white circular disk is lowered from a boat and its depth of visibility recorded. The Regional Water Authority (RWA) also uses a multi-parameter instrument called a datasonde to simultaneously measure temperature, dissolved oxygen, turbidity, pH, conductivity, and pigment fluorescence by phytoplankton and cyanobacteria (chlorophyll a and phycocyanin, respectively). By conducting vertical depth profiles at one or more reservoir sampling locations, real-time data can be collected to help understand the distribution and concentrations of algae and cyanobacteria. These profiles can be used to guide intake depth and source selection and sample collection for additional parameters, such as phytoplankton cell identification and enumeration, cyanotoxins, total and dissolved organic carbon, UV254, and manganese. This monitoring has multiple benefits including providing possible causal information about current or impending water quality problems, increasing knowledge of seasonal reservoir behavior, and helping to guide operational decisions and management measures.

Watershed Management

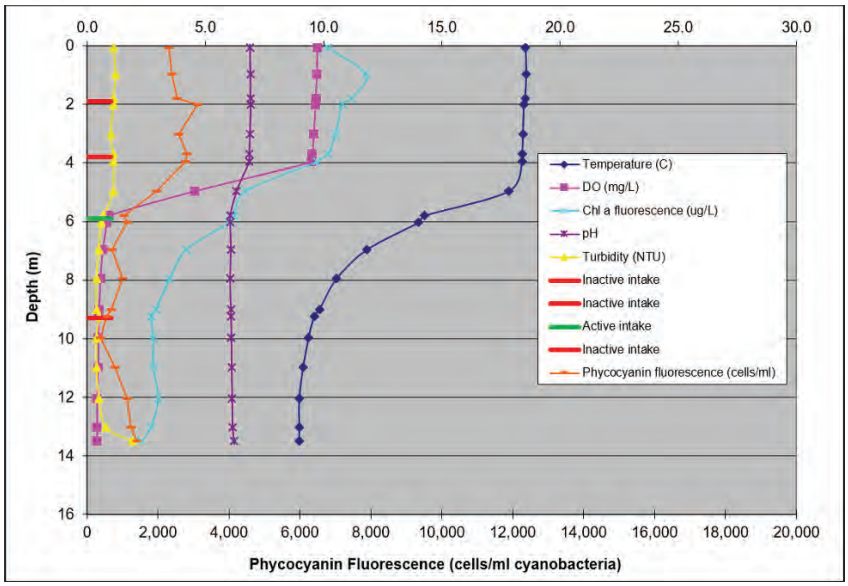
Actions to reduce current or future nutrient loading will always be beneficial, although this can be difficult to achieve in the case of existing development and land use activities. Most effective are actions to preserve natural watershed lands through fee simple acquisitions and conservation easements. Being vigilant with respect to reviewing and commenting on proposed development activities before local and state agencies within public water supply watersheds is highly advised, with special attention to topics such as riparian buffers, stormwater management, erosion and sediment control, and minimizing impervious cover. Opportunities to improve water quality during redevelopment projects or stormwater system retrofits should also be explored. Regular watershed inspections can help identify and correct problem sources of nutrient loading.

Measuring water transparency with a secchi disk.

Conducting a vertical water quality profile with a multi-parameter datasonde.

Selective Withdrawal and Diversion Management

Some reservoir systems offer flexibility in terms of selecting source waters, including out of basin diversions from streams and storage reservoirs, multiple distribution reservoirs, and multiple depth intake windows. Coupled with a regular monitoring program, this can present significant opportunities to optimize the quality of water entering a reservoir or treatment plant. For example, the RWA regularly closes certain stream diversions in anticipation of major storm events that could bring in major influxes of nutrients and organic matter. Selective depth withdrawal at the intake can be a highly effective way to avoid layers of algae or cyanobacteria, particularly during thermal stratification. It is often the case that cold water with low algal biomass can be accessed using intake windows below the thermocline depth.



Datasonde water quality profile data.

This, however, needs to be balanced with the tendency for higher summer manganese concentrations at deep intakes, especially when the hypolimnion becomes anoxic.

Algaecides

Copper sulfate has been used by drinking water utilities in the United States for controlling algae blooms since the early 1900s. When properly dosed, it is highly toxic to algae and cyanobacteria; however, copper treatments also come with disadvantages that can be counterproductive to sustaining good water quality and a healthy ecological balance in water supply reservoirs. Once applied to a heavy bloom, large masses of decomposing algae consume oxygen in the reservoir. Resulting anoxic conditions can cause sediment manganese to be mobilized, and even result in a rebound in algae growth due to internal phosphorus loading. Lysing of cyanobacterial cells due to treatment also risks releasing cyanotoxins and taste and odor causing compounds. This is why it is best to apply algaecides when it is apparent that a problem cyanobacterial bloom is developing but before it reaches exceedingly high cell concentrations.

Another significant drawback associated with copper sulfate is its toxicity to non-target organisms, especially invertebrates. This includes zooplankton that graze on algae, effectively removing a natural biological control mechanism. Copper will also accumulate in reservoir sediments, potentially having long-lasting impacts to benthic organisms. Sodium peroxide-based compounds are now becoming an increasingly attractive alternative to copper for controlling cyanobacterial blooms.

Peroxide degrades to water and oxygen so it is non-persistent in the environment and tends to be selectively toxic to cyanobacteria, with no major effects on zooplankton or eukaryotic phytoplankton. Research has also shown that following treatment, more desirable forms of phytoplankton, such as green algae and diatoms, tend to become more dominant.

In September and October of this year, a bloom of Aphanizomenon formed in an RWA reservoir that raised turbidity readings and hampered the filtration process. Although the reservoir has multiple intakes, selective withdrawal options were limited due to the depth of the bloom and hypolimnetic manganese concentrations.

To address this situation, the RWA arranged to treat the reservoir with a granular peroxide-based product (sodium carbonate peroxyhydrate). Within one day of application, influent turbidities substantially declined and filter runs returned to normal. Pre- and post-treatment microscopic analysis showed the peroxide application reduced total Aphanizomenon biomass by up to 86%.

Oxygenation and Circulation

Aeration and mixing technologies can be also be used to accomplish multiple water quality objectives, including control of manganese and algae. These are generally grouped into two categories, oxygenation and circulation. Oxygenation involves the injection of air or pure oxygen to maintain aerobic conditions in the hypolimnion during thermal stratification. It can help manage the release of both dissolved phosphorus and manganese without disrupting thermal stratification, thereby making a cold, low algae layer available for raw water withdrawals and reducing overall nutrient availability to cyanobacteria. Circulation systems use air or mechanical means to mix the entire water column.

This achieves some of the same benefits as oxygenation and also can prevent cyanobacteria blooms due to the unfavorable turbulent mixing conditions. The intent is to maintain thermally homogenous conditions from the surface to the bottom of the reservoir, so this

technique may not be preferred when selective depth withdrawal is a viable option for optimizing water quality.

Nutrient Inactivation

Another control technique in lakes and reservoirs is the direct application of phosphorus binding compounds. Known as nutrient inactivation, it is often used to control internal loading of phosphorus through the application of aluminum sulfate (alum). Alum acts to bind sediment phosphorus during summer thermal stratification when chemical reactions in the absence of dissolved oxygen cause iron bound phosphorus to be released into the water column. Alum applications should only be conducted with the advice of an experienced consultant or contractor to ensure that the water chemistry, along with the product selected and its dose will not result in fish kills.

Sonication

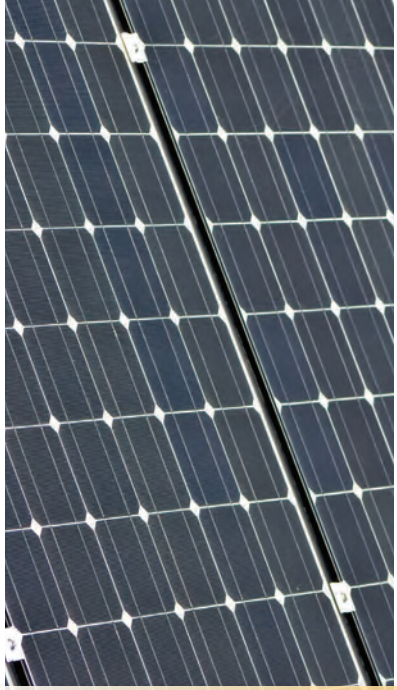
An emerging control technology is the use of sound waves. Devices are deployed in water bodies to emit ultrasonic sound waves intended to disrupt the integrity of cyanobacterial cells. Vendors are now marketing this technology world-wide as a means for controlling cyanobacteria in recreational ponds, wastewater lagoons, drinking water reservoirs and other water bodies.

CONCLUSION

The appropriate tool or set of tools to manage climate change effects on cyanobacterial blooms will vary by individual reservoir system, but common to all is developing a robust monitoring program to understand the seasonal behavior of your reservoir system, and having actionable and timely data for decision-making concerning operations, management measures, or long-term capital improvements. This may ultimately include treatment process improvements to enhance solids removal, filtration, and/or providing for advanced oxidation of cyanotoxins and taste and odor compounds.

Peroxide-based algaecide application.



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THE BARGH PIPELINE

By Dan Lawrence

Aquarion owns and operates a raw water pipeline between Bargh Reservoir Dam, in the City of Stamford, and the Rockwood Reservoir Dam watershed, in the Town of Greenwich. The existing raw water pipeline is a 20-inch cast iron main with a length of just over a mile, referred to as the Bargh Raw Water Pipeline. The Bargh Pipeline is a critical component of the Greenwich public water supply system and is necessary to the storage, and withdrawal of water for the Greenwich public water supply system.

The existing 20-inch diameter water pipeline (constructed in 1905) deteriorated over time. The combination of corrosion, soil movement, traffic loads and operating pressures have led to leakage problems and pipe breaks in numerous locations along the pipe. Additionally, residential development along the existing pipeline route has resulted in structures (e.g., swimming pools, rock walls, etc.) and extensive landscaping being constructed over segments of the existing pipeline making access to the pipeline for repairs very difficult. Other sections of the pipeline were constructed along wetland areas located behind residences with the only access to repair or maintain the pipeline through the wetlands.

The Bargh to Rockwood diversion has a registered diversion rate of 14.9 million gallons a day (MGD), but the existing pipeline does not have the capacity needed to transfer the full registered diversion rate.

Because of the existing pipeline restrictions, Aquarion decided to replace the existing pipeline with a new 24 inch ductile iron pipeline which would allow the full diversion limit, minimize leakage and provide full access for pipeline maintenance. The increased transfer capacity would provide greater flexibility in operations and limit draw down of the Putnam and Rockwood Reservoirs during the peak demand periods.

Pipeline Preconstruction Activities

Designing and constructing a pipeline is a major undertaking, requiring a wide variety of engineering and construction skills and is a multi-step process. Many months prior to the actual pipeline construction phase, planning and surveys were conducted, permits are applied for and received, and property easements negotiated and granted.

Pipeline Construction steps can broadly be grouped into three categories:

- Pipeline pre-construction activities.
- Pipeline construction activities.
- Pipeline post-construction activities.

For the purpose of this paper, pre-construction items will be limited to the actual physical routing of the pipeline. The discussion of the construction and post construction phases will address construction activities and challenges faced during the pipeline installation phase.

Pipeline Routing

The existing pipeline is mostly installed in rural areas, either traversing cross country or through private properties (via easements) with the exception of a short stretch that is installed in Farms Road. The new pipeline alignment through rural areas was selected to avoid existing structures and installed in new easements or Aquarion property and the middle pipeline segment was placed in public road right-of-way (ROW). Figure 1 shows the existing and new pipeline routes.

The new pipeline alignment follows the existing pipeline for the first 725 feet, with the next 1,140 feet is routed around existing residential structures to Farms Road. The new alignment follows Farms Road and Taconic Road for about 3,730 feet to avoid disturbing the existing wetlands along Farms Road and behind the residential structures along the east side of Taconic Road. The last 2,330 feet of the new pipeline was installed on Aquarion owned property and terminates directly into Rockwood Lake.

The new pipeline total length from the pump station to the stream outfall is 7,905 feet (1.5± miles).

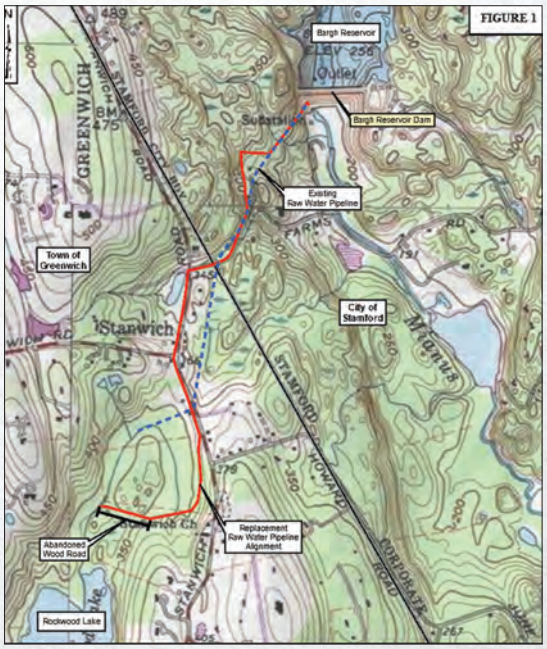

Figure 1. Existing and new pipeline routes.

> **Routing and installation of a new pipeline requires proper selection of pipe installation methods, material, planning, and considerations for surface access, as well as services.**

The operating pressure in the pipeline varies between 95 psi at the Bargh Raw Water Pumping Station to 3 psi at the high point, respectively. The last 2,200 feet (0.4± miles) of the pipeline flows by gravity. Pipeline elevations range from 220 feet to 357 feet (NAVD88).

Challenges along the pipeline route included regulatory as well as physical obstacles.

Often, the chosen pipeline route is based on the physical and regulatory challenges, with the means/methods chosen for constructing the pipeline also dictated, in part, by the regulatory and physical obstacles. Regulatory requirements included obtaining permits and permissions from a myriad of regulatory agencies.

Physical obstacle along the chosen pipe route included, but were not limited to:

- multiple intermittent streams.
- upland wetlands.
- extensive bedrock.
- public row and traffic control.
- groundwater.

Pipeline Construction/ Restoration Activities

The piping chosen for this project was Class 52 Ductile Iron pipe with Polyethylene tube encasement of all pipe segments, joints, and fittings. Construction included the installation of both restrained joints and push-on joints. Where required, the pipeline was restrained using FieldLok gaskets and megalugs for mechanical joints.

Pipe Segments 1 and 2: Cross Country – 1,850 Linear Feet

Segment 1 construction consisted of an open cut through an upland forested area, with federally protected northern long-eared bats, 0.45 acres of upland wetlands, and two intermittent stream crossings.

The first 725 feet of the existing 20-inch pipeline was removed and the new 24-inch pipe installed in the same trench. Five hundred and fifty (550) feet of the existing 20-inch Segments 1 and 2 pipelines was installed in Farms Road, the remaining 4,135 feet of the existing pipe traveled cross country was abandoned in place.

Wetland and two intermittent streams were crossed by the pipeline in Segment 1. In order to reduce the long-term effect of scouring, the new pipeline was encased in concrete at the two intermittent stream crossings.

The 550 feet of existing 20-inch Segment 1 pipe, installed in Farms Road, was backfilled with flowable fill or control density fill (CDF) to minimize further disruption to the traveling public. Backfilling the pipe with a cementitious material eliminates the possibly of the pipe cracking, under the roadway in the future and leading to failure of the roadway.

A meter vault was constructed in Segment 1. The meter vault was installed immediately downstream of the Bargh pump station to be used to meter the flow from the Bargh Reservoir. The flow data will be collected via SCADA and reported to the CT Department of Energy and Environmental Protection on a monthly basis (Figure 2).

Figure 3. Hydraulic Hammer.

Segment 2 constructions was the segment with the least number of challenges and consisted of clearing and grubbing and open cut through an upland forested area. The pipe was installed with three feet minimum cover in all segments. Erosion control consisted of the installation geotextile silt fence, hay bale barriers, bypass pumping and temporary culvert crossings to convey stream flow during installation.

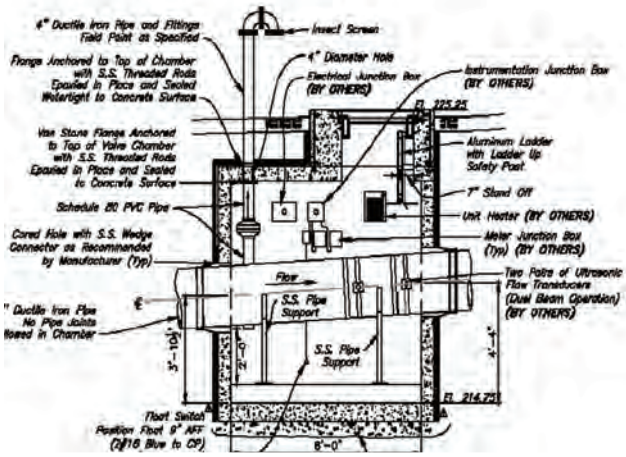

Figure 2. Meter Chamber.

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Restoration for each of the seven segments consisted of planting of wetland vegetation, trees, creating wildlife habitat by stacking trees at designated locations, and installation of three owl boxes.

Segment 3 through 5: Public Road – 3,750 Linear Feet

Segments 3 through 5 were installed in existing Farms Road and Taconic Roads right of ways (ROW). Pre-construction test borings indicated that bedrock was within two to three feet of the surface. Where rock or rocky formations were encountered, excavator mounted hydraulic hammers were used to fracture the rock prior to excavation (Figure 3).

Blasting was used where mechanical equipment could not break up or loosen the bedrock.

Roadway Segment 3 was particularly challenging due to topography, full depth bedrock, a stream crossing and a total road washout as a result of Hurricane Ida an extreme rainfall event associated with. Pipe trench depth in this Segment varied from seven to 12 feet. Bedrock was encountered in the section within two feet of the roadway surface.

Noteworthy unforeseen conditions encountered during this roadway segment include: significant seasonal fluctuations in ground water level, a rainfall event in excess of a 500-year storm, and a failed bridge deck.

The pipeline was installed and awaiting a successful pressure test when Hurricane Ida passed through the area on September 1, 2021, releasing up to eight inches of precipitation within hours. The storm was reportedly a 500-year storm event. The storm caused excessive flows that exceeded the stream channels carrying capacity, resulting in overland flow that traveled approximately 300 feet downslope to the area of the recent pipe installation. The pipe trench had only received a temporary two-inch asphalt patch prior to the storm event, pending a successful pressure test, so it was vulnerable to erosion. The permanent pavement restoration was scheduled for the following spring paving season (April 2022). The floodwaters eroded the pipe trench and roadway in Segment 3 (Figure 4).

The floodwaters traveling downslope lifted the two-inch temporary asphalt

Figure 4. Pipe Trench Erosion.

patch and eroded the pipe bedding up to the top of pipe in some instances. The flooding and subsequent erosion of the roadway in Segment 3 resulted in closure of Farms Road to the traveling public for approximately three months.

The pipeline was inspected and determined to be undamaged by the flood event. After a successful hydrostatic test was performed on the pipe, post flood event, reconstruction of Farms Road began in earnest, with a target date of having the road reopened before the end of December 2021.

Reconstruction of the roadway was done as cooperative effort between Aquarion, the City of Stamford, several consulting engineering firms, and a contractor. The road reconstruction consisted of stripping and removing all pavement from Segment 3, bringing in new fill material for the pipe trench and road bed, compaction of the pipe trench and road bed to 95%, rough grading, fine grading and installation of four inches of asphalt (consisting of two two-inch lifts).

During reconstruction of the roadway, the City took the opportunity to inspect a 50+ year old reinforced concrete bridge deck. The inspection showed that the deck was determined to be not structurally sound and required replacing before the road could be reopened. A design-build contractor was retained to repair the deck.

The timeline from retaining the design build contractor to the installation of the deck took approximately seven weeks to install the deck. The deck was installed, paved and the road reopened ahead of schedule.

Erosion control consisted of the installation geotextile silt fence, hay bale barriers, bypass pumping and temporary culvert crossings to convey stream flow during installation.

Pipeline installation in Segments 4 and 5 consisted of an open cut through Taconic Road and restoration of the public ROW and tree clearing. Trench depth in these roadway segments varied from five feet to 20 feet.

During installation of the 24-inch pipeline on Taconic and Farms Road (Greenwich, CT) it was discovered that the soils were contaminated with heavy metals and hydrocarbons along the entire 2,720 linear feet pipeline route.

Figure 5. Installed Outfall.

The polluted soils were taken offsite, segregated and tested with the test results indicating that the soils were non-hazardous but contaminated. The sampling results indicated that soils suitable for backfill could be used as trench backfill as originally planned. Excavated soils unsuitable to be used as backfill were required to be disposed of in a licensed disposal/reuse facility with approximately 3,925 cubic yards having to be disposed and replaced with clean fill.

Bedrock was also encountered through these two segments. Blasting was chosen to expedite the excavation. Approximately 3,550 cubic yards of rock was blasted an excavated from the trench.

Restoration in these segments consisted of repaving of the excavated trench and/or the entire road width and restoration of the ROW.

Segments 6 and 7: Cross Country – 2,305 Linear Feet

Segments 6 and 7 construction consisted of open cut through a wildlife protected area with wetlands, multiple

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intermittent stream crossings and construction of an outfall to the stream supplying the Rockwood Reservoir.

The outfall design is based on the United States Department of the Interior, Bureau of Reclamation Stilling Basin for Pipe. The purpose of the structure is to dissipate the energy in the pipeline so that there is no erosion to the receiving watercourse.

The new pipeline outfall is approximately 2,000 feet downstream of the existing pipeline outfall thereby reducing the loss of water due to evaporation, transpiration and seepage. The new pipeline is expected to significantly shorten, by up to 40 to 50%, the refill rate of the Rockwood Reservoir (Figure 5).

Conclusion

Routing and installation of a new pipeline requires proper selection of pipe installation methods, material, planning, and considerations for surface access, as well as services. Contingency plans and budgets should also be available to keep the project moving in the event of the unexpected, particularly for projects that traverse a wide range of environmental and urban conditions.

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CWWA Legislative Update

CWWA Active on Bills Affecting the Water Industry

Although this was one of the shortest legislative sessions on record, CWWA was active on several bills affecting the water industry:

Fire Service Charges

CWWA is actively opposing a bill which would undermine a water utility's ability to fund and maintain critical fire protection systems. SB-325 prohibits water companies from assessing municipalities for 1) fire protection charges for A) a water line that is not connected to a hydrant on the street where such water line is located or that does not have a hydrant connected to it within the municipality, or B) a water line or hydrant that is not owned or maintained by such company, or 2) a linear foot charge or hydrant charge for a water line located on private property.

The bill also prohibits a water company from installing a hydrant without first obtaining approval from the municipality's chief administrative officer in addition to the local fire marshal.

CWWA is communicating with lawmakers to oppose the bill, which creates the following concerns:

- Very impractical and labor intensive to implement and administer, resulting in increases in customer costs.
- Changing the number of service lines and hydrants used in calculating fire protection charges will simply force an increase in the per unit cost or a shift in costs to other customers.
- Water lines not directly connected to a fire hydrant or located on private property can still provide water to fire hydrants elsewhere in a municipality and are appropriately and equitably included in the allocation of fire service charges.
- Fails to recognize that water mains can be installed in easements over private property to prevent dead ends, improve available fire flow.
- Creates uncertainty as to whether water companies will be prohibited from assessing fire service charges for buildings with sprinklers and private hydrants, such as town halls and schools.
- For water utilities that serve several municipalities, decreasing the fire service assessment for one municipality would require an increase in the assessment to other municipalities.
- Places an additional burden on water utilities to seek approvals from town administrators not familiar with hydrant usage and requirements.
- Undermines the authority of fire marshals in designating and approving the location of fire hydrants consistent with applicable fire safety codes and standards.
- Delays efforts to replace hydrants that have been hit by plows or cars or otherwise damaged, creating fire safety risks.

Sales Tax Exemption Moves Forward

HB-5404, which exempts purchases of products and services by private water companies from the sales tax, was approved on consent in the legislature's Finance Committee. This bill helps ensure greater parity in customer rates by addressing concerns regarding sales taxes incurred by private water companies that regional and municipal water companies are exempt from. The bill awaits further action from the House and Senate.

Legionella Bill Dies in Committee

HB-5482, which included recommendations requiring water companies to adhere to strict sampling requirements and maintain a 0.1 chlorine residual died in the Public Health Committee, which took no action. Although CWWA had significant concerns with the bill, as drafted, we are reaching out to the Department of Public Health (DPH) to work with them to address concerns regarding Legionella.

Impact of Solar Installation on Watershed Lands and Aquifer Protection Areas

SB-248, which included CWWA's language to require DPH to provide information to the CT Siting Council regarding whether a proposed solar installation would have an adverse impact on the purity and adequacy of public water supplies, died in the Public Health Committee.

Electronic Notification of Proposed Projects within a Watershed

Language requiring applications for proposed projects on a public water supply watershed to be provided by email if a water company provides instructions for electronic transmittal of such notice on its website was also included in SB-248 and did not move forward in the process.

The legislature adjourned on May 4. CWWA will be providing a legislative wrap-up at the CTAWWA/CWWA annual conference.

If you have any questions on these issues, please contact CWWA's Executive Director, Betsy Gara at *gara@gmlobbying.com.*

Connecticut Water Wins National and Regional Top Workplace Awards

Connecticut Water employees have voted the company as a USA Top Workplace 2022. The award was based on anonymous employee responses to a workplace survey conducted by Energage. Last fall, the company's employee professional development programs were also recognized nationally with a Cultural Excellence Award.

Maureen Westbrook, president of Connecticut Water, says employee satisfaction is a priority of the entire leadership team. She noted it is especially gratifying to know that our employees understand and appreciate that leaders value them and are committed to the health and well-being of employees and their families within our purpose-driven organization.

Thank You to Our 2022 CTAWWA Section Enhancers

List current to May 2, 2022.

Able Tool & Equipment
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AQUA Solutions
Aquarion Water Company
ASG
Badger
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CDM Smith
Clow Valve Company
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Corrtech
DN Tanks
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G & L Waterworks Supply Corp.
GL Lyons Associates
H2M architects + engineers
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Harper Haines Fluid Control, Inc.
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Hymax-A Mueller Brand
J&S Valve, Inc.
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Kleinfelder
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Preload, LLC
PRIME AE Group
Reed Manufacturing Company
Regional Water Authority
Sima Drilling Company
SLR
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Snyder Civil Engineering, LLC
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Statewide Aquastore, Inc.
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The Kupferle Foundry Company
Ti-SALES
Total Piping Solutions, Inc.
Tyler Union
US Pipe
Water & Sewer Specialties
Wedge Manufacturing
Weston & Sampson
Woodard & Curran
Wright-Pierce
WSP USA

Welcome New Members

James Amendola, Whitewater
Barrington Brown, Choice1inspections
Alicia Campbell, EJ Prescott
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Robert Carr, East-West Engineering, PLLC
Cydney Caterino, Arcadis
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Maureen Crowley, AECOM
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Jonathan Fraser, Regional Water Authority
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Michael Joyce
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Sunny Lakshminarayanan, Regional Water Authority
Heather Landis
Jake Lavalette, University of Maryland
Jahmar Mitchell, The Metropolitan District
David Null
Andy Purchia, The Mattabassett District
Bryan Roberts, Bristol Water and Sewer Department
William Smith, Aquarion Water Company of CT
Barry Williams, SUEZ Westchester
Sophia Wint, Aquarion Water Company

Connecticut Water Promotions

Amanda Deming is the new Director of Customer Service. Amanda had been the Manager of Customer Service and has worked in Connecticut Water's call center for nearly a decade. In her new role, Amanda will lead both the Customer Service and Revenue Service teams.

The Company is shifting to geographic-based leadership of our service delivery teams to best meet the needs of the 60 towns and more than 60 public water systems served across Connecticut.

Paul Lowry has been named the Manager of the Northeast Region and **Gerry McDermott** has been named the Manager of the Southwest Region. In these newly-created positions, Paul and Gerry will assume responsibility for all aspects of their respective region's operations, distribution system maintenance and customer service. **Bob Ross** will be the Superintendent of Service Delivery for the Southwest Region.

Please join Connecticut Water in congratulating Amanda, Paul, Gerry, and Bob.

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2022 Buyers' Guide

CT InFlow-Line 2022 Buyer's Guide

For All Your Product and Service Needs

Our 2022 Buyers' Guide consists of two sections:

- *A categorical listing of products and services and a list of companies that provide them.*
- *An alphabetical listing of companies appearing in the first section. This includes name, contact info, website, and more.*

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BioSafe Systems, LLC

AMI COMMUNICATIONS
SUEZ Advanced Solutions

AMR/AMI/MDM
Core & Main
EJ Prescott
Neptune Technology Group
Ti-SALES

ASSET MANAGEMENT
CorrTech, Inc.
Environmental Partners
Kleinfelder
SUEZ Advanced Solutions
Tata & Howard, Inc.
Tighe & Bond, Inc.
Wright-Pierce

AUTOMATIC METER READING SYSTEMS
Core & Main
Neptune Technology Group
Stiles Company, Inc.

BRASS VALVES AND FITTINGS
Ford Meter Box Company

CHEMICAL PROCESSING AND FEED SYSTEMS
AQUA Solutions, Inc.
Ti-SALES

COAGULATION AND FLOCCULATION
AQUA Solutions, Inc.
Coyne Chemical Environmental Services

CONTINUING EDUCATION FOR WATER/WASTEWATER PROFESSIONALS
Southern Connecticut State University School of Business

CONSTRUCTION, TESTING, AND REDEVELOPMENT
Weston & Sampson CMR, Inc.

CONTRACT OPERATIONS
Woodard & Curran

CONTRACTORS
Pro Tapping, Inc.

CORROSION CONTROL
CorrTech, Inc.

CSO/SSO CONTROLS, WATER RESOURCES, DISTRIBUTION, AND COLLECTION
Coyne Chemical Environmental Services
Mission Communications

DECHLORINATION
Superior Product Distributors

DESIGN
Environmental Partners
Kleinfelder
Luchs Consulting Engineers
Snyder Civil Engineering, LLC
Tata & Howard, Inc.
Tighe & Bond, Inc.

DISINFECTION
BioSafe Systems, LLC
Coyne Chemical Environmental Services
Superior Product Distributors

EDUCATION – PUBLIC UTILITY MANAGEMENT
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ELECTRICAL INSTRUMENTATION/ CONTROLS/ GENERATORS
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VEGA Americas, Inc.

ENGINEERS/ CONSULTANTS
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Environmental Partners
Gesick & Associates, PC
Hazen and Sawyer
Kleinfelder
Luchs Consulting Engineers
Snyder Civil Engineering, LLC
Tata & Howard, Inc.
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Weston & Sampson CMR, Inc.
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FILTER MEDIA
Culligan Water Co.
Orthos Liquid Systems, Inc.

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Culligan Water Co.
Orthos Liquid Systems, Inc.

FIXED NETWORK
Stiles Company, Inc.

GENERAL INDUSTRIAL
Baker Water Systems: A Division of Baker Manufacturing Co., LLC

GROUNDWATER/ WELL SERVICES
Baker Water Systems: A Division of Baker Manufacturing Co., LLC

HOT TAPS, WET TAPS, LINE STOPS, PIPE FREEZES
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NUTRIENT REMOVAL
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ODOR CONTROL
BioSafe Systems, LLC
Hayes Pump, Inc.

OPERATION SERVICES
Environmental Consulting Laboratories, Inc.

PACKAGED PUMP STATIONS/BOOSTER STATIONS
Baker Water Systems: A Division of Baker Manufacturing Co., LLC
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PIPE COUPLINGS
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PIPE REPAIR PRODUCTS
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PIPELINE REHABILITATION
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SUEZ Advanced Solutions

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BioSafe Systems, LLC
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LISTINGS

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O 800-356-5130
F 608-882-3777
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www.bakerwatersystems.com

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22 Meadow Street
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CORE & MAIN
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O 860-826-0517
F 860-826-0518
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www.coreandmain.com

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F 508-435-0096
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www.corrtech-inc.com

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