

VOLUME 51 NUMBER 3 | ISSN 1077-3002 FALL 2017

MUNICIPAL/AGENCY TOPICS

Anniversary 1967–2017

CSO success—overcoming funding and design challenges in Madawaska, Maine

Journal

Sanford Sewerage District rises to the challenge—17 years of progress

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On the cover: Decatur WAY—Lowell, Massachusetts, is a green alley that collects rainwater and allows that water to infiltrate into the ground before entering the city's drainage system. It is also an urban amenity, providing a pedestrian corridor, outdoor art gallery and neighborhood meeting place.



The concepts, ideas, procedures and opinions contained in the articles in this publication are those expressed by the various authors who submit the material for publication. The New England Water Environment Association, its ttee, the editors, the executive director, and administrative staff hereby assume no responsibility for any errors or omissions in the articles as presented in this publication, nor are the concepts, ideas, procedures and opinions in these articles necessarily recommended or endorsed as valid by NEWEA, its executive committee the editors, the executive director or staff. References to specific products or services do not constitute endorsement of those offerings by NEWEA. The Journal's committee reserves the right to make any editorial changes as deemed necessary for publication of submitted papers.

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OUR ASSOCIATION WAS ORGANIZED EIGHTY-EIGHT YEARS AGO in Hartford, Connecticut, on April 23, 1929, with the objectives of advancing the knowledge of design, construction, operation and management of waste treatment works and other water pollution control activities, and encouraging a friendly exchange of information and experience. From 40 charter members, the membership has steadily grown to more than 2,000 today. Membership is divided into the following classes:

Professional Member—shall be any individual involved or interested in water quality including any manager or other officer of a private waste treatment works; any person engaged in the design, construction, financing, operation or supervision of pollution control facilities, or in the sale or manufacture of waste treatment equipment.

Executive Member-shall be an upper level manager interested in water quality and who is interested in receiving an expanded suite of WEF products and services.

Corporate Member-shall be a sewerage board, department or commission; sanitary district; or other body, corporation or organization engaged in the design, consultation, operation or management of water quality systems.

Regulatory Member—this membership category is a NEWEA only membership reserved for New England Environmental Regulatory Agencies, including: USEPA Region 1, Connecticut Department of Energy and Environmental Protection, Maine Department of Environmental Protection, Massachusetts Department of Environmental Protection, New Hampshire Department of Environmental Services, Vermont Department of Environmental Conservation, and Rhode Island Department of Environmental Management.

Academic Member-shall be an instructor or professor interested in subjects related to water quality.

Young Professional Member-shall be any individual with five or fewer years of experience in the water quality industry and who is less than 35 years of age.

Professional Wastewater Operations Member (PWO)-shall be any individual who is actively involved on a day-to-day basis with the operation of a wastewater collection, treatment or laboratory facility, or for facilities with a daily flow of <1 million gallons per day. Membership is limited to those actually employed in treatment and collection facilities.

Student Member—shall be a student enrolled for a minimum of six credit hours in an accredited college or university.

WEF Utility Partnership Program (UPP)—NEWEA participates in the WEF Utility Partnership Program (UPP) that supports utilities to join WEF and NEWEA while creating a comprehensive membership package for designated employees. As a UPP a utility can consolidate all members within its organization onto one account and have the flexibility to tailor the appropriate value packages based on the designated employees' needs. Contact WEF for guestions & enrollment (703-684-2400 x7213).

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BECOME A NEWEA MEMBER

- Complete and mail the membership application form on pages 91–92
- Download a membership application from **newea.org** by clicking— How Do I Join?
- Join online at **wef.org** by clicking— Become a Member

2017 RATES

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President's Message

"The field is where all the action is."

- Steve Small, Construction Manager, AECOM

Our 2017 theme is the growth and development of students and young professionals, and my message begins with a student's story. At our Annual Conference in January, I was introduced to an undergraduate from Worcester Polytechnic Institute, Tess Laffer. She is an environmental engineering major and vice president of its student chapter of the American Academy of Environmental Engineers and Scientists (AAEES). During the spring, I met with the students on several occasions, and Ms. Laffer and I worked closely to develop a NEWEA student affiliation with its AAEES chapter. During this time, it became apparent to me that Ms. Laffer was special-bright, engaging, organized, and motivated, and a perfect candidate for a summer internship with us at the Framingham Department of Public Works (DPW). As her term was winding down, I offered her a position at DPW. I felt that we could provide her an opportunity to work closely with our engineers on design projects and with our operations staff in the field on our sewer construction projects.

Ms. Laffer began by preparing plan and profile designs for two sewer replacement projects. I had her go "old school" and prepare her designs with pencil and profile paper using drafting triangles and an engineering scale. Although I appreciate all the advantages CAD provides, I wanted her to learn as I learned as a young engineer. The concepts of pipe and manhole dimension, pipe length, stationing, and slope become more tangible by drawing them by hand. She finished her designs and was now ready to construct them as our field engineer. We were working with tight grades, and I instructed her that she would be checking grades for each stick of pipe as it was installed. We started by refreshing her surveying skills using a level and rod, and I showed her how we would adjust our design grades to address field conditions. After some trepidation and struggles, she found her groove and was on her way. She was providing the crew with pipe and manhole grades, assisting with manhole invert construction, and observing trench excavation, backfilling, and compaction. We would check in on each day's progress, and I sensed her pride and growing confidence as she recounted the day's production, the challenges that were overcome, and her part in it. Ms. Laffer was now an engineer! Watching her flourish in the field has truly been a highlight for all of us at DPW. The field is the best classroom, and she passed the course with flying colors. She will return to WPI for her senior year this fall with self-assurance, experience, and the satisfaction of a job well done.



In typical NEWEA fashion, our summer has also been filled with action and accomplishment. In June, I participated in the 50th Anniversary celebration of the New Hampshire Water Pollution Control Association (NHWPCA) at Hampton Beach. The well-attended event was led by President Kevin MacLean and 50th Anniversary Committee Chair Mike Theriault with help from many NHWPCA volunteers. NHDES Commissioner Tom Burack provided a rousing keynote address that highlighted 50 years of water quality accomplishments in New Hampshire, and he challenged the attendees to raise the bar higher over the next 50 years. The sense of pride in these accomplishments among the attendees was palpable. On behalf of NEWEA, I congratulate NHWPCA for 50 years of excellence serving as the stewards and protectors of Lake Winnipesaukee (one of New England's crown jewels of water resources), the Seacoast, and all the lakes, rivers, and streams in the great Granite State.

A recent NEWEA initiative has been to increase During the fall, we will have specialty conferences our collaboration with our counterparts in the New sponsored by our Industrial Wastewater Committee and our Small Communities Committee. NEWEA members England Water Works Association (NEWWA) and the also participated in the WEFTEC Conference in Chicago, New England Chapter of the American Public Works Association. In June, the three associations co-sponincluding a Sunday evening reception at historic Soldier sored a workshop on EPA's Effective Utility Management Field's Skyline Room, overlooking the Chicago Bears' home field. Other events include our 2nd Annual Golf tool. More than 30 people attended, including representatives from four New England states. The workshop Classic, the Water for People Softball Tournament, and was led by EPA's sustainability program manager, Jim the Northeast Residuals and Biosolids Conference. Horne, and WEF Past President Ed McCormick. The In addition, we enjoy participating in Affiliated State attendees exchanged ideas on improving our public Associations Affiliated State Associations (ASA) trade utilities with respect to leadership, business planning, shows and workshops scheduled throughout New knowledge management, and sustainable practices. England during the fall. Please check the NEWEA In July, the three associations co-sponsored the Joint calendar for more information about these and other NEWEA events. Specialty Conference on Creating Resilient Infrastructure and Watersheds. Our NEWEA Watershed Management As we bid goodbye to our fickle friend, the summer Committee and its officers: Chair. Jennifer Johnson: Vice wind, we smile and reflect on the good times and memo-Chair, Sara Greenberg; and facilitator, Zach Henderson, ries we have shared these last few months. Like painted led a program focused on climate change impacts and kites those days and nights went flying by. I look forward strategies for improving infrastructure resilience in floodto our fall season and seeing you at our NEWEA and prone inland and coastal watersheds. Keynote speakers ASA events. We are fortunate to be working together in Juliette Rooney Varga and Alicia Hunt provided opening this great water infrastructure industry. Whether you are remarks and interesting perspectives on this important a utility manager, engineer, operator, product representatopic. Finally, over the last several months, NEWEA tive, regulator, or administrator, YOU play an important, and NEWWA members have been participating in a vital, and relevant role protecting our New England water resources. There are very few, if any, vocations Joint Exploratory Group to develop a closer working that are as challenging and fulfilling as ours, and it is a relationship, investigate collaborative opportunities, and initiate programs to benefit the members of each privilege and honor serving with all of you as we strive for water quality excellence. organization. Over several meetings, a Vision Statement

was adopted to reflect the group's priorities and to guide ongoing efforts with a focus on adopting the concept of "One Water." The working group established the framework for our initial collaboration, focusing initially on government affairs, training and workshops, young professionals, and establishment of a One Water Award.

Our summer would not be complete without a nod to our Committee Member Appreciation event held at Kimball Farms in Westford, Massachusetts. NEWEA has truly found a home here for this event, and more than 100 attendees enjoyed an evening of food, fun, and frivolity! Special thanks to NEWEA staff and Committee Member Appreciation Chair Denise Descheneau for coordinating another successful event. We also use this event to celebrate our Thanks-a-NEWEA program that recognizes the efforts of our members during the last year. I extend my congratulations to this year's recipients, and thank you for your volunteer efforts and participation in our activities and programs.

From the Editor

Joe Boccadoro, P.E., Senior Project Manager-Water, AECOM

he 1960s were a turbulent time in America. There was unrest and uncertainty, but several important events, inventions, or publications emerged from this time, including the following, which are all from 1967 and are celebrating a 50th anniversary:

underlying Throwback Theme for 2017 (see note). The author, Lloyd Caughran, describes an innovative school (for the times) in Missouri (Water and Wastewater Technical School) that for the first time was developed by, attended by and taught by those in the water environment industry.





- Summer of Love/Monterey Pop Festival
- 60 Minutes
- Beatles Sgt. Pepper's Lonely Hearts Club Band album
- Red Sox Impossible Dream season
- First human heart transplant
- The ATM
- RollingStone magazine
- Handheld calculator
- McDonald's Big Mac
- NEWPCA (NEWEA) Journal

Yes, that's right, you probably noted already after viewing the cover-the fall of 2017 marks the 50th anniversary of the Journal. It all began in 1966, when the New England Water Pollution Control Association (NEWPCA) voted to convert the newsletter to a journal, which led to the publication of the first edition in October 1967.

The first edition had a lot of similarities to the Journal that you see today: feature articles, editorials, advertising, membership information, industry information, and association leadership.

The feature articles published in the inaugural edition provide a glimpse of what was important in our field and to a certain degree in society in the late 1960s:

- "The Impact of Nuclear Power on the Quality of Natural Waters," by Jack E. McKee
- "Connecticut Operator Education and Certification," by Salvatore L. Falconieri
- "Training is the Key to Achievement," by Lloyd Caughran
- "The Virucidal Effects of Chlorine in Wastewater," by Richard W. Burns and Otis J. Sproul

Of those on the list above, we chose to reprint "Training is the Key to Achievement" to commemorate the 50th anniversary of the first Journal and to further support our



In other news, the themes/categories for 2018 were posted to the NEWEA website. We are excited to offer a change in 2018 in which we are focusing on professions and sectors as compared to the past theme- or topicbased approach. Please refer to the table below.

Future Journal themes & submission deadlines

Winter-National Issues of Regional Interest (Sept. 29)

Spring 2018—Operators (Dec. 29, 2017)

Summer 2018—Engineers (March 30)

Fall 2018—Public Works/Municipal (June 29)

Winter 2018—Public Works/Municipal (Sept. 28)

We are eager to hear your feedback about this change in approach to 2018 submissions.

Please join us in wishing the Journal a happy 50th anniversary! We hope you enjoy the special features we have included in that regard. Thanks to all for your continued support of the Journal and our team, who work tirelessly to produce a first-rate publication. On a personal note, rest in peace Charles N. Smith, Journal editor, 1986-1994.

Note from the Editor

Throughout 2017 we are featuring an underlying Throwback Theme in which, among other features, we reprint articles from past Journals and spotlight past influential members. In this regard, please refer to our timeline on page 58, which includes several historical milestones in the water environment field since NEWEA was founded in 1928, the Al Peloguin Spotlight on page 56, and a reprint of an article on the importance of training that first appeared in our inaugural issue in October 1967.



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Charles River Water Quality Earns a "B" Grade in 2016

– David Deegan, EPA Region 1 News Release

EPA has given a grade of "B" for water quality in the Charles River during 2016. This is a slight reduction from the "B+" grade awarded for water quality in the river during 2015.

EPA and state and local partners have worked to improve water quality in the Charles River for over two decades. This is the 22nd year EPA has issued a Charles River Report Card. The grade of "B" reflects EPA analysis of bacterial contamination in water samples taken monthly from the lower Charles River by the Charles River Watershed Association (CRWA) at 10 sampling stations between Watertown and Boston in 2016. CRWA collects monthly water quality samples throughout the length of the Charles.

In 2016, the Charles River met the Massachusetts bacterial water quality standards for boating 86 percent of the time, and for swimming 55 percent of the time. The river's grade is determined according to the following criteria:

- A Almost always met standards for boating and swimming
- B Met standards for almost all boating and some swimming
- C Met standards for some boating and some swimming
- D Met standards for some boating but no swimming
- F Did not meet standards for boating or swimming

The grading is also based on a comparison to previous years' grades and whether the water quality has improved. The slightly lower grade for 2016 is likely related to seven out of ten sample events having occurred during or immediately after a rain event, despite the overall drought conditions throughout the region during most of the year.

The lower Charles River has improved dramatically from the launch of EPA's Charles River Initiative in 1995, when the river received a "D" for meeting boating standards only 39 percent of the time and swimming standards just 19 percent of the time. These improvements were due to a significant reduction in the amount of sewage discharged into the river Artistic rendering of a proposed permanent swimming facility in the Charles River at North Point Park reprinted with permission from Stantec

over the last 20 years from combined sewer overflows (CSOs) and illicit discharges through storm drains. Illicit discharges often consist of cracked and leaking sewer pipes or improper sewer connections to the storm drain system.

EPA continues to collaborate with state and local governments, private organizations, and community advocates, as the goal of a consistently healthy river becomes closer to an everyday reality. For the third year, EPA has launched a water quality monitoring buoy in front of the Museum of Science in the Charles River Lower Basin. This buoy measures water quality in near real time, and the data can be viewed on EPA's Charles River website (epa.gov/charlesriver), as well as viewed as part of an exhibit on the Charles River at the Museum of Science, Boston.

Last year saw further expansion on the public's enjoyment of the long-term trend of improved water quality in the Charles River, illustrated by more than 140 swimmers competing in the Charles River Swim, a 1 mi (1.6 km) swim race held in June, and the release of a feasibility study for a permanent swimming area near the entrance to the Charles River at North Point Park (see thecharles.org/ media/uploads/2016/07/Swimmable-Charles-Study reduced. compressed.pdf).

In addition to illicit discharges, stormwater containing phosphorus and the algae it produces are some of the major pollution problems remaining. Every citizen can help tackle these problems. A major load of phosphorus comes from fertilizer and runoff from impervious surfaces such as roads and rooftops. Citizens have been the driving force behind the Charles River Initiative, and they can continue to help improve water quality in the river while monitoring progress themselves.

For more information on EPA's ongoing efforts to improve water quality in the Charles River, visit epa.gov/charlesriver.

EPA Selects Biddeford, Maine Project to Apply for Low-Cost Water Infrastructure Loan

– David Deegan, EPA Region 1 News Release EPA is inviting Maine Water Company in Biddeford, Maine, to apply for a Water Infrastructure Finance and Innovation Act (WIFIA) loan. EPA's Water Infrastructure Finance and Innovation Act program accelerates investment in our nation's water infrastructure by providing long-term, low-cost supplemental loans for regionally and nationally significant projects.

"Rebuilding America's infrastructure is a critical pillar of the President's agenda," said EPA Administrator Scott Pruitt. "These large-scale projects will improve water quality for 20 million Americans, especially those communities that need it the most. such as rural and urban communities."

The privately held Maine Water Company has requested a loan of \$24.5 million to help the company construct a new 20 mgd (75.7 ML/d) water treatment facility (WTF) serving 50,000 people, replacing the existing facility built in 1884

The Biddeford project is one of only 12 such projects nationwide selected by EPA for this opportunity. The projects were selected from a group of projects that represent large and small communities from across the United States that submitted letters of interest to EPA in April 2017. The privately held Maine Water Company has requested a loan of \$24.5 million to help the company construct a new 20 mgd (75.7 ML/d) water treatment facility (WTF) serving 50,000 people, replacing the existing facility built in 1884. This project will provide public water service to the coastal municipalities in York County, Maine; improve system processes, redundancy, resiliency, and sustainability; and allow for expansion to serve neighboring water systems in southern Maine, consistent with the Southern Maine Regional Water Council master plan.

"Maine Water Company is extremely pleased that our Saco River WTF project has been selected to apply for funding through the WIFIA program, and we look forward to working with EPA to deliver financial benefits to our customers that prior to WIFIA would not have been possible," said Rick Knowlton, president of Maine Water Company.

In FY 2017, the WIFIA program received \$25 million, including an additional \$8 million in the Consolidated Appropriations Act of 2017 which was signed into law by President Donald Trump on May 5, 2017. This year's projects will also leverage more than \$1 billion in private capital and other funding sources including EPA's State Revolving Fund (SRF) loans, to help finance \$5.1 billion in water infrastructure investments. The selected projects demonstrate the broad range of projects that the WIFIA program can finance, including wastewater, drinking water, stormwater, and water recycling projects.

EPA received 43 letters of interest from both public and private entities in response to the 2017 WIFIA Notice of

Funding Availability (NOFA). In addition to the Biddeford, Maine project, EPA has selected 11 other prospective projects to submit applications for loans, including Miami-Dade County, Florida; San Francisco Public Utilities Commission, California; Metropolitan St. Louis Sewer District, Missouri; city of Omaha, Nebraska; Orange County Water District, California; city of San Diego, California; Indiana Finance Authority, Indiana; King County, Washington; Baltimore City Department of Public Works, Maryland; city of Morro Bay, California; and city of Oak Ridge, Tennessee.

Established by the Water Infrastructure Finance and Innovation Act of 2014, the WIFIA program aims to accelerate investment in our nation's water infrastructure by providing long-term, low-cost supplemental credit assistance for regionally and nationally significant projects. The program's funding in President Trump's FY 2018 budget is \$20 million, an amount that should fund approximately \$1 billion in loans. For more information, visit epa.gov/wifia.

To see fact sheets on 2017 selected projects, visit epa.gov/ wifia/wifia-fy-2017-selected-projects-summary-factsheets.

Building Better Water Quality One Job at a Time

– WEF Member Association Newsletter Article Pallavi Raviprakash, WEF Technical Programs Manager



The National Green Certification Program (NGICP) has two main

purposes: to encourage water quality improvements via green infrastructure (GI) projects, and to create jobs for those who know how to build them. NGICP took several major steps in the past year toward achieving these goals and has several more in the works.

Initiated under the leadership of DC Water and the Water Environment Federation (WEF), NGICP sets certification standards for GI construction, inspection, and maintenance workers. The program takes a different tone than most GI and water quality programs. It focuses on the "how" of GI. The program's certification establishes green workforces to give utilities and private customers confidence in their choice of landscape and construction providers. It also provides a credential to certified workers that meets international best practice standards. And because the program is national in scope, the same certification will apply from coast to coast, providing a "portable" credential that will expand beyond the United States eventually.

Major Development

During the program's development phase in 2016, NGICP took several major steps to carefully conceive a nationally relevant certification program. WEF convened 14 founding partners (see sidebar) to create the necessary governance and foundational materials.

Representatives from the founding partner organizations participated in the Technical Advisory Group (TAG) and the Strategic Advisory Group (SAG). TAG oversees the development of the program's technical components, while SAG develops the vision and the implementation plan for the national rollout of NGICP. A separate Certification Council oversees the program's governance elements.

First, these groups conducted a job task analysis survey to determine which components the program needed to cover. They fed these survey results into an exam blueprint, which led to an official curriculum. Training support materials came next as the first exam was developed.

First Exam

This progression led to the inaugural NGICP exam on December 13, 2016. Seven locations, corresponding to many of the founding partners, hosted the exam for more than 90 applicants. Exam locations included: Baltimore, Maryland; Rockville, Maryland; Harrisburg, Pennsylvania; Pittsburgh, Pennsylvania; Fairfax County, Virginia; Milwaukee, Wisconsin; and Washington, D.C.

The three-hour exam tested applicants on their knowledge of entry-level GI fundamentals, construction methods, inspection techniques, and maintenance procedures in accordance with the exam blueprint.

First Class and Continued Improvement

On January 26, 2017, NGICP announced its first class of 62 certified individuals who passed the exam. Now, NGICP will use this year to refine policies and procedures, and continue to build the exam database. In 2017, training and exams will be available only through the NGICP founding partner organizations. The first exam date in 2017 was on June 6, and the second will be on November 14.

National Debut

In 2018, NGICP will celebrate another milestone: the national launch of the program. This expansion will broaden the partnership and enable other utilities and municipalities to join. Affiliate partners could include non-governmental organizations, workforce centers, government entities, trainers, and training providers that share a common goal of developing a GI workforce.

Through this nationwide program, certified individuals can set foot on a long-term and sustainable

National Green Infrastructure **Certification Program Founding** Partners

- DC Water, Washington D.C.
- Milwaukee Metropolitan Sewerage District Milwaukee, Wisconsin
- Montgomery County, Rockville, Maryland
- Kansas City Water Services Department, Kansas City, Missouri
- Fairfax County, Fairfax, Virginia
- City of Baltimore Department of Public Works, Baltimore, Maryland
- Louisville Metropolitan Sewer District, Louisville, Kentucky
- San Francisco Public Utilities Commission. San Francisco, California
- Capital Region Water, Harrisburg, Pennsylvania
- Metropolitan Water Reclamation District of Greater Chicago, Chicago, Illinois
- New Orleans Delegation, New Orleans, Louisiana
- Pittsburgh Water and Sewer Authority, Pittsburgh, Pennsylvania
- Metropolitan Sewer District of Greater Cincinnati, Cincinnati, Ohio
- Boston Water and Sewer Commission. Boston, Massachusetts

path for living-wage jobs—often in dense, urban areas where such opportunities can be scarce. By design, these are the same communities where utilities are investing in GI projects.

NGICP will help to ensure a beneficial cycle of employment, water quality improvement, and community development. The workers benefit from employment. The utilities benefit from lowimpact, distributed stormwater management. The community benefits from the ancillary advantages of GI such as more green spaces and neighborhood beautification as well as air quality and habitat improvements.

For more background on NGICP as well as the latest news, visit ngicp.org.

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FEATURE

CSO success—overcoming funding and design challenges in Madawaska, Maine

ROBERT POLYS, PE, Woodard & Curran, Portland, Maine BRENT BRIDGES, PE, Woodard & Curran, Portland, Maine MAGGIE CONNOLLY, PE, Woodard & Curran, Portland, Maine

ABSTRACT | Madawaska, Maine, undertook a holistic sewer system rehabilitation program to address combined sewer overflows (CSOs). Under a consent order from Maine Department of Environmental Protection, the town planned and implemented a series of repairs, upgrades, and replacement projects that have virtually eliminated overflows. The program used historical knowledge, known problem areas, and targeted investigations to determine where to prioritize investments. Projects were executed in a sequence that maximized performance improvement in trouble areas. Work included sewer pipe and manhole replacements and upgrades to the town's two largest pump stations. Coordination among private industry and local, state, and federal agencies in both the United States and Canada was necessary. Since completing the work, Madawaska has experienced only one overflow event, which occurred during historically high flooding in the spring of 2014. Previously the town experienced about 10 CSO events per year.

KEYWORDS | Combined sewer overflows (CSOs), collection systems, asset management



Phase I of Madawaska's collection system upgrades begins

INTRODUCTION

Madawaska, a rural town of approximately 4,000 people, borders the Canadian city of Edmundston and is a busy point-of-entry to the United States. The town's wastewater needs were served by an old sewer collection system, much of which had been installed in the early 20th century. The original sewer pipes were mostly composed of vitrified clay and asbestos-cement pipe. The structural integrity of the aged sewer pipes and manholes in the collection system was generally poor and allowed substantial infiltration. This, in combination with direct inflow connections from roof drains and sump pumps, at times overwhelmed the collection system's capacity and caused combined sewer overflows (CSOs) to the St. John River. In 2008, Madawaska received a consent order from Maine Department of Environmental Protection (MEDEP) to eliminate CSOs and began

a comprehensive process to find, design, and implement a solution that would meet its needs economically while also protecting the river and surrounding environment.

IDENTIFYING THE ROOT CAUSES OF OVERFLOWS

Madawaska's wastewater system consists of approximately 20 miles (32 km) of sewers ranging from 6 to 24 in. (15 to 61 cm) in diameter. The collection system includes three pump stations—Main pump station, Fraser pump station, and St. David pump station. Main pump station transports all of the flow to the town's wastewater treatment facility

(WWTF); Fraser pump station transports two thirds of the town's flow to a main interceptor, which feeds into Main pump station; and the small St. David pump station serves about 120 user connections. Treatment in town is met by a single WWTF constructed in the late 1970s, with a significant upgrade to add full secondary treatment completed in 1998. The facility uses a high-rate activated sludge process with a design average daily flow of 0.6 mgd (2.27 ML/d). Historically, peak hour wet weather flows ranged from 2.5 to 2.8 mgd (9.5 to 10.6 ML/d) with average dry weather flows of 0.25 mgd (.95 ML/d), meaning peak wet weather flows were 11 times higher than the normal average-day dry weather flows. This put a tremendous strain on the WWTF concerning treatment performance and operations for town staff.

The structural integrity of the aged sewer pipes and manholes in the collection system was generally poor and allowed substantial infiltration. This, in combination with direct inflow connections from roof drains and sump pumps, at times overwhelmed the collection system's capacity and caused combined sewer overflows

The town had two original licensed overflows, included dedicated flow monitoring equipment the first near Main pump station and the second that the town used for monitoring and reporting of near Fraser pump station. Overflow No. 1 was overflow events. just upstream of Main pump station in the last Historically, Madawaska experienced about 10 manhole in the collection system just prior to the overflow events per year. Several known issues pump station influent channel. During high flow contributed to the problem, including sewer pipe events when the capacity of Main pump station was and manhole deficiencies. Specifically, the vitrified exceeded, levels in the pump station wet well would clay and asbestos-cement pipe installed in the early rise, and flow would backup into the manhole. The 1900s was in poor condition. At times, the collection sewer channel through the manhole contained fixed system experienced an infiltration and inflow (I/I) weirs, which would automatically allow excess flow rate of 26,000 gallons per day per in.-mile (24m³ to overtop and enter a drainage pipe that transper cm-km). Direct inflow from cross connections ported the flow to a stormwater system manhole. such as floor drains, roof drains, and sump pumps In that manhole, sanitary flows combined with discharging to the collection system were known stormwater drainage flows and were piped directly to be an issue. Mechanical equipment deficiencies to the St. John River. The elevation of the overflow such as pump clogging, lack of reliable controls,



weir system in the manhole upstream of Main pump station could not be raised to prevent overflows as this would create flooding in the dry pit basement of Main pump station.

Overflow No. 2 was upstream of Fraser pump station in a manhole in the main interceptor sewer that fed into the pump station. During high flow events when the capacity of Fraser pump station was exceeded, flows would back up into the main interceptor. The sewer overflow manhole contained a dedicated overflow pipe that automatically transported excess flows to a stormwater drainage manhole and then onto the St. John River. The overflow pipe was set just above the manhole invert bench, such that when the manhole channel was surcharged, flow would automatically be relieved out of the overflow pipe. Each overflow manhole





lack of reliable remote communications, and lack of dedicated standby power at the pump stations were also known causes for overflow events.

These problems were compounded by weather, particularly in the spring when rain and snowmelt combined to put extra pressure on the system. Typical average snowfall in the region is 112 in. (284 cm), so the town normally experienced increased I/I and overflow events as the weather warmed up during the spring season. For example, the monthly average flow in April 2009 was 1.55 mgd (5.86 ML/d), six times higher than the typical dry weather monthly average flow of 0.25 mgd (.95 ML/d) at the WWTF during other times of the year. This serves as a typical example of the sustained high flow and challenges that the town and the WWTF operational staff faced during the spring.

HOLISTIC APPROACH TO ELIMINATING THE PROBLEMS

In addition to the known issues, Madawaska expected to uncover additional improvements that could take a high priority in the capital plan to address overflows. As part of the engineering It was recommended that the town take a holistic approach to fixing the problems within the collection system rather than simply implementing an endof-pipe solution with additional treatment capacity or stormwater treatment systems at the WWTF

evaluation it was recommended that the town take a holistic approach to fixing the problems within the collection system rather than simply implementing an end-of-pipe solution with additional treatment capacity or stormwater treatment systems at the WWTF. This holistic approach would provide greater long-term benefit than an end-of-pipe solution. To determine the holistic fix, Madawaska set out to perform a preliminary engineering evaluation, secure project funding, and implement a phased improvement plan to mitigate the overflows.

Using the results of investigations to prioritize investments led to the development of a 10-year proposed schedule including eight project phases. The initial phases focused on the Fraser pump station collection system area, as this area of the collection system had a high concentration of I/I due to sewer pipe and manhole deficiencies. This area was targeted to reduce I/I pumped to Main pump station. Historically, this area was also more severely affected by high flows during the spring. The following phases focused on the Main pump station collection area with the goal of maximizing the amount of extraneous flow removed early in the implementation. Within these phases, high priority was given to replacing vitrified clay pipe, asbestoscement pipe, and manhole structures with the highest concentration of deficiencies to maximize impact.

MECHANICAL AND INFRASTRUCTURE UPGRADES

The upgrades to Madawaska's wastewater systems can be broken into two categories: 1) sewer pipe and manhole deficiencies and 2) mechanical system deficiencies. The mechanical system deficiencies were "low hanging fruit" that were known causes of overflows and that did not require additional investigation via TV inspection, smoke testing, or dye testing as was required for sewer collection system deficiencies. The mechanical system upgrades aimed to improve the mechanical systems at the town's two largest pump stations, Fraser and Main.

The upgrades to Fraser pump station were significant. In addition to the mechanical deficiencies the pump station also required a physical relocation due to a planned expansion of the U.S. Customs Border Crossing Station at the port of entry



 New electrical building and wet well at the relocated Twin Rivers pump station
 Startup and testing of new dedicated standby generator at relocated Fraser pump station 3. Startup and testing of new submersible chopper pumps at relocated Fraser pump station

between Madawaska and Edmundston, New Brunswick, Canada. The relocation involved routing a new 18 in. (46 cm) sewer through the parking lot of the U.S. Customs Border Crossing Station and across Bridge Street, a busy thoroughfare for traffic between the United States and Canada. This routing of the new sewer line avoided two costly crossings of the active Bangor & Aroostook Railroad line.

The new pump station site was located adjacent to Bridge Street just behind the Twin Rivers Paper Company mill. As part of the project a new precast wet well and valve vault were constructed along with a small electrical and controls building. Finally, a new below-grade force main was installed to connect to the existing interceptor sewer behind the Twin Rivers Paper Mill building. The new force main replaced an abovegrade force main at the edge of a steep cliff on the river bank.

Historically, Fraser pump station had significant issues with pump clogging, often up to two to three times per week. This continued despite the town's public educational program. Fraser pump station was also configured in a lead/lag setup, which required both pumps to run to accommodate high flow conditions. If pump clogging occurred, only one pump would be online and this pump did not provide sufficient capacity to accommodate high flow events, leading to overflows. In the new pump station, a change in pump technology alleviated the issues associated with pump clogging. The new station was equipped with submersible, centrifugal chopper-type pumps, and the station setup was changed from lead/lag to lead/standby, where one pump can handle all the flows that enter the station.

Fraser pump station had not been equipped with dedicated standby power systems. Before, if the town lost power, overflows would occur. As part of the pump station upgrades, a new dedicated standby





Installation of shoring and bracing systems for installation of a new wet well and valve vault at the relocated Fraser pump station. The old above grade force main is in the background.

A change in pump technology alleviated the issues associated with pump clogging. The new station was equipped with submersible, centrifugal chopper-type pumps, and the station setup was changed from lead/lag to lead/standby, where one pump can handle all the flows that enter the station.

diesel generator was installed to provide backup power and thus eliminate any overflows due to loss of primary utility power.

The pump station was also upgraded with more reliable controls and communication systems. Previously, the staff would often not receive alarms when problems occurred at the pump station due to communications interferences with American and Canadian radio signals. A radio path study was conducted and coordinated with both the American and Canadian communications commissions to provide a more reliable dedicated licensed radio frequency in the 220 Mhz band. This is a far more reliable solution, alerting staff to anything requiring their attention as soon as it happens. Previously, fault conditions would occur and the operations staff would not know about them, leading to backups and overflows.



collection system upgrades

The Fraser pump station upgrades were the most challenging. The challenges included coordination with American Customs to perform work on its property. Work around the busy port of entry and an active paper mill also created challenges during construction. One of the most challenging aspects was the amount of underground utilities. The area contained stormwater drainage, underground electric, sanitary sewers, underground communications, and numerous piping systems used to operate the paper mill, as the mill is on both sides of the border. Night work was required due to the traffic in the area and the day-to-day operations of the paper mill.

At Main pump station, a combination of insufficient pump capacity, a lead/lag pump configuration, and a lack of reliable variable frequency drives (VFDs) combined to allow CSOs during high flow events. Similar to Fraser pump station, Main pump station was originally configured in a lead/lag setup, which required both pumps to run to accommodate high flow conditions. If a pump was down for maintenance or mechanical issues only one pump would be online, and this pump did not provide sufficient capacity. Additionally, the pump VFDs were old and outdated. They also could not accommodate the electrical load and amperage from the pumps. preventing staff from running the pumps at full capacity. This in turn led to overflows.

To remedy this, new larger capacity pumps were installed to allow for a lead/standby pump configuration. The electrical system at the pump station was completely upgraded to replace outdated equipment, and new VFDs were installed for the higher-capacity pumps. In addition, a new dedicated standby diesel generator was added to power the station during outages and emergencies. Communications and control system upgrades were also implemented. Much like at Fraser pump station, more reliable controls and communication systems were installed after a radio path study and coordination with both countries' communications commissions.

One of the most important upgrades was to the CSO monitoring instrumentation. The location of the overflow monitoring instrumentation was adjusted to prevent false readings due to stormwater flows, which had been a problem. The overflow monitoring equipment was previously located in a stormwater manhole that experienced a significant amount of I/I. At times the instrumentation would falsely register an overflow event when none was occurring.

Significant upgrades to the collection system infrastructure in Madawaska were also part of the town's holistic approach. Addressing just the mechanical issues would have had a large impact on the mitigation of future overflows; however, the aging pipes and poor condition of the collection system would continue to let in a high volume of I/I and eventually fail, requiring expensive emergency repairs. Using the findings of TV inspection, smoke and dye testing, and the staff's historical knowledge to prioritize replacement, Madawaska undertook an ambitious series of sewer system upgrades. Approximately 47,000 linear feet (14,326 meters) of sewer lines have

been replaced to date, meaning approximately 45 percent of the system has been upgraded since the original CSO master plan was approved. The town also established priority areas to maximize the investment in sewer system improvements and I/I removal.

OUTREACH, ENGAGEMENT, AND ORDINANCE **CHANGES**

In addition to the physical upgrades, a public engagement program was conducted and an ordinance put in place to address illegal connections and support the system long-term. This began with a house-to-house inspection program and public education. The inspections were overseen by the engineer but conducted by local engineering students, with interns performing much of the data management. This helped control costs, created a valuable educational opportunity, and helped connect local students with municipal leaders, staff, citizens, and the community infrastructure.

Madawaska also wrote and passed a new ordinance imposing fees for illegal connections to the sanitary sewer system or for refusing inspection. Fees were broken into two categories: inflow fees and floor drain fees. A penalty of \$100 every six months was assessed for any property either refusing inspection or those that had a roof drain and/or sump pump connected to the sewer system. The fee would be assessed every period until the property owner demonstrated that there was no connection to the sewer system. The floor drain fee would total approximately \$25 per year and be assessed to any property with a floor drain that remained connected to the sewer system.

FUNDING THE SOLUTION

This work was a significant undertaking, particularly for a small community such as Madawaska. External funding was necessary to support the investment and ensure that it was sustainable without overburdening residents as part of their sewer user fees. Madawaska pursued several different funding sources from state and federal agencies. The largest funding was a \$1.98 million loan and a \$4.72 million grant from the U.S. Department of Agriculture Rural Development program.

An additional \$2 million came from an Economic Development Administration grant, with a further \$1 million loan from MEDEP with \$300,000 in principal forgiveness. This total package allowed the work to be completed in a few years, rather than over a much longer period, and leveraged the town's share of the cost.

CONCLUSIONS

The CSOs in Madawaska had many causes, and required input and cooperation from a wide range of stakeholders. By taking a proactive approach, committing to solving the root causes and seeking all possible funding sources, the town addressed the issue head-on and implemented solutions quickly and effectively. Since the improvements began, Madawaska has experienced only one CSO, in the spring of 2014 when historic flooding and snow melt contributed to an exceptionally wet season. That spring saw record flooding in northern Maine, and many other facilities experienced problems. Prior to the improvements, the town had about 10 CSO events per year, so this is a dramatic reduction and highlights the success of the holistic approach. Moreover, the town had previously discharged up to 8 MG (30 ML) per year from CSOs, but that volume of CSO discharge flow has been eliminated, and it has seen a reduction of approximately 230,000 gpd (870,000 L/d) in average day flow treated at the WWTF, a 34 percent reduction in the typical average day flows. Thus, the project has had a pronounced benefit, both in CSO mitigation and the day-to-day operations of the town's wastewater system.

ABOUT THE AUTHORS

- Robert Polys is a professional engineer with nine years of experience specializing in wastewater treatment process and collection system design. His work on projects ranges from planning through design and construction management of wastewater treatment, collection system, pump stations, and advanced treatment system designs.
- Maggie Connolly is a civil engineer with 13 years of consulting experience in site/civil and environmental engineering, and specializes in wastewater treatment and collection system design and construction. She has experience working with various funding agencies including Rural Development, the Economic Development Administration, and Maine Clean Water State Revolving Fund.
- Brent Bridges is a professional engineer with more than 30 years of experience in the design, funding, permitting, and construction management of civil and environmental engineering projects. Mr. Bridges specializes in helping municipalities identify infrastructure needs, developing viable solutions, and securing funding to make projects economically feasible.



Sanford Sewerage District rises to the challenge—17 years of progress

LINDSEY SHIELDS, PE, Wright-Pierce, Portland, Maine ANDRÉ BROUSSEAU, Sanford Sewerage District, Sanford, Maine

ABSTRACT | The city of Sanford is a "big city on a small river," forcing the Sanford Sewerage District to be ahead of the curve with wastewater treatment in the 1960s, 1980s, 2000s, and now. At each juncture, the District has had to address difficult environmental wastewater issues years before other Maine and New England communities. This paper will discuss the District's historic challenges with discharge limits, implementation of creative upgrade solutions, and implementation of asset management planning and environmental stewardship.

KEYWORDS | AWWTF, system upgrades, trigger flow, asset management, composting, nutrient removal

STEWARDS OF THE ENVIRONMENT

The city of Sanford, Maine, is a mid-sized community of about 20,800 and is the regional economic and industrial center of York County. The Sanford Sewerage District owns and operates an advanced wastewater treatment facility (AWWTF) with a design monthly average capacity of 4.4 mgd (16.7 ML/d) and an on-site composting facility. The District manages 70 miles (113 km) of gravity sewer and 16 pump stations. The District serves the city of Sanford and provides septage disposal services for York and Cumberland counties, and a few neighboring New Hampshire communities.

The AWWTF discharges treated effluent to the Mousam River, which flows to Estes Lake and then continues to the Atlantic Ocean in Kennebunk. Maine. The Mousam River, in the area of the District's discharge, is a Class C surface water, which is Maine's lowest classification. Per the Maine Water Classification Program, Class C waters will after treatment be suitable for: drinking water supply after treatment; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation; navigation; and as a habitat for fish and other aquatic life.

The District protects public health, water quality, and the environment by maintaining a sustainable wastewater collection system and treatment facility to comply with all policies, permits, and regulations

set forth by the board of trustees. the Maine Department of Environmental Protection (MEDEP), and EPA.

BIG CITY/SMALL RIVER-HISTORIC PERMITTING CHALLENGES

The District was established in 1947. The original facility was constructed in 1961 to eliminate raw sewage discharges to the Mousam River and Great Works River. The facility included the Mousam River pump station, four facultative stabilization ponds covering 130 acres (53 ha), an outfall to the Mousam River, and an on-site secure sludge landfill—5.4 acres (2.2 ha).

Algae blooms in Estes Lake used to regularly occur in the 1970s due to excess nutrients in the river—primarily phosphorus. Water quality in Estes Lake improved following the implementation of tertiary treatment at the AWWTF. However, flow in the Mousam River is very low in comparison to the AWWTF effluent flow, resulting in a very low dilution factor. Typically, a facility's licensed flow limit is compared to the 7010 river flow (minimum sevenday flow with a 10-year recurrence interval) to calculate the worst-case dilution factor. A "trigger flow" limit, or artificial 7Q10 river flow (significantly higher than the actual 7Q10 river flow), was established for the District's discharge to allow for a higher dilution factor. Discharge from the facility is not allowed

when the river flow drops below the trigger flow value. The trigger flow value was determined to be 10 cfs (0.3 m³/s).

The 1981 upgrade added aerated lagoons, an intermediate pump station, tertiary treatment process for phosphorus removal, and an on-site secure sludge landfill to handle the tertiary solids. The tertiary treatment upgrade was required to meet stringent phosphorus, BOD, and TSS discharge limits set by EPA and MEDEP. This upgrade was successful in reducing or eliminating algae blooms in Estes Lake.

In 1993, the District's discharge limits were revised to include stringent toxics water qualitybased limits for aluminum, ammonia-nitrogen, and copper. The limits were among the most stringent of any municipal treat-

ment facility in New England at the time they were issued. The facility was not designed for removal of these parameters and experienced numerous permit violations.

In 1994, the District received a "308" letter (provision of the Clean Water Act that allows EPA to request information) from EPA for non-compliance with BOD, ammonia-nitrogen, aluminum, and copper violations.

In July 1998. EPA issued an Administrative Order to the District for continued non-compliance. In addition to discharge permit non-compliance, the Administrative Order also cited deficiencies with In 1996, the District prepared a draft preliminary the District's Industrial Pretreatment Program Facilities Study. The primary focus of this report was and required that a Combined Sewer Overflow to estimate design criteria for the facility (flows and (CSO) Master Plan be prepared. In response to

A timeline of Sanford Sewerage District significant events







loadings), summarize past treatment performance, and assess the impacts of the facultative stabilization ponds' sludge accumulation on treatment performance. This initial report was expanded and subsequently reissued as the Phase 1 Facilities Study. these requirements, the District developed and implemented technically based local limits for the Industrial Pretreatment Program and initiated work on a CSO Master Plan.

In 1998, the District prepared a Phase 1 Wastewater Facilities Study. This study presented the preliminary conclusion that an alternative to relocate

the outfall to the

Atlantic Ocean near

Kennebunk, Maine,

was financially and

technically feasible.

However, this recom-

mendation was not

significant additional

Mousam River water

MEDEP, and significant

additional evaluation

and negotiations were

required to determine

15 mi (24 km) transmis-

sewer to the Atlantic

Ocean. MEDEP and

EPA requested that

additional evaluations

be performed prior to

concept.

further developing this

the feasibility of a

sion and outfall

absolute because

quality data was

still required from

UPGRADE SUMMARY

Mousam River Pump Station Upgrade

- \$500,000
- June 2002 to April 2003

AWWTF Phase I Upgrade

- \$17.5 million
- June 2003 to June 2005

AWWTF Phase II Upgrade

- \$2.5 million
- October 2006 to February 2008
- Goodall Pump Station Upgrade
- \$1 million
- June 2011 to May 2012

Route 109 Pump Station upgrade • \$300,000

- \$500,000
- May 2014 to August 2014

Composting Facility

\$2.4 millionMarch 2016 to October 2016

Landfill Closure

- Estimated \$600,000 to \$1.5 million
- Construction timeline to be determined

In 1999, the District prepared a Phase 2 Wastewater Facilities Study. During the development of the phase 2 study, meetings were held with the town of Kennebunk and the Kennebunk Sewer District management and staff to discuss the ocean outfall concept. Initial indications from Kennebunk were not discouraging. The final phase 2 study was completed in February 2000. During the phase 2 study, additional Mousam River data was collected by MEDEP and the District, including a macroinvertebrate study, a dissolved oxygen survey, ambient river toxics levels, and flow variations. Based on the Mousam River water quality data available at that time, a technically feasible alternative that included continued discharge to the Mousam River was not possible. The recommended alternative of this study was a treated effluent transmission pipeline to an Atlantic Ocean Outfall near Kennebunk.

A CSO Master Plan was also completed in February 2000. The CSO Master Plan identified and screened CSO control alternatives to eliminate the two remaining licensed CSO discharges within the collection system. The plan recommended implementation of a 10-year sewer separation program to remove the 67 remaining catch basins from the sewer system. The plan also recommended upgrades to the Mousam River pump station (a CSO location) to increase the capacity from 8 to 11 mgd (30 to 42 ML/d). The District implemented both recommendations as part of the AWWTF upgrades and asset management program. In 2013, the District was removed from the MEDEP CSO Program.

In 2002, after significant opposition by the town of Kennebunk, the District determined that the continued pursuit of an ocean outfall did not appear feasible. As such, the District and MEDEP renewed focus on the Mousam River.

CREATIVE REGULATORY APPROACH TO OPTIMIZE DISCHARGE LIMITATIONS

Maintaining and increasing a river discharge on the water quality-limited Mousam River included interactive discussions with MEDEP and required the use of several creative regulatory strategies during the MEDEP water quality modeling and Total Maximum Daily Load (TMDL) development to negotiate feasible effluent limitations. Without these creative strategies, the discharge standards would have been substantially more stringent and prohibitively expensive to achieve.

Trigger Flow

MEDEP's TMDL report indicated that continued discharge to the Mousam River was feasible if a higher trigger flow of 20 cfs (0.6 m³/s) was used.

Treated Effluent Storage

The trigger flow approach requires the District to shut off the treated effluent discharge when the river flow drops below the trigger flow. Since influent sewage is conveyed to the AWWTF continuously, the influent and effluent flow imbalance requires wastewater storage. In Sanford's case, the aerated lagoon—3 MG (11 ML) and facultative stabilization ponds—240 MG (908 ML) were converted from "treatment ponds" to "treated effluent storage ponds" as part of the AWWTF upgrades. This provided the District with approximately 60 days of storage under design conditions. When the river flow rises above the trigger flow, the District may discharge up to the permitted effluent flow.

Tiered Discharge

As described above, the trigger flow approach (first tier) will result in the District storing treated effluent during the stringent summer season. This treated effluent flow needs to be tested, potentially treated further, and discharged prior to the subsequent summer season to gain freeboard in the storage ponds for additional treated effluent storage. To compensate for this net effluent flow capacity reduction, an additional set of TMDL standards was established for a 60-day period referred to as the high flow

Table 1. Effluent limitations and monitoring requirements ¹							
	Mass Limits (Ibs/day)		Concentration Limits (mg/L)			Monitoring	
	Monthly Avg	Weekly Avg	Daily Max	Monthly Avg	Weekly Avg	Daily Max	Frequency
Flow	3.48 mgd (13.2	ML/d) — Sumi	ner (May 1–Se	ptember 30, u	nless otherwis	e noted)	
BOD5	261	392	522	10	15	20	3/week
NH3-N (May 15– Sep. 30)		14.5					2/week
Total Phosphorus	3.0						2/week
TSS	290	435	580	10	15	20	3/week
Dissolved Oxygen	Maintain at > 7.5 ppm						Daily
Flow 4	.4 mgd (16.7 M	lL/d) — Non-Sເ	ımmer (Octobe	er 1–April 30, u	nless otherwis	e noted)	
BOD5	1,101	1,651	1,835	30	45	50	2/week
NH3-N (Oct. 1–May 14)	276			11.3			2/month
Total Phosphorus	23		46				2/month
TSS	1101	1651	1835	30	45	50	2/week
	Flow	4.4 mgd (16.7	ML/d) — Toxic	Substances (al	l year) ²		
Aluminum (Total)	9.39						1/quarter
Copper (Total)	0.28		0.36				1/quarter
Mercury				4.5 ng/L		6.8 ng/L	1/year
	Flow 8.8 mgd	(33.3 ML/d)—	High Flow Tie	r Limits (Februa	ary 15–April 15) ³	
BOD5	2,202	3,303	3,670	30	45	50	1/week
NH3-N	612			12.5			1/week
Total Phosphorus	23		46				1/week
TSS	2,202	3,303	3,670	30	45	50	1/week
Aluminum (Total)	18.8						1/quarter
Copper (Total)	0.56		0.72				1/quarter
Mercury				4.5 ng/L		6.8 ng/L	1/year

The District is not authorized to discharge when the Mousam River flow is < 20 cfs (0.6 m³/s).
 The toxicity limits reflect June 12, 2013 MEPDES permit. All other limits have remained unchanged since the 2003 MEPDES permit.
 To facilitate emptying of wastewater lagoon ponds to increase summer storage capacity, the District can discharge the following limits from February 15 to April 15, whenever flow as measured at Route 4 > 100 cfs (2.8 m³/s).

tier period (February 15 to April 15), which allows for increased effluent flows—8.8 mgd (33 ML/d) and loadings to be discharged when the river flows are greater than 100 cfs (3 m³/s).

Based on the results of the TMDL study, MEDEP established the allowable facility discharge limits for all pollutants of concern for summer, non-summer, and high-flow tier periods. EPA approved the TMDL document on March 8, 2001. Refer to Table 1 for a summary of the effluent limits that were incorporated into the District's 2003 MEPDES permit.

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| SANFORD SEWERAGE DISTRICT |

TREATMENT FACILITY UPGRADES

- Even with the creative regulatory approach and unique facilities available to the District, the facility still received effluent limits among the most stringent in the United States when issued: <0.5 mg/L ammonia-nitrogen and <0.1 mg/L total phosphorus (Table 1). In response to the effluent limits, the District designed and constructed two phases of comprehensive upgrades, beginning in 2001 with preliminary engineering reports. Treatment
- processes were identified, evaluated, and selected



based on four key criteria:

- 1. Reliable and proven technologies
- 2. Ease of operations
- 3. Maximum flexibility
- 4. Minimum long-term operations cost

The key design elements and facility performance are summarized below.

Phase I AWWTF Upgrade

Biological Nutrient Removal

A traditional extended aeration activated sludge process (oxidation ditch) was selected for reliability and simplicity. This process was coupled with anaerobic and anoxic reactors for biological removal of total nitrogen and phosphorus. Anaerobic and anoxic reactors were not specifically required to meet the discharge limitations but were selected based on the tangible benefits provided—improved mixed liquor settling, biological denitrification, which reduces oxygen (and thus energy) by the 25 percent required, and 50 percent reduction in supplemental alkalinity chemicals. Variable frequency drives were also selected to minimize electrical energy costs associated with operation of the facility.

Ultraviolet Disinfection

A state-of-the-art medium pressure, high-intensity ultraviolet disinfection system was selected for reliability and simplicity in operations. This system eliminated the need to use two additional chemicals at the facility: sodium hypochlorite for disinfection and sodium bisulfite for dechlorination.

Additional upgraded process systems include:

• Upgrade of the Mousam River Pump Station— 11 mgd (41 ML/d) CSO abatement, including mechanical influent screening and screenings wash press

- New vortex grit removal
- New septage receiving equipment
- New spiral-blade circular secondary clarifiers
- New scum, return sludge, and waste sludge pumping systems
- New secondary effluent pumps (pump from oxidation ditches to tertiary treatment)
- New effluent post-aeration tank with dedicated aeration system
- Upgrade of the intermediate pump station (pump from storage ponds to tertiary treatment)
- New solids handling system, including aerated sludge storage tanks, sludge feed pumps, and centrifuge dewatering equipment
- Comprehensive SCADA upgrade
- Rehabilitation/upgrade of administration spaces, heating plant, and standby power system

Phase II AWWTF Upgrade Tertiary Phosphorus Removal

The existing chemical/physical phosphorus removal facilities included polymer and pH adjustment (caustic) feed systems, coagulant (polyaluminum chloride [PAC]) feed system, flocculation tank, inclined lamella plate clarifiers, and multi-media sand filters. These tertiary facilities were upgraded to continue to achieve the stringent discharge limitations. Multi-point chemical facilities (i.e., multiple chemicals at multiple injection locations) were provided to maximize removal with the minimum chemical dose possible.

Flexible Treatment Process Configuration

In addition to the creative regulatory strategies and innovative combination of treatment processes, a flexible process configuration was required.

All influent sewage is pumped to the AWWTF and treated through preliminary and biological nutrient removal (advanced secondary treatment). Based on the influent flow quantities and the receiving water conditions, in order to best meet the permit requirements, the operator then has the choice to direct this flow to:

- A. The Mousam River (by direct gravity flow through effluent aeration/disinfection)
- B. Tertiary treatment
- C. A short-term storage pond (i.e., former aerated lagoon)
- D. Long-term storage ponds (i.e., former facultative stabilization ponds)

Short-term storage is primarily intended to attenuate peak hour flows related to the combined sewer system; flow directed to short-term storage is returned to the main flow stream by the secondary effluent pumps. Long-term storage is primarily intended to

be used during a trigger flow situation; flow directed to long-term storage is returned to the main flow stream by way of the intermediate pump station.

Facility Performance

As a result of the sewer separation and collection system maintenance work that the District has been completing, influent flows to the AWWTF have been declining. The average monthly influent flow to the AWWTF has decreased from 90.8 MG (344 ML) per month in 1998 to 65.9 MG (249 ML) per month in 2006 to 42.3 MG (160 ML) per month in 2016. The facility has performed relatively well and continues to meet the stringent effluent limits for nutrients, toxics, BOD, and TSS. The upgraded AWWTF removes significantly more pollutants than prior to Phase I and uses significantly less power and fewer chemicals (including after normalizing to reduced influent flows). Refer to Figures 1, 2, and 3 (see next pages).

ASSET MANAGEMENT PROGRAM

In the years following startup of the treatment facility, the District completed a series of asset management studies.

The Pump Station and Force Main Needs Assessment (2009) developed a planned upgrade cost and implementation schedule for each pump station. The planned upgrade and replacement costs spanned 21 years from 2009 to 2030 and considered the existing condition, capacity, and age as prioritization criteria. In addition to the planning-period capital improvements, it was recommended that the District develop a system-wide grease inspection, reduction, and maintenance program, and to set up remote connectivity with each pump station for alarm capability. In the years since the pump station needs assessment, the District has:

- Established a fats, oil, and grease (FOG) program to protect the pump stations and related sewers
- Added radio telemetry to each pump station to allow for remote monitoring and alarming
- Upgraded three high-priority pump stations and one force main, and upgraded one mediumpriority pump station

The Treatment Facility Needs Assessment (2011) outlined items that would likely require capital improvements, including planning-level costs and approximate timing, for the District's planning and rate-setting. Much of the original facilities were upgraded in 2005 and 2008; however, some remaining equipment was original to the 1960s and 1980s construction. The treatment facility needs assessment included costs for eventual on-site secure sludge landfill closure and composting facility construction.

The Collection System Needs Assessment (2012) evaluated the collection system based on capacity and condition parameters. The capacity evaluation

found that the District's sewer flows have dropped steadily over the years due to several factors, the most significant of which are the loss of several large industrial users, implementation of water conservation measures by sewer users, and separation of combined catch basins. Given the declining trend in flow and given that the system was originally designed as a combined sewer system (i.e., can handle higher peak flows), no general capacity limitations in the system were expected. The condition assessment found that much of the collection system will have exceeded its original useful design life by the end of the planning period (2030). To maintain the level of service within the collection system, the District has addressed the following condition-based needs in the system since the assessment:

- Updated sewer system GIS database
- Cleaned and closed-circuit televised 42 percent of the gravity sewer system
- Replaced about 22,000 ft (6,700 m) of gravity sewer
- Replaced 740 ft (225 m) of asbestos-cement pipe via pipe bursting
- Replaced 48 manhole structures
- Rehabilitated five manhole structures
- Completed three trenchless point repairs
- Separated 40 catch basins
- Permanently sealed CSO structures
- Provided three employees with NASSCO Pipeline Assessment Certification Program (PACP) certifications

COMPOSTING FACILITY

In 2011, the on-site secure sludge landfill was approaching full capacity and the District began to consider alternative long-term solids handling options. It was anticipated that the District's biosolids disposal costs would increase dramatically.

In March 2012, the District completed the preliminary design for an on-site aerated static pile composting operation to process the District's biosolids to a Class A end-product for beneficial reuse. A 50-by-350 ft (15-by-107 m) composting facility was proposed for amendment storage and active composting. The District established a project budget of \$1.5 million.

In January 2013, the District issued a Request for Proposals to solicit bids to provide biosolids management (i.e., contract hauling, processing, and disposal) and to establish a public-private partnership to address regional biosolids management. Four qualified biosolids management contractors submitted bids between \$585,000 and \$1,004,000 over five years with a potential partnership for a regional facility developed within that time. The District proceeded with final design of a composting facility in September 2013.

Solid waste composting facilities must be licensed through MEDEP and meet the design and









not present a bird hazard to aircraft. Therefore, the operational standards and requirements of the District will implement the following actions if birds Maine Solid Waste Management Rules (Chapter 400 become a nuisance at the facility: – General Provisions and Chapter 409 – Processing 1. Erect netting and/or streamers to dissuade birds Facilities). The licensing process includes submitting a General Application for a Solid Waste Composting from eating or nesting on site Facility to MEDEP. Despite the 450 acres (182 ha) 2. Place more cover material on outdoor curing available to the District at the AWWTF site, the siting piles to remove attractant of the composting facility was a challenge during 3. Maintain finished compost under cover in the licensing, as described below:

1. Per Chapter 409, Section 2.A.(1): Composting facilities must be greater than 100 ft (30 m) from an active, inactive, or closed solid waste landfill. CHALLENGE: The compost facility is 30 ft (9 m) away from the toe of the on-site secure sludge landfill.

RESOLUTION: The District sought a variance to the rule. Anticipated hazards to health and welfare due to the proximity of the proposed composting facility site to the secure sludge landfill are unlikely. As part of the license, the District is required to implement a quarterly methane monitoring plan.

2. Per Chapter 409, Section 2.A.(1): Composting facilities must be greater than 5,000 ft (1524 m) from the end of an airport runway used by piston-type aircraft, when putrescible waste is to be handled outdoors in an uncovered or exposed condition. CHALLENGE: The compost facility is 5,000 ft (1524 m) from the Sanford Regional Airport runway. RESOLUTION: No putrescible waste will be handled outdoors in an uncovered or exposed condition. All putrescible waste handling occurs within the composting facility, and only once the compost mixture has met the requirements for pathogen reduction and vector attraction reduction is it relocated outdoors to cure. As part of the license, the District must operate the facility such that it does

Figure 3. Energy usage

- composting facility longer before relocating outdoors

3. Per Chapter 409, Section 4.F.(1): Composting facilities may not unreasonably adversely affect existing uses and scenic character.

CHALLENGE: The AWWTF is an active birding site and home to a breeding area of a state-listed threatened bird species (common moorhen).

RESOLUTION: All construction traffic was routed to mitigate any disruption or noise to the common moorhens during breeding season (April 15–July 31).

In 2014, the District received a solid waste management license for the facility. Construction of the composting facility began in March 2016 and was substantially completed in October 2016. In December 2016, the District opened the facility to local contractors and landscapers to showcase the compost material to promote its beneficial reuse potential. A District compost brochure stated that, the "District will go above and beyond to make sure the final product is safe in terms of amending our earth with rich nutrient-filled compost."

The District continues to modify its compost mix to produce the best product for its end-users. The current compost mix includes: one part wood ash, one part compost remix, and one part biosolids. The compost mix is supplemented with wood shavings and sawdust as necessary to create additional

porosity. The District is producing 800 cubic yards (612 cubic meters) of finished compost per month and has received \$1,200 in revenue since May 2017.

The District is now completing its landfill closure plan. The first phase of the landfill closure will define the closure approach for the facility, and the second phase will include a detailed design and closure application to MEDEP. The District is verifying that the leachate and groundwater collections systems satisfy MEDEP regulations, as well as evaluating the overall stability of the landfill contents. The information collected will inform the decision regarding the landfill cover material. The landfill closure plan is anticipated to be complete by the end of 2017, and the schedule for the construction is under discussion.

PUBLIC OUTREACH

The District frequently engages in community outreach. This includes facility tours during normal business hours and open-house events, the most recent of which was hosted on May 20, 2017, and attended by 200 visitors. Also, in part because of the care the District puts into their surroundings, the site is home to many species of birds and fauna. Birdwatchers and York County Audubon (a chapter of Maine Audubon and the National Audubon Society) have identified about 230 species of bird on the facility grounds, nearly half of the 436 known native species to Maine. The District also maintains a user-friendly and educational website, answering questions such as, How do I get rid of my cooking grease? and What can we flush down our toilets and drains?

CONCLUSIONS

The District has been in a challenging situation since the 1980s with effluent limits. It has addressed its challenges by:

- Being creative with potential alternative approaches to optimize discharge locations
- Being creative, interactive, and collaborative with regulators to increase trigger flow to maintain the Mousam River discharge
- Developing a combination of relatively simple technologies (e.g., extended aeration activated sludge), significant reuse of assets (e.g., converting the aerated lagoons and facultative stabilization

ponds into effluent storage basins), and a flexible treatment process configuration for a reliable, costeffective, and efficient solution to address permits

- Operating and maintaining the AWWTF effectively and economically to reduce chemical and energy usage since before the treatment facility upgrades and since startup of those upgrades, while simultaneously removing more pollutants from the effluent and environment
- Proactively engaging in asset management planning and implementation resulting in reduced influent flows
- Beneficially reusing biosolids through an on-site composting facility

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Integrating sewer system evaluation surveys and illicit discharge detection and elimination...and helping the community understand why it matters

ZACH HENDERSON, Woodard & Curran, Portland, Maine DEIRDRE HALL, ESQ, previously with City of Quincy, Massachusetts

ABSTRACT | New England communities are facing substantial and increasing wastewater and stormwater infrastructure challenges because of age, population growth, funding constraints, and severe weather. Integrated planning for and implementation of Illicit Discharge Detection and Elimination programs and Sewer System Evaluation Surveys can improve efficiency, maximize compliance, and refine capital improvement programs to get the greatest benefit from limited funding. Integrated implementation of clean water programs may also be a more attractive way to discuss sewer and stormwater programs with the public.

KEYWORDS | Integrated planning and permitting policy (IP3), MS4, stormwater, wastewater, IDDE, SSES, I/I, Clean Water Act (CWA), EPA Region 1, New England



Quincy, Massachusetts city center—Quincy's 250 miles (402 km) of sanitary sewer pipe is on average 92 years old, with greater than 70 percent more than 100 years old

INTRODUCTION

Clean Water Act (CWA) obligations are increasingly requiring municipalities to develop and implement new compliance programs resulting in changes to interdepartmental and interagency coordination, as well as workflow and public stakeholder engagement. Entities involved in sewer and drainage system management are finding that leveraging seemingly disparate EPA National Pollutant Discharge Elimination System (NPDES) obligations results in enhanced capital planning and program efficiencies that address both wastewater and stormwater compliance obligations.

Sanitary sewer collection and municipal separate storm sewer systems are complex underground utility infrastructure that require advanced management to protect both public health and safety, and the environment. In New England, this critical infrastructure is particularly challenged by climate, civic organization, and age. Isolated NPDES regulatory programs and management entities can result in divergent priorities and inefficient use of funds; additionally, it can result in duplicative efforts or poor decision-making that may50jeopardize the value of investment in45itself or another NPDES compliance40program.35

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Integration of Sanitary Sewer Evaluation Surveys (SSES) and Illicit Discharge Detection and Elimination (IDDE) programs is helping utility and municipal management agencies in the city of Quincy, Massachusetts, better prioritize capital renewal investments. These programs result in comprehensive risk analysis across assets, integrated program implementation efficiencies, and improved data management. It also provides what the city believes is a better way

to present "what we do" to the public ratepayers and city leadership The result is a more sustainable effort that meets multiple regulatory obligations, increases efficiency, saves money, and better protects public health.

Results from recent SSES work in Quincy demonstrate the aging infrastructure dilemma that is common in New England. Quincy's 250 miles (402 km) of sanitary sewer pipe is on average 92 years old, with greater than 70 percent being more than 100 years old.

The aging infrastructure challenge is becoming more evident as utility and municipal management agencies conduct SSES and capacity, management, operation and maintenance (CMOM) program assessments. The assessments of infrastructure and programs result in expanded maintenance recommendations, regulatory requirements, and stringent timelines for implementation of rehabilitation and renewal. Ironically, infrastructure investment is declining even with more assets in a critical state. A recent report by the Congressional Budget Office, Public Spending on Transportation and Water Infrastructure, 1956 to 2014 (2015), found that real spending on water infrastructure from 2001 to 2014 dropped by 19 percent for the federal government and by 5 percent for local government.

Concurrently, new Municipal Separate Storm Sewer System (MS4) regulations in Massachusetts (and other New England states) are focused on stormwater drainage assessments, an entirely different and largely unfunded infrastructure. EPA has NPDES permit primacy in Massachusetts and New Hampshire, and the direct presence of the federal government in NPDES decision-making in two of the six New England states is now obligating compliance at the local level to meet rigorous "national standard" requirements.

The reissuance of the MS4 General Permit in Massachusetts highlights the increasing complexity of NPDES requirements in the stormwater domain.



The original 2003 Massachusetts MS4 General Permit contained six pages of requirements; the 2017 Massachusetts MS4 General Permit contains 51 pages of requirements and several appendices containing more than 80 pages of obligations related to impaired and Total Maximum Daily Load (TMDL) waters.

The primary focus in recent enforcement actions and now in 2017 MS4 General Permit requirements lies within Minimum Control Measure 3—IDDE. The permit places extensive and explicit obligations on regulated communities that will ultimately result in each community conducting comprehensive illicit discharge detection investigations in every stormwater drain within the regulated urban area over the next 10 years.

Compared to the rest of the country, New England municipalities, though small in land area, often have an abundance (between 200 and 600) of regulated MS4 discharge points (i.e., outfalls). Quincy currently has 306 mapped discharge points. In some cases the drainage areas discharging to these outfalls are serviced by hundreds of miles of drainage pipe and open channel conveyance that require labor-intensive field-based investigations. IDDE Investigations consist of grab sampling throughout the drainage system with the intent of isolating pipe and drainage segments compromised by leaking adjacent sanitary sewer collection systems. Once illicit connections, either direct or indirect, are verified, sanitary sewer collection system (or lateral) replacement, renewal, or rehabilitation will be required to abate the illicit source of cross-contamination.

NEED FOR INTEGRATED COLLECTION SYSTEM PLANNING

With the increasing focus on SSES and IDDE, communities such as Quincy are finding value in integrating planning around wastewater and drainage collection system asset investigations. SSES investigations mostly identify structural and Figure 1. Quincy's sanitary sewer collection system age and length



Figure 2. Overlapping rehabilitation and investigation priorities across stormwater and wastewater programs

operational and maintenance (O&M) deficiencies with a key objective to reduce inflow and infiltration (I/I) and prevent sanitary sewer overflows (SSOs). IDDE investigations mainly identify crosscontamination of drainage systems from wastewater sources via direct illicit connections or indirect illicit connections via exfiltration from sanitary sewers. Although IDDE does not necessarily require structural condition assessment of the drainage system, the investigation often leads to visual assessment in both the storm and sanitary sewer collection systems to determine the causes of indirect illicit connections.

Table 1. Typical SSES and IDDE investigation actions and commonalities between programs.

Investigation Action	IDDE	SSES
Understanding in system flows	Dry weather base flow—visual assessment	Calculated flow volumes at key junctions to isolate I/I
Analytical sampling	Key junction manhole grab sampling	Salinity testing in coastal areas, hydrogen sulfide monitoring for odors and corrosion control
Manhole inspection	Key junction drainage manholes for access to dry-weather flow sampling, structural condition assessment	Structural condition assessment and hydraulic capacity observations
Pipeline inspection	Visual inspection in the drain for structural integrity, O&M deficiencies, Indicators of direct or indirect illicit connections	Visual inspection in the sewer for structural integrity, O&M deficiencies, indicators of inflow and infiltration sources
Dye flooding/flushing and smoke testing	Confirmation of direct or indirect illicit connection	Confirmation of direct or indirect I/I sources

On the surface, program objectives appear to be closely aligned, but in many communities the planning and analysis of these separate collection systems may be completed by different teams of investigators and project managers, with different funding sources and different objectives. In some communities, investigations are completed by separate utility authorities entirely (e.g., municipality versus sewerage district). While the priorities for inves-

tigation of the collection system assets may be different, the strategy for investigation is largely

the same, and, in most cases, the infrastructure is close together. Table 1 summarizes typical SSES and IDDE program components.

Clearly, the skills necessary to conduct SSES and IDDE investigations are similar. Isolated investigations and ultimately discrete rehabilitation in different areas of Quincy to conduct largely the same work may be an opportunity lost. In worst-case scenarios, the data outputs resulting from investigations in separate collection systems are not shared, and redundant work is undertaken.

ALIGNING SEWER AND STORM COLLECTION SYSTEM INVESTIGATION PRIORITIES

Fundamental to both SSES and IDDE is targeting the most vulnerable assets to get more out of less investigation time in the field. Standard factors in SSES investigation prioritization include:

- Consequence of Failure (CoF) analysis
- Sewer system age and material analysis
- Known I/I locations
- Hydraulically limited sections
- Reported SSOs
- Manholes with evidence of surcharge
- Locations scheduled for upcoming roadway resurfacing or other utility work

• Anecdotal and/or known problem areas Among others, factors to identify priority drainage systems for investigation under an IDDE program include:

- Outfall sampling results
- Sewer system age, material, and condition analysis
- Reported SSOs
- Proximity of stormwater outfall discharges to primary or secondary public water body use areas
- Stormwater and sanitary sewer crossings
- Parcel density

These factors can be used separately for prioritization, and then the determined resulting priority areas can be integrated to identify areas of overlap

and to develop final program investigation priorities. In an integrated collection system investigation program, the IDDE priority catchments are an additional factor in selection of SSES investigation areas. In Quincy, this overlap will allow for the use of sanitary sewer collection system condition assessment results to be obtained within a similar timeframe as IDDE investigation findings. Both investigation programs will be completed by the end of 2017.

The alignment of the timing of these investigations will increase the likelihood that rehabilitation or replacement recommendations will address both I/I and exfiltration/illicit discharges. Shared investigation in targeted zones reduces mobilization costs, traffic disruption, and police detail costs. It also increases the likelihood of success as a single "management

entity" can be responsible for both collection system investigations and interpretation of results. The savings annually through program alignment could be substantial. Additionally, the resulting rehabilitation or replacement projects will address multiple program objectives across NPDES permit obligations.

CONSEQUENCES OF ISOLATED PLANNING

Ouincy has been actively engaged in I/I removal projects; however, project prioritization prior to fiscal year 2015 was appropriately and largely sewer rate driven, with a focus on I/I removal. Owing to its proximity to the ocean, Quincy's tidally influenced sewer infrastructure was the highest priority for rehabilitation. Flow monitoring conducted in 2010 indicated that areas of Quincy's sewer infrastructure were subject to tidally influenced groundwater up to 20 hours a day, and these sanitary sewer lines and manholes were contributing significant I/I into the system as evidenced by the diurnal curve shown in Figure 3.

From this flow monitoring data, along with additional CCTV data, the city prioritized rehabilitation projects that resulted in the highest I/I removal. Since this infrastructure was all tidally influenced, the rehabilitation also had a net positive impact on the coastal environment, although this was not a primary factor in the city's I/I planning.

The city achieved its goal by removing the most cost-effective I/I. The most recent project was planned in 2013 but not constructed until 2015 and illustrates the net value to the ratepayers from I/I removal. The project, Coastal Rehabilitation Phase IIB (Coastal IIB), included 13,500 ft (4,100 m) of cleaning and inspection, 10,000 ft (3,050 m) of



Squantum Sewer Lines - Salinity & Tide Stage v. Time

Figure 3. Salinity as an indicator of tidal intrusion within the sanitary sewer collection system

> cured-in-place pipe (CIPP) lining, and 112 sewer lateral rehabilitations. The total cost of this project was \$1,901,307. The project removed an estimated 300,000 gallons (1,135,623 L) per day of I/I from the collection system. Based upon the cost to convey and treat a gallon of wastewater, the payback on this project is about three years.

Although this project was successful in removing I/I from the collection system, recent outfall sampling results and IDDE inspections show that the project may not have succeeded in removing all potential sanitary waste water cross-contamination from the drain.

Coastal IIB included full CIPP lining of almost 3,000 ft (900 m) of 20 in. (50.8 cm) vitrified clay pipe (shown in red in Figure 4). Sea Street, as evidenced by the name, lies 8 to 12 ft (2.4 to 3.7 m) above sea level along an isthmus; it is an emergency artery for the Hough's Neck neighborhood, a dense residential peninsula in the city. CIPP installation occurred in the summer of 2016.

Over this same summer, Quincy finalized its drainage catchment delineation across the city. Each catchment is identified by the same ID assigned to the corresponding drainage outfall.

As illustrated by Figures 4 and 5 (see next page), the catchments along this land mass contain little land area and a limited amount of sanitary sewer pipe. Therefore, by rehabilitating the large interceptor on Sea Street, the highest likelihood of wastewater exfiltration to the drain should have been eliminated but did not address lower cost-benefit smaller sanitary sewer collectors (nor private sewer laterals).

The city conducted dry weather sampling at all coastal outfalls during September and October 2015.







The Sea Street outfalls were included in this exercise. and the results of dry weather sampling are shown in Figure 6.

As illustrated by Figure 6, five of the catchments along Sea Street, which contains the 20 in. (50.8 cm) newly rehabbed sewer main, tested positive for possible indicators of sanitary sewage. So, although this sewer rehabilitation project successfully removed cost-effective I/I, it may have failed to fully address sewer defects contributing to exfiltration into the drain system.*

These catchments were not identified as highpriority in the application of the city's catchment prioritization scheme during the project planning stages. Therefore, the city did not have the necessary data available to it to trigger additional investigation and rehabilitation in these catchments prior to or during construction. Nonetheless, the city must now explain to impacted residents why additional sewer investigations and rehabilitation may be necessary in the same proximal location of recent sewer rehabilitation work. Typically, when public infrastructure projects appear to fail to correct all deficiencies the first time, it is difficult to maintain public support for continued initiatives. The city of Quincy is now attempting to get "out in front" of sewer rehabilitation efforts with stormwater outfall screening and investigation. These efforts will allow city managers to identify potential illicit discharges and to consider addressing these as part of future sewer lining bid packages.

INTEGRATED COMMUNICATIONS: CLEAN WATER IS EVERYBODY'S BUSINESS

Just as the infrastructure is often "out of sight, out of mind," the work of integrating clean water programs is largely invisible to the public. This can lead to a lack of political support for clean water initiatives because city leaders do not feel pressure from the public sector. Integrating communications around sewer, drainage, and water resources can have a significant positive impact on public support and funding.

Quincy created an integrated communications program that appeals to the public with clear messaging about the health, environmental, and economic value of clean water infrastructure. Using the tagline, "clean water is everybody's business," communication focuses on the benefits of the work and the outcomes rather than the technical details.

The first core message is that the work the city is doing to improve its infrastructure has clear economic and quality-of-life benefits. Reducing inflow means paying less for wastewater treatment. Planning for and preventing flooding saves money when disaster strikes. Addressing critical

*Private lateral lining along Sea Street was not completed until late fall, after outfall sampling



infrastructure needs now avoids costly and dangerous disruptions when a street collapses or a sewer line breaks. Protecting water resources not only preserves property values, it supports water-based tourism and commercial fishing, which contribute positively to Quincy's economy.

The other key message is that public health and safety depend directly on clean water. The city describes clearly how aging and leaking sewer pipes can increase waterborne illness, causing unsafe swimming and beach closures. It also describes the potential for street collapse and infrastructure failure which are dangerous to the public. Additionally, intense rainfall and coastal storm surge can overwhelm drainage systems and threaten public safety.

The city's communications program uses many of the typical methods to reach customers. Door hangers, bill inserts, and public service announcements on local TV are all included. Quincy also publishes a quarterly information letter from the Department of Public Works that is distributed to every household. The letter explains ongoing work, makes connections between projects visible to the public, and emphasizes the key messages referenced above. The city also uses targeted mailings in infrastructure assessment areas to invite residents to public meetings about the projects in their neighborhood.

Together these messages convey what taxpayers are buying for their investment in terms of the benefits to the individual and community. It gives people an understanding of why they should support the work without asking them to learn the difference between a manhole and a catch basin, or the technical details of a sewer project. In Quincy, it has led directly to increased political support because residents now raise clean water issues with city councilors more frequently, making it easier to advocate for the necessary funding.

| ILLICIT DISCHARGE DETECTION AND ELIMINATION |

ent of Public Works 2217 March

> Figure 7. Outreach materials such as the quarterly InfoLetter (sent to all residents), bumper stickers, and the annual DPW calendar support Quincy's integrated clean water outreach

CONCLUSION

Wastewater and stormwater infrastructure nationwide is experiencing the effects of age, population growth, funding constraints, and severe weather. Municipal Sewer and Water reports: "According to an EPA survey, about 30 percent of [sanitary sewer] pipes are 40 to 80 years old, and roughly 10 percent of pipes are more than 80 years old." These old pipes are leaking and prone to clogs. This is particularly true in the Northeast, where 100-year-old sewer systems remain in service and are not atypical.

New England communities face substantial and increasing infrastructure challenges given the age of our infrastructure. However, through integrated planning for IDDE and SSES efforts and integrated public communication, communities can significantly improve efficiency, maximize compliance, and refine capital improvement programs to maximize the benefit from limited funding. 🛟

ABOUT THE AUTHORS

- Zach Henderson is a water resources technical manager with Woodard & Curran and has spent 18 years dedicated to clean water and assistance to municipalities in development of stormwater programs. Mr. Henderson focuses on planning, compliance, asset management, and stormwater treatment system design across New England.
- Deirdre Hall, Esq., is the former compliance manager for the city of Quincy's Department of Public Works. She has eight years of experience practicing administrative law with a recent emphasis on water, sewer, and drain regulatory requirements. She has been actively involved with the city's climate resiliency efforts, specifically as they pertain to utility adaptation planning.

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FROM THE JOURNAL ARCHIVES

PRESIDENT'S LETTER Originally published in October 1967

DEAR FELLOW MEMBERS:

Although it has been the custom for our presidents to write one letter to the membership each year, and this will probably continue in the future, I would feel remiss if I did not include a few words in this "Inaugural Issue" of our Journal.



In 1966 a special committee was appointed to investigate the advisability of employing a full-time Secretary/ Treasurer. The committee made a negative report as it felt that our membership was not as yet large enough to support such an endeavor, but offered a number of recommendations which would lead gradually to this eventuality. All were adopted by the Executive Committee

in June 1966 including one that our Newsletter be converted to a N.E.W.P.C.A. Journal as soon as practicable. Bruce Eaton, Newsletter Editor, accepted the appointment as Journal Editor.

With our rapidly expanding membership, it has become increasingly necessary to provide more services and a better means of disseminating information. A greater number of papers are being presented at Federation annual conferences and Member Association meetings making it impossible to print in the Federation Journal all those worthy of publication, particularly ones of only regional interest. Thus, the commencement of a New England Journal at this time is most appropriate.

Perusal of our "Inaugural Issue" will readily indicate the excellent performance of our Editor and his entire staff. Innumerable hours have been spent in developing a solid groundwork and the effort expended is evident. On behalf of the Association it is my pleasure to thank them for this most auspicious beginning. May I ask the full support of the entire membership in order that the Journal will be a continuing success.

Very truly yours, MERWIN E. HUPFER President

FROM THE JOURNAL ARCHIVES

By LLOYD CAUGHRAN President, Water and Wastewater Technical School, Neosho, Missouri

Originally published in October 1967 Presented at June 14, 1966 New England – New York Joint Meeting

THE SCHOOL WAS CREATED TO SERVE A VIT need for trained people. The number of new water pollution control facilities completed within the past



few years and the number planned for immediate construction create an urgent need for trained operators. Increased industrialization, with its concurrent move of the population from rural to urban areas. will continue to demand more and better

operated facilities for the treatment of waste water. The The first class began in January, 1960. Since that begincomplex character of pollutants of our water resources ning in 1960, the school has grown at a remarkable pace. requires that present and future operators of these The school's training capacity in 1960 was approximately treatment facilities have a high degree of technical 30 people. Its present facilities provide complete training training and well developed skills. Such developments for 250 people. From one building in the beginning it as telemetering, remote operation, and many other now has eleven buildings. Plans call for an increase of laboratory water quality control advancements within this amount of housing in the near future. Whereas the: school had the first building under a lease agreement, After a critical assessment of the training it has since acquired ownership of all of the buildings and 19.25 acres of land. Thus, for the first time in history situation. it was determined that the of the water and waste water industry, there is a school logical solution was an institution that established for the industry, operated by the industry, would be designed exclusively to train and designed to upgrade the personnel in the industry.

both water and waste water personnel.

The school is unique in that it is the only school of its kind in the world. Because of this fact, participants have been referred to the school from the office of the industry prove emphatically the need for training as a protection for the health of the population. International Health, World Health Organization, The water and water pollution control industry had Agency for International Development, and the Pan American Health Organization. Through May, 1967, 50 countries were represented by these participants.

reached a point a few years ago at which the need for an additional means of filling the gaps in their training programs was obvious. Short courses, correspondence The school was sponsored initially by the Missouri courses, and regional training meetings were providing Water and Sewerage Conference. In February, 1963, it was some service to the industry. Time, space, and equipment incorporated as a nonprofit educational institution in the State of Missouri. Shortly thereafter it was accepted limitations, however, restricted the ability of these training courses to provide the total training needed. as such by the Internal Revenue Service and given a After a critical assessment of the training situation, it classification of 501-C-3 and provided that donations to the school would be deductible tax wise. was determined that the logical solution was an institution that would be designed exclusively to train both A tremendous assist was given the school early in its water and waste water personnel. career by virtue of a grant. This project was supported in Conferences toward this end were held during 1959 part by Water Supply Pollution Control Demonstration Grant No. WPD-2-62 from the Public Health Service. The with representatives of the manufacturers and supply

TRAINING IS THE KEY TO ACHIEVEMENT

AL	services of the two industries, engineering consultants,
	regulatory agencies, municipal groups, and others, who
	provided the support necessary for the establishment
er	of the school. Without exception, the responses of those
	who learned of the school were encouraging. Many
	leaders of the industry said they felt that such an insti-
	tution had been needed for at least twenty years.
	Another step was taken during the same year to
5	provide housing for the school through a lease agree-
	ment with Fifth Army Headquarters for use of one of
	the buildings in the Fort Crowder Military Reservation.

THE SCHOOL

TRAINING IS THE KEY TO ACHIEVEMENT—June 1969

program of training of the institution was greatly accelerated by this support. A continuation grant was given in March, 1965, by the Federal Water Pollution Control Administration.

In its system of training the school has combined a number of old and new training methods. For example, in some classroom work, such as mathematics, hydraulics, and others, much of this is done with didactic lectures, which is traditional to all classroom work.

In addition to this, it further serves its trainees with modern day visual aids, including movies, film strips, slides, overhead projections, and opaque projection.

The school has been making many slides to use in teaching. It has equipment to produce its own transparencies. The film library continues to grow, both from purchased films and these generously provided by the Public Health Service, industry, and others.

Much of the equipment is built as models or cut-away devices. Other units are production items. All of these things are used to provide the trainee with an understanding of the application, operation, and maintenance. He becomes acquainted with the unit's use. He learns the components that make up the equipment. He is taught preventive maintenance, as well as repair in the event of an operational failure.

Demonstrations are given on all types of activities involved in the operation and care of a water or sewerage works facility. Finally, every student must perform every action in every class, whether it be a bacteriological examination in the laboratory or tapping of pipe. These three sectors of training, that is, hearing, seeing, and doing, constitute what we call total training.

An important facet of any school or training program is the curriculum. In the Water and Wastewater Technical School this has been given very careful and detailed attention from the very beginning of the school. Courses for the one-week sessions, which have been conducted to upgrade those already employed in our industry, were carefully outlined so as to give continuity. The courses are listed as Course I, II, III, and IV. A Course II is a stepping stone directly above Course I and the information dovetails exactly. Thus, an operator in a small facility who has an extremely difficult time getting away from his job will be able, over a period of time, to get four weeks of very comprehensive training.

In the design and production of the curricula of the school we drew upon the resources of some of our most noted and outstanding leaders in the field. This resulted in a powerful and useful product. We got the full benefit of their seasoned judgment, their vast knowledge, and their hard-won experience.

A very unique factor of the school, and a highly useful one, is the equipment included in the two mechanical buildings. Along with the items in these buildings, we also have another building which houses heavy equipment, such as back hoe, loader, mobile treatment unit, welder, trucks, and tractors.

This vast quantity of mechanical material represents virtually every aspect of the collection, treatment, and operation of water pollution control facilities. They range from sludge pumps to highly sophisticated telemetering equipment. These are used very extensively in the course of training. Much of the equipment is built as models or cut-away devices. Other units are production items. All of these things are used to provide the trainee with an understanding of the application, operation, and maintenance. He becomes acquainted with the unit's use. He learns the components that make up the equipment. He is taught preventive maintenance, as well as repair in the event of an operational failure.

In the classrooms of the mechanical buildings the instructor discusses the equipment, uses visual aids to make them more acquainted with the equipment and in many instances shows movies which indicate the use of the equipment in the field. He then provides the equipment for the class and when possible he operates the equipment. It is then disassembled and each operating part is identified and discussed. The instructor now gives the students assignments wherein they disassemble, inspect the parts, and reassemble the equipment. For example, the school is often soliciting old and worn pumps in order to give the students a real opportunity to work on them. After this has been done several times, the pump is in such good condition that we are looking for other equipment that would challenge them to restore it to the most practical working order.

This unique program is of incalculable value to the student, but it is also very important to the employer, management, and owners, who are often the general public. The mechanical course, or practical, if you so wish to term it, gives the board diversified knowledge of operations for which there can be no substitute. It gives a high degree of competence in operation and maintenance which can be translated into dollars and cents, effectively preventing breakage, eliminating costly interruptions of service, and prolonging the life of the equipment.

Local housing facilities in Neosho, Missouri, are adequate and reasonable. This is in addition to the dormitory housing on campus. Food is at the school cafeteria. Three excellent meals are provided each school day. Inquiries are often made concerning housing. The school has dormitory facilities available on the campus. They are clean and quite comfortable. It should be said at this point that they are not of Hilton caliber. However, they are comfortable and practical.

When a student enrolls at school he is given a three-rin binder. At an appropriate time the instructors give him handout material which become his property. Much of this is provided by manufacturers and suppliers. A tremendous amount of handout material has now bee designed by the school and is run off by the school's repr duction equipment and is then submitted to the student This material becomes a veritable text, particularly wher used in conjunction with good classroom notes.

Anyone interested in, or already engaged in, the water or waste water industry can enroll in the Water and Wastewater Technico School. For those enrolled in the 36-week course it is requested that they be high school graduate or equivalent.

I think it would be appropriate to state at this point that the school has a Student Handbook which sets forth the school regulations. The student is given an orientation period during his first week of school. The Handbook is read to him by some of the staff members. It is discussed by other staff members or advanced students. He is instructed to read it very carefully. The school does not have a lot of rules, but those that it does have, it keeps religiously. A student can be, and sometimes is, dismissed for violation of these rules. It is our contention that our school is evaluated by the students that graduate from it. If that student does not practice good grooming, as is prescribed by the handbook, then he certainly would not be acceptable as an employee in our industry. Sometimes we must change cultures in order to make them more suitable employees, as well as making them technically knowledgeable.

The school scrupulously avoids any form of endorseand work experience makes it possible for a better ment as to treatment methods, equipment, or engitrained individual. A person not having sufficient funds neering firms. The fact that a manufacturers name is to pay for his entire training would be able to enroll and imprinted on his literature or that the name is stamped through earnings during the work experience be able to on the equipment is not construed by us as being pay his continued training. The Water and Wastewater an endorsement. This rule has been enthusiastically Technical School feels that this is a very worthwhile accepted by all of the manufacturers and professional program. people who have been affiliated with the school. During the latter part of 1964 the school was contacted

A prohibition that the school follows with great care is that of entertainment. While a student is at school he is not allowed to be entertained by any company representative, at any time. This rule eliminates the convention atmosphere and does not cause one representative to feel that he is put in a position of having to equal or surpass the entertainment provided by another representative.

sentative to feel that he is put in a position of having to equal or surpass the entertainment provided by another representative. Who can enroll? Anyone interested in, or already engaged in, the water or wastewater industry can enroll

ver,	in the Water and Wastewater Technical School. For those
	enrolled in the 36-week course it is requested that they
ng	be high school graduate or equivalent. The equivalent
n	meaning a mechanical, scientific, or experience back-
	ground. The tuition rate for those enrolled is \$35 per man
	per week. This rate applies to all types of classes.
en	The school recently secured a grant from the Fund for
ro-	the Advancement for Education established by the Ford
t.	Foundation. This money is being used in a Work-Study
n	program. Dr. Warren A. Kramer, formerly of the Missouri
	State Division of Health, has been employed to coordi-
	nate this program. The Work-Study program consists of
	having an individual who desires this type of training to
	be enrolled in the school for a period of several months.
al	He would then be given a work experience assignment
u	in a water or wastewater facility. While serving in this
	capacity he would be paid and would save an amount
ol	which would pay for the next period of time at the
	school. This alternate program of on campus training
	લો



During the latter part of 1964 the school was contacted by the Agency for International Development and was requested by them to consider putting on a pilot program of training water works personnel in Kingston, Jamaica. The school was pleased and honored to be considered for this first of a kind type of training.

The curriculum covered four major areas of water supply and production. They were water treatment, laboratory control, water works equipment, and water works maintenance.

NEWEA ARCHIVES

> Reports from the Government of Jamaica, Agency for International Development, and others indicate that this was a highly successful operation. Due to the demonstration given by this first course, it was determined that a second program would be scheduled.

> The Water and Wastewater Technical School again sent a staff and a sizeable quantity of equipment to Jamaica in January, 1966. Twenty-two operators were given training using the same curriculum outline as that rendered in 1965. Without sounding boastful, there was, apparently, a unanimous agreement that this course was also an unqualified success.

One of the critical proofs of work-related training is the ability of its graduates to secure employment. It has been estimated by school officials that approximately 90% of the graduates have gone to work immediately.

To export education to a foreign country was not easy. Arrangements were made for all the necessary items involved, such as passports, visas, vaccinations, immigration clearance, customs, air freight shipments, and all the other assorted documents necessary for ingress and egress of personnel and supplies. This was particularly difficult due to our lack of knowledge of such matters. This year the school was much more knowledgeable of the handling of these affairs.

The Government of Jamaica and the State Department through the Agency for International Development conclude that four major benefits accrued from the courses. They were, first the skills and knowledge acquired by the students will certainly upgrade the operational capability. Second the participants in the course can pass along the information that they have learned, resulting in increased efficiency throughout the system. Thirdly the quality of the finished product will be improved by better operational know-how. And *finally* the public health benefits gained through a better quality of water.

Some of the needs of our municipalities are being met through the training of this unusual school. If the school can advance as rapidly in the next seven years as it has in the past seven years, perhaps it will reach a point where it can more fully meet the enormous challenge of providing capable employees to operate the vitally important water and waste water facilities in the cities of our state and country.

One of the critical proofs of work-related training is the ability of its graduates to secure employment. It has been estimated by school officials that approximately 90% of the graduates have gone to work immediately. A number of these have secured their jobs as much as two months prior to graduation. The beginning average salary for these men who complete the nine months' course has been running \$400 plus per man. Graduates from the twelve months' course have entered the industry with an average salary of \$75 to \$100 more than those completing the nine months' course. Recent graduates have had several jobs to select from.

What are some of the benefits to you who are in responsible charge by having, or acquiring, trained employees? Well, first it is a very practical way to cut operating and overhead cost. Second, it prevents you from having to recruit and train employees for every job. Third, it helps to reduce job turnover. Fourth, it combats the old problems of absenteeism, lateness, apathy, and inefficiency. And finally, it gives the employee special habits of thinking, viewpoints, and attitudes. It motivates him with ambition, initiative, and resourcefulness - the self propelled traits so essential for greater achievement. I therefore submit, in closing, that training is the key to achievement. 🔷



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Decatur WAY

Converting an overgrown alley into a city and community asset

Stone Reservo

Course

Filter Fabric

Max 2% Pitch

HDPE Liner -

Concrete

by Michael Dodson CDM Smith, Manchester, NH and Mike Stuer Lowell Regional Waste Water Utility, Lowell, MA

ne Leveling

Course

ecatur WAY (Water, Art, and You) in the Decatur neighborhood of Lowell, Massachusetts, was once an overgrown alley with weeds and trash that attracted undesirable activity. In 2010, the neighborhood group ACTION mobilized a dedicated group of volunteers to clean up the alley. With the Lowell Regional Waste Water Utility (LRWWU) searching for opportunities to reduce combined sewer overflows (CSOs) in the neighborhood, a partnership was formed among LRWWU, the city of Lowell, CDM Smith, UMass Lowell, and the ACTION group to create a green alley and outdoor art gallery in Decatur WAY. Thus, by 2016, Decatur WAY was transformed into a green alley that collects rainwater and allows that water to infiltrate through precast pervious concrete and into the ground before entering LRWWU's drainage system. Moreover, as a pedestrian corridor, it links the neighborhood together, and is an outdoor art gallery and neighborhood meeting place.

Stormwater and Sustainability Enhancements

Stormwater management provided the impetus for this project as LRWWU looked for sustainable solutions while solving stormwater collection issues. For this neighborhood, the stormwater conveyance system designed as a part of this project connects to existing catch basins that were previously connected to the combined sewer system. With this new conveyance system, stormwater is redirected to cleanly discharge into the Merrimack River, greatly reducing the potential for CSOs as well as for overloaded combined systems that had at times overflowed into the streets of Lowell.

Several porous pavement alternatives were considered to provide stormwater management for the alleyway. Alternatives included porous asphalt, precast interlocking permeable pavers, cast-in-place pervious concrete, and precast pervious concrete. Precast pervious concrete, though

potentially more expensive than other solutions, was selected. Reasons for the selection of this alternative include: it is formed in a controlled environment; the cleaning/replacing of panels is easier than cast-in-place pervious concrete; and different standard-size panels are available.

Max 2% Pitch

Pervious Concrete

Concrete

Perforated Underdrain

A cross section view of the precast pervious concrete application for Decatur WAY

Maintenance requirements for precast pervious concrete include inspecting it at least once per year to examine surface infiltration rates, and vacuuming it two to four times per year to remove solids and debris, and keep voids open. Power washing can be used to dislodge trapped particles, and light salting during winter months is acceptable.

The 4-ft-wide (1.2-m-wide) strip of precast pervious concrete panels stores up to 3,500 ft³ (99 m³) of stormwater and encourages infiltration at the source of rainfall. An HDPE barrier is on both sides of the reservoir stone below the panels encouraging infiltration into the ground and away from the abutting buildings. To ensure stormwater has a location to drain during large storm events, a 6 in. (15 cm) underdrain is at the low points of the system. The underdrain is connected to the new stormwater conveyance pipe to remove stormwater overflow from entering the combined sewer system (Figure 1).

Before the panels were installed, drainage from the alley's roofs and adjacent parking lots, and within the alley itself would flow downstream to several catch basins connected to the combined sewer system. The stormwater conveyance pipe disconnected these catch basins from the combined sewer system and directed stormwater to cleanly discharge to the Merrimack River. The panels in the alley now allow stormwater to infiltrate at its source and provide groundwater recharge.

In addition to the improved stormwater management that the alleyway has provided, other enhancements further benefit the neighborhood and city. This custom-built 85-ftlong (26-m-long) arborway, inspired by the nearby historic Aiken Street Bridge spanning the Merrimack River, uses

arches on the cross members to cast shadows onto the pervious concrete and represent the character of water flowing. Sitting walls, plantings, benches, signage that defines CSOs, why they occur, and how they can be minimized, stamped bituminous concrete, and an arbor industrial in character make it equally inviting. As the native honeysuckle and wisteria vine plantings mature, a shaded walkway will emerge giving respite from the heat in the heart of the city.

Poetry, murals, and artwork by local school children and professional artists, and sidewalk art revealed only during rain events add to the allure. The potential for vandalism is believed to be greatly reduced because all of the artwork is locally sourced and thus a source of local pride will help protect the art. A large mural at the entrance shows a "mill girl" and tells her story on a plaque below the painting. Harriet Hanson Robinson started work in the Lowell mills as a bobbin changer at the age of 10. She soon became a labor leader on behalf of the mill girls and later founded the National Woman Suffrage Association of Massachusetts.

Success All Around

This project is a success story for community awareness. It shows how green infrastructure can reinvigorate a community and bring people together to work collaboratively while addressing water quality concerns. Funding often is directed to enhancing the environment but less often is offered to enhance community assets. Decatur WAY demonstrates the use of green infrastructure to reduce CSOs, recharge groundwater, and positively affect the environment. It also shows the co-benefits of handling stormwater responsibly, including creating a community asset, destination, and outdoor art exhibit, a sense of pride, and enhanced health and well-being. New studies are showing that the cost benefit analysis of green infrastructure installations includes a broad set of returns on investment. The true success of a public space can only be told by time, and Decatur WAY exemplifies the improvements to the environment and human well-being.











Befor



Figure 1. Stormwater conveyance in Decatur neighborhood





NEBRA Highlights

Fields of Dreams—The North East Biosolids & Residuals Association (NEBRA) hosted its first-ever Fields of Dreams on July 18 at historic McCoy Stadium, home of the Pawtucket Red Sox in Pawtucket, Rhode Island. The PawSox won, and attendees enjoyed an all-you-could-eat BBQ, networking, and family fun. Fields of Dreams are found throughout the region, not only at sports stadiums but wherever biosolids and other residuals are professionally managed. The annual Fields of Dreams event is a special NEBRA fundraiser held at a different ballgame each year to promote biosolids recycling.

NEBRA Tackles Phosphorus and Polyfluorinated Alkyl Substances

NEBRA's Reg/Leg and Research committees have been busy this year in continuing to address how to manage phosphorus in organic residuals and the "emerging" contaminants perfluorinated and polyfluorinated alkyl substances (PFAS).

The work on phosphorus builds on the November 2016 symposium that NEBRA helped UMass Extension produce. That symposium advanced regional understanding of analyzing phosphorus in organic residuals with the water extractable phosphorus (WEP) test and how phosphorus in organic residuals behaves in the soil. Katie Campbell-Nelson, UMass Extension vegetable specialist, provided follow-up interim guidance that is posted on NEBRA's website on the phosphorus resource webpage. The Massachusetts Department of Agricultural Resources had proposed an update to its Plant Nutrient Regulations, and NEBRA has asked for updates and further communication.

NEBRA's efforts on PFAS—especially perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS)—have included legislative work, communications with states' regulatory staff and researchers around the country (including a PFAS presentation to the U.S. Department of Agriculture's W-3170 biosolids/residuals expert research group), creation of PFAS sampling and analysis guidance, and production of webinars to transfer information. NEBRA members have access to all this work on the NEBRA website's Members Only page.

EPA Posts Electronic Biosolids Data

Beginning this past winter, EPA required most biosolids management programs to submit their annual biosolids reports electronically. Biosolids reports are required by 40 CFR Part 503 and must be completed by February 19, with data from the prior year.

Now, the 2016 data collected this year is being provided online for public consumption through the standard EPA

SEPA E



Biosolids data collected this year is being provided online through the standard EPA ECHO database system

ECHO database system. Included are 1,955 reports. The system allows for searches using a variety of options, including by geography, by type of biosolids processing, by classification, etc. It includes data submitted in the Part 503 reports and links to already-existing facility and permitting data, which includes records of violations and enforcement actions. The system does not provide 2016 reports submitted on paper; those will be added over time.

Having biosolids program data online will help the biosolids management profession better understand trends, while providing the public with further information about this important national recycling and management program. However, data quality and presentation are important as the new online system rolls out and is tweaked over the next year. Biosolids management programs are advised to test the new system, review the online presentation and accuracy of their data, and provide feedback to EPA (Courtney Tuxbury: Tuxbury. Courtney@epa.gov).

Look for the new biosolids search options at echo.epa. gov. (The online version of this story includes live links and an explanatory EPA slide presentation: nebiosolids.org/ news.)

In Brief

New Hampshire Legislation

NEBRA was busy this spring on legislation in the Granite State. We helped push through one bill that makes permanent the grandfathered status of certain long-term biosolids land application farm sites. But we had to work hard to defeat or stall bills that addressed concerns about PFAS that would have affected water quality operations. Our vigilance continues this fall regarding the bills. NEBRA is working with a coalition of water quality groups, the New Hampshire Municipal Association, and the Business and Industry Association in promoting legislation that would establish a study commission to develop a longer-term, adequately funded strategy relating to emerging contaminants, including PFAS.

Vermont

NEBRA is participating in a biosolids stakeholder group convened by the Vermont Department of Environmental Conservation (DEC) to provide input on biosolids policy and regulations. So far, the group has been exchanging information on current biosolids management and recycling in the state, most importantly with Vermont Department of Agriculture staff, who are focused on how biosolids and other residuals (e.g., paper mill residuals) fit into their other agricultural and nutrient management systems. Vermont DEC plans to begin formal rulemaking for the biosolids program later in the year.

New Part 360 Solid Waste (Materials Management) Regulations Finalized by New York DEC

A few changes have been made related to biosolids management and land application, including the following:

- Removal of land application restrictions based on soil types
- Addition of a definition for "papermill residuals" and related attention to the land application of those residuals
- Change of the minimum pH of soils at land application sites to 6.0
- Integration of the latest scientific understanding of phosphorus in biosolids (allowing that 30 percent of phosphorus is available)
- Improved allowance for field stacking of residuals prior to land application

Some commenters on the draft rule requested more stringent regulation, including additional setbacks and testing (e.g., for organic compounds), and maintaining of cumulative loading limits. New York held to current scientific consensus that does not support the need for additional restrictions and testing—and most other jurisdictions do not impose them. The New York DEC Materials Management division has a mandate, driven by the policies <text>

sponsors NEBRA and the NEWEA Residuals Committee are joined this year by the Green Mountain Water Environment Association in presenting a program packed with hot topics from anaerobic digestion to PFAS and phosphorus and carbon. Also included will be special coverage of research, residuals management in Quebec, and new technology. This destination conference includes unique networking activities in beautiful, fun Burlington on the shore of Lake Champlain. Included are three optional tours and NEBRA's 20th Anniversary Celebration!

of several administrations going back years, to advance the recycling of biosolids and other organic residuals, and any additional restrictions for which there is no public health or environmental benefit only serves to reduce recycling of these materials.

Biosolids Reviewed

Pennsylvania's Legislature—in a resolution adopted in 2016—required a formal review of the state's biosolids management. That review was completed in June 2017. It found that Pennsylvania's biosolids regulations are similarly protective in comparison to the regulations in neighboring states and that more Pennsylvania solids are landfilled (46 percent) than land-applied (38 percent). The report raised concerns about malodors and the limited number of inspections on the part of the Pennsylvania Department of Environmental Protection and recommended that the department require and enforce more formal odor control plans. Find the report here: lbfc.legis.state.pa.us/.



On July 18, Barry Wenskowicz (inset) led a NEBRA tour of the Narragansett Bay Commission's upgraded anaerobic digestion and planned combined heat and power (CHP) systems at the Bucklin Point wastewater treatment facility

WEF Biosolids Fact Sheets

The WEF Residuals & Biosolids Committee and its subcommittees have been active in recent years producing fact sheets on timely topics:

- Phosphorus in Biosolids (with a long and a short version): wrrfdata.org/PhosphorusFS/ WEF-PhosphorusFactSheet2014.html
 Microconstituents: wrrfdata.org/NBP/
- Newsletter/wp-content/uploads/2017/07/ WEF-FACT-SHEET-MICROCONSTITUENTSv25-AUG-2017.pdf
- Renewable Identification Numbers (RINs): wrrfdata.org/NBP/Newsletter/wp-content/ uploads/2016/09/WEF_Biofuels_RINs_Final-Draft-v31-AUG-2016final.pdf
- Survey of biosolids drying facilities: wef. org/globalassets/assets-wef/3---resources/ topics/a-n/biosolids/technical-resources/wefrbc-dryer-survey-fact-sheet-2017.pdf
- Water Treatment Residuals: coming soon

Bucklin Point Green Energy

The Narragansett Bay Commission (NBC) hosted a NEBRA tour of the upgraded anaerobic digestion and planned combined heat and power (CHP) systems at the Bucklin Point wastewater treatment facility (WWTF) on July 18. Barry Wenskowicz led the tour.

Mr. Wenskowicz estimates that off-site solids management—landfill disposal and incineration—generates the WWTF's largest proportions, about two-thirds, of greenhouse gas emissions, much in the forms of methane and nitrous oxide. To address that, and to help meet NBC's aggressive goal of achieving 100 percent sustainable electricity generation, the Bucklin Point facility is installing CHP to fully use the biogas produced in the anaerobic digesters. Part of the plan includes optimizing the digestion process and ensuring consistency in biogas production.

The new biogas-fueled engine, being installed now, will provide about 5 million kWh/year of power, roughly 14 percent of NBC's total demand. Existing and new solar and wind power systems at the larger NBC Fields Point WWTF and at offsite locations will provide the remaining renewable energy expected to meet NBC's sustainability goal.

The Bucklin Point biogas CHP project is expected to cost \$6.44 million, plus \$172,000/ year for operations. It will generate 37 percent of Bucklin Point's electricity demand, providing an estimated value of \$440,000 annually. Mr. Wenskowicz and the operations team are studying the facility's operations to ensure the digesters will run as smoothly as possible.

Ned Beecher, Executive Director Tamworth, N.H. 603-323-7654 | info@nebiosolids.org

For additional news or to subscribe to NEBRAMail, NEBRA's email newsletter visit nebiosolids.org







NEWEA 2018 Annual Conference & Exhibit



OUR TECHNOLOGY IS BASED ON SOUND SCIENCE Inspect More, Clean Better



Spotlight: Al Peloquin



Editor's Note: In keeping with the underlying throwback theme for 2017, our fall edition Spotlight features Alfred Peloquin—Past President, 5S member, recipient of numerous regional and national awards, and our first executive director, a position he held from 1986 to 1993. Most, if not all, of the content below was taken from his autobiography, The Times and Doings: An Engineer and Citizen Soldier, which he wrote in 2001. It was an honor to prepare this Spotlight and commemorate his contributions to the water environmental field. Please read on to learn more about his amazing career and fascinating life.

-Joe Boccadoro, Journal Editor



Alfred E. Peloquin served as NEWEA's (formerly known as NEWPCA) first executive director. His contributions to our field were many. He was born in 1922 in Southbridge, Massachusetts, and was part of America's "Greatest Generation." He attended public schools through high school and then matriculated to Norwich University in 1940, a military college in Vermont. He

expressed an interest in the armed forces at an early age, so his choice was not surprising. His major was civil engineering. As you will read below, these two areas—the military and engineering, specifically environmental engineering—were a significant part of Mr. Peloquin's career.

COLLEGE AND MILITARY YEARS

Mr. Peloquin's late teens and 20s coincided with World War II, which interrupted his college education in two ways: He needed to take a year off after his freshman year due to a slowdown in his father's pharmacy business and, as an Army reservist, he was called to active duty. In the summer of 1941, between his freshman and sophomore years, it was a difficult time for small businesses and the Peloquin family experienced financial hardship. As a result, he had to take time off from school, and took jobs at a factory and as a personal driver for the wife of a local business owner. During this time, the Japanese bombed Pearl Harbor on December 7, 1941, and the United States entered the war. In the fall of 1942, the family financial situation stabilized and he returned to Norwich. His stay was short-lived. In 1943 he was called to active duty. While waiting for orders, he worked for the U.S. Geological Survey as a member of a survey party that mapped parts of Sturbridge, Massachusetts. Eventually, he received his orders, and after two months of training as part of the Amphibious Tractor Battalion (transport for troops from ship to shore), he was shipped to the Western Pacific in 1944.

Mr. Peloquin's autobiography describes his time at war, in particular securing the Palau Islands, the Ryukyus (west of the Island of Okinawa), and other islands in the Western Pacific. His battalion was responsible for transporting

soldiers and supplies as part of these efforts. He served on amphibious tractor vehicles and DUKWs (think rolling rally). An entire article could be devoted to his experience at war. Unfortunately, space does not permit a detailed account. He returned to the United States in 1946.

PROFESSIONAL CAREER

Once home, Mr. Peloquin resumed his studies at Norwich and graduated with a civil engineering degree in 1949. His first job was with the Vermont Department of Highways where he worked in maintenance and construction of state highways. He held this job for a short time when, interestingly, at the age of 27, he took a job as the town manager of Castleton, Vermont, a small town in the west central part of the state that at the time had a population of 1,800 people. This position had many responsibilities, including road commissioner. Many of Castleton's roads were unpaved and muddy in the spring. As commissioner, he was instrumental in developing a soil-cement stabilization process that led to the main road through town finally being "out of the mud." His autobiography mentions that his time as town manager, from 1949 to 1952, was a satisfying and fulfilling part of his career, and it formed the basis for an interest in public works-type jobs and projects in the future.

Between 1952 and 1967, Mr. Peloquin worked for the New England Army Corps of Engineers, Electronic Systems Command, and the U.S. Public Health Service. For the Army Corps, he worked on contracts administration for the design of military facilities throughout New England, and for the Public Health Service, he was chief of the Water Quality section, his first foray into the water pollution control field. His section oversaw collection and analysis of water quality data of New England rivers and determined quality levels needed to support future uses, undoubtedly forerunner to today's Total Maximum Daily Load (TMDL) studies. His other duties consisted of dissemination of public information and educational material on water pollution, which one day took him to the office of the New England Interstate Water Pollution Control Commission (NEIWPCC).

NEIWPCC and EPA

In 1967, the executive secretary position at NEIWPCC was open. Mr. Peloquin's experience at the Public Health Service made him a good candidate so he applied and was hired.

He took the position at a time when the water pollution control field was in its infancy. He was instrumental in developing several key programs and shaping the response to pollution problems.

His accomplishments during this time include:

- Training, 1969, the New England Regional Wastewater Institute. He initiated action in creating a one-year certificate program to train individuals in the operation of wastewater treatment facilities. The institute was on the campus of Southern Maine Vocational and Technical Institute in South Portland, Maine.
- Nashua River Program, 1973 basin-wide study on pollution of the Nashua River, highly polluted with pulp, paper, and other wastes. The study recommended wastewater treatment facilities. The resultant abatement program was completed in the 1980s, which ended the pollution cycle and began the path toward a clean river.
- New England representative on EPA Advisory Committee. This committee worked with the agency to develop rules, regulations, and policies to implement the Clean Water Act (CWA). The committee unified the states, which provided power and better representation of the needs of the region.
- National Commission on Water Ouality. He was invited to represent the six New England states on a commission chaired by Vice President Nelson Rockefeller.
- Manpower provider. He provided staff to assist the states in implementing CWA requirements.

After NEIWPCC, he worked for Region I EPA from 1983 to 1988. This period coincided with the start of the Boston Harbor Cleanup era. During his time at EPA, he was assigned to the Boston Harbor Section, responsible for tracking the progress of the cleanup.

While at EPA. at the behest of his successor at NEIWPCC. he became the executive director of NEWPCA in 1986, and split his time between the two organizations. He served in this dual role for two years, during which he worked with the New England states to develop programs to implement what we now know as the State Revolving Fund (SRF).

NEWPCA (NEWEA)

Though Mr. Peloquin's two-year stint serving both EPA and NEWPCA concluded in 1988, he continued in the exclusive role as executive director for another five years. Here are some major accomplishments and memorable experiences during his time as executive director:

- Establishing a permanent office and staff. A significant goal of the association was achieved when space and staff (Elizabeth Cutone [then Elizabeth Haffner]) were shared with the NEIWPCC.
- Congressional Breakfast. He established the annual Congressional Breakfast to provide a forum for interaction between association members and the New England congressional delegation to discuss important water quality issues.
- Technology Exchange Symposium with the Republic of China, 1987 to 1990. At the request of two Chinese engineers, Mr. Peloquin was instrumental in organizing a symposium in Taiwan to exchange technical information

on wastewater, solid waste, groundwater and ocean pollution, and air pollution. Planning for the event took place between 1987 and 1989, and the event was held in May 1990.

- Loma Prieta Earthquake. He and his wife, Pauline, attended the annual WEF conference in San Francisco in 1989 and experienced the famous Loma Prieta Earthquake. He devotes a few pages to this in his autobiography. Though he could have recounted memories of an undoubtedly frightening and highly unnerving event, he chose to share a few humorous experiences: the gentleman who, while racing down the stairs to exit the hotel, uttered a profanity with each step, and the young lady who ran out of her room and started to descend the stairs before realizing she was naked.
- Volga River Pollution Conference. On the heels of the successful Taiwan symposium, he was asked to serve as the NEWPCA and WEF representative at a conference in the former Soviet Union on pollution in the Volga River. Accompanied by his wife, he attended in 1991. He describes his trip in his autobiography in significant detail. It must have been stressful visiting the former Soviet Union in 1991; however, once again he chose to include an amusing experience. While on a train traveling from Moscow to Nizhny Novgorod (conference location), he needed to use the restroom. The flush mechanism on the toilet was not immediately obvious. After taking a few minutes to study his surroundings, he realized that a device that looked like a furnace stoker was to be used to activate a flap valve in the toilet bowl. After pushing downward, the valve released and deposited the contents to the railroad tracks below!

RETIREMENT

Mr. Peloquin retired in 1988, but still served as executive director of NEWPCA (NEWEA) until 1993; however, also in 1993, he worked for a consultant on a project in Alexandria, Egypt, to assess the local sewerage authority and make recommendations for improvements.

In retirement, he also traveled back to the World War II battlegrounds of the Western Pacific where he served in the 1940s, and then eventually moved to Sun City West in Arizona, where he joined the Arizona Water Pollution Control Association (AWPCA) in 1996. He was active on this association's Water for People Committee through 1999, helping to complete a number of projects in Mexico.

Mr. Peloguin transitioned to a career in water pollution control in the 1960s when the industry was in its infancy, a time when laws were strengthened to better protect the environment and public, new agencies and organizations were formed to write and enforce regulations, and a different public consciousness regarding pollution was emerging. The era demanded involvement from people with strong character, conviction, and vision. He had all these traits, and we owe him a debt of gratitude for his contributions to our industry in general and to NEWEA in particular.





NEWEA logo cica 1999

1992-2000

NEWEA Journal articles: odor control, stormwater, trenchless sewer rehab, comprehensive wastewater management planning, low phosphorus limits

1986-91 NEWPCA

Journal articles: solid waste to energy, Membrane filtration Boston Harbor cleanup, sewer rehabilitation, vacuum sewers, SCADA directional drilling, VOC emissions, ĞİS

1992 Name change to NE Water Environment Association

1989

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1991 Name change to Water Environment Federation (WEF)

1996-2004

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1990s

1997 Kyoto Change Treaty

1999 Phase I Protocol Stormwater Climate Regulations





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For more information, visit annualconference.newea.org call: 781-939-0908 • email: mail@newea.org

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Maine State Director Report

by Clayton "Mac" Richardson mrichardson@lawpca.org

reetings from Vacation land! This year's **Legislative Breakfast** was held in association with Maine Water Utilities Association, Maine Rural Water Association, Associated General Contractors of Maine, the Maine Chapter of the American Public Works Association, NEWEA, and the New England Interstate Water Pollution Control Commission on March 7 at the Senator Inn in Augusta. Maine Water Environment Association (MEWEA) President Matt Timberlake has worked hard to strengthen the collaboration that supports clean water and the infrastructure required to "make it all happen."



Urban runoff 5K participants

Shortly after rubbing elbows with lawmakers, many MEWEA members headed to Attitash ski area on March 24 to participate in our **annual ski day** with the New Hampshire Water Pollution Control Association as it celebrated the start of its 50th anniversary. A great day was had by all even if nobody could keep up with our hostess, Patty Chesebrough!

The **MEWEA** strategic planning meeting and spring conference were next on the busy schedule. The planning session was held at the Ramada Inn in Lewiston on Thursday before the conference on Friday, April 14. The conference featured a tour of the Lewiston-Auburn Water Pollution Control Authority anaerobic digestion facilities and technical sessions covering anaerobic digestion operations, combined sewer overflow abatement, nutrient modeling, hands-on pump and valve packing, and many others.

info at

mewea.org

We were outdoors again on April 22 as our Young Professionals Committee got a group together to run in the **urban runoff 5K**. Once again, our association had the largest field of runners/walkers from among all the non-profit groups participating. After the race, the young professionals continued with a booth at the Green Neighbor Family Festival.

Our **Operations Challenge team** has continued to be active this year, participating at the training day in Holyoke, Massachusetts, on April 7 and taking second place at the NEWEA spring meeting in June. At this writing, the team was anxiously awaiting its trip to the national event at WEFTEC in Chicago. Of course, a special shout out is due to the NEWEA Operations Challenge chair, our own Travis Peaslee, for a job well done.

MEWEA again collaborated with the Maine Joint Training and Coordinating Committee to offer two days of training in "the" county, officially known as the **North Country Convention**, on April 26 and 27. This semi-annual event is appreciated by the operators of Aroostook County as they often find it difficult to travel to other conferences in New England. The event is also a good opportunity for many Maine professionals to interact with colleagues from maritime Canada who often come over the border to take part in the event.

Also in April, Brad Moore, Darold Wooley, Rich May, Mac Richardson, and Andy Rudzinski held an **afternoon symposium and pizza party** for about 25 University of Maine students interested in careers in water environment-related work. The presentations went well, and MEWEA has been invited back for next year. Thanks to NEWEA President Jim Barsanti for giving us the nudge to make this happen.



In June, we engaged with younger students, as the winners of our annual **Clean Water Week Poster Contest** were formally recognized at a tour of the Bangor Wastewater Treatment Facility, held with the annual release of Atlantic salmon to the Penobscot River. The salmon are raised at the treatment plant in an aquarium gracing the plant office. Contest winners declared from more than 600 entries were as follows:

- Jordan Drake (Oxford) from Central Maine Christian Academy
- Sophia Spiller (Augusta) from St. Michael School
- MacKenzie Cates (Cutler) from Bar Ridge Elementary
- Etta Crossman (Cutler) from Bar Ridge Elementary

Special thanks are due to Jen McDonnell who coordinated the contest this year and Bangor mayor Joe Baldacci who presented awards.

Rounding out our look at recent activities, on July 13 the Young Professionals Committee was at it again hosting a **Poo and Brew event** at the South Portland treatment plant and Foulmouthed Brewing. In addition to touring the treatment plant and brewery, those attending were shown a few examples of stormwater abatement and permeable paving projects completed by the city of South Portland.

Our **Government Affairs Committee** continues to be extremely active despite the legislative session ending and the State of Maine getting back to work after a contentious three-day shutdown. Currently the committee is rallying support for a proposed \$50 million bond that will provide \$47.65 million for plant upgrades and combined sewer projects, \$2 million for the small community program to repair or replace failing septic systems, and \$350,000 to fund the overboard discharge removal program that helps open areas to shellfish harvesting once closed due to direct discharges to marine waters. If passed, this bond is expected to leverage \$121 million in federal funds.

The young professionals, being the irrepressible folks that they are, participate in many events, such as:

• September 9 – Table and booth at the Portland Greenfest in Monument Square

- Fall convention Putting contest and vendor raffle
- October 24 and 25 Maine Stormwater Conference in Portland

Thanks to our Young Professionals chair, Michael Guethle.

Our **Stormwater Committee** remains busy as well. Recently the committee has submitted comments on the MS4 general permit proposed by Maine Department of Environmental Protection. The committee is finalizing a Best Management Practices plan for use when water utilities are flushing hydrants and is looking to join the National Stormwater Alliance.



Finally, we thank those who joined us at our annual convention. This year we kicked off the festivities in the beautiful Mahoosuc Mountains with a golf tournament on the Sunday River links on Wednesday. Thursday and Friday followed up with two full days of great training and informative vendor displays. Some folks brought their families and made a weekend out of it as Grafton Notch State park, with amazing waterfalls and hiking adventures, is just around the corner.

As always, we value the collaboration and support we receive from NEWEA and all our sister state associations. If you have questions concerning MEWEA check out our website (managed and updated by our vice president, Paula Drouin) or drop me a line at mrichardson@lawpca.org.

Clean Water Week Poster Contest winners



New Hampshire State Director Report

by Sean Greig sgreig@newmarketnh.gov

Hello everyone. The New Hampshire Water Pollution Control Association (NHWPCA) had a busy spring season celebrating 50 years of service to the clean water industry.

NHWPCA began its year with its annual legislative breakfast on March 8 at the Holiday Inn in Concord. The 90 attendees were given a hearty breakfast followed by two keynote speakers—Paul Tracy, the Escape Outside editor from WMUR Channel 9, and Clarke Freise, assistant commissioner of the New Hampshire Department of Environmental Services (NHDES). The message to the legislators is that New Hampshire's economy, jobs, and quality of life depend on water. We need to ensure that this valuable resource is affordable and available in all our communities throughout New Hampshire. The legislators had many questions and comments, which led to a lively discussion and made it a successful event.

On April 6, at the Executive Court Banquet Facility in Manchester, NHWPCA held its **37th**

annual trade fair. Operators from around the state mingled with vendors and exchanged stories with fellow operators. The event offered two technical sessions, one featuring pumps, and the other highlighting the NHWPCA Operation Challenge team. Iron Mike Carle and "Mr. Smooth," Dustin Price, demonstrated the Operations Challenge events to New Hampshire operators. NHWPCA is working hard to continue the Operations Challenge program, so if you are a New Hampshire operator and interested in participating, please contact Mr. Carle at mcarle@ town.hampton.nh.us. The trade fair and technical sessions were followed by a luncheon and an awards presentation. Special thanks to Jim Barsanti for attending the lunch and presenting the NEWEA awards.

info at

hwpca.org





NHWPCA had a booth at the **Discover Wild New Hampshire Day** in Concord. Discover Wild New Hampshire Day is sponsored by New Hampshire Fish and Game, with thousands of people attending to explore New Hampshire's wildlife. More than 60 organizations from around the state were on hand with exhibits and demonstrations. The foot traffic was high, and the association received a lot of exposure. NHWPCA volunteers answered questions and raffled off a fishing pole every half an hour.

The NHWPCA **poster contest winners** met with the governor for the Governor's Proclamation signing on May 16. The event was followed by a pizza party and presentations from NHWPCA members. Sixty people attended the NHDES- and NHWPCA-sponsored event. NHWPCA members who attended said they had a great time with the poster contest winners and their families.

The New Hampshire Operations Challenge thickeners. team travelled to the NEWEA Spring Conference The NHWPCA Winter Meeting will be held at the Newmarket Wastewater Treatment Facility on in early June to compete against other New December 8. The facility is investing \$14.1 million England teams for a chance to compete in Chicago at the WEF conference in October. New to change its process from trickling filtration to a Hampshire's Sewer Snakes team comprises Mr. four-stage biological nutrient removal process. Carle, Mr. Price, Patty Chesebrough, and Mike The improvements include a new influent screen, dewatering press, SCADA system, aeration tanks, Tibbetts. The team tore through the process control test with smoking pencils, rescued a secondary clarifiers, primary clarifier drives, mannequin in the safety event, ripped through and process control building. The primary and secondary digesters will be converted to sludge pipe and installed a saddle in the collection systems event, set up a BOD test in the lab event, holding tanks. and performed maintenance and installed the I hope everyone is having a great year so far. Please consider attending the NHWPCA Winter pump at a pumping station for the maintenance event. The Sewer Snakes gave it everything they meeting. It is guaranteed to be a great time. had but finished fourth overall, so they did not move on to the WEF competition this year.

The NHWPCA **50th Anniversary Celebration** was held at the Hampton Beach State Park South Beach Pavilion in Hampton. The event was well attended with a lot of old and new faces. The attendees played games, ate excellent food, and enjoyed conversations. The celebration was highlighted by several keynote speakers reminiscing about contributions from operators, engineers, regulators, and others who have made up the fabric of the association and the industry in the past 50 years. Thank you to Mike Theriault and his team for all the work they put in to make the day so successful.

The NHWPCA **Fall Meeting** was held at the Manchester Wastewater Treatment Facility on September 15. The city of Manchester has completed \$20 million of improvements to the aeration systems and is spending \$9 million to improve its primary clarifiers and gravity thickeners.



Vermont State Director Report



by Nathan Lavallee, <code>nlavallee@town.milton.vt.us</code> with thanks to Bob Fischer for help with this report $\ ,$

In Vermont, the Green Mountain Water Environment Association (GMWEA) has been busy on many water, stormwater, and wastewater issues. GMWEA continues to offer training opportunities, educational outreach to the public, events for operators and their families, and proactive outreach on government affairs.

Spring Meeting

The GMWEA Spring Meeting took place in Killington on May 25. Approximately 200 participants attended the event. There were excellent trainings including a three-hour IACET certified course "The New Wave of Public Relations and



Vermont Statehouse—Legislators Meet and Greet (L to R) Daniel Hecht, GAC members Amy Macrellis, Bob Fischer, U.S. Rep Peter Welch, Jeff Wennberg, Shaun Fielder (Vermont Rural Water Association.)

Water/Wastewater Utilities" by Kirsten King, New England Water Works Association. The election of officers took place during the luncheon. Of the four candidates vying for two director positions, Steve Crosby retained his current directorship and Michele Eisenstein returned to the board of directors following a hiatus. GMWEA's annual awards were given out and the NEWEA Vermont Operator and Alfred Peloquin awards were re-presented by NEWEA Vice President Ray Vermette to Robert Baillargeon and Ernie Kelley, respectively.

Water Quality Day

GMWEA hosted the third Water Quality Day in Vermont on May 19. There were tours of water, wastewater, and stormwater facilities. The Milton wastewater facility had more than 75 participants attend its open house. The governor of Vermont, Phil Scott, made an Official Proclamation declaring "...do proclaim May 19, 2017, as Water Quality Day." GMWEA provided coordination, signage, refreshments, and talking points.

GMWEA Golf Tournament

Nearly 100 players and sponsors took part in the George Dow Memorial Golf Tournament on August 18. The proceeds help fund a GMWEA scholarship in Mr. Dow's name.

Government Affairs

The GMWEA Government Affairs Committee (GAC) was busy this year. On January 18, it hosted a Legislators Meet and Greet in front of the cafeteria in the Vermont Statehouse. This is a good opportunity to interact with legislators, and along with refreshments we provided legislators with information on specific talking points. Mary Barry and Jim Barsanti represented NEWEA at the event.

Next, GMWEA was a sponsor and had the GMWEA booth set up at the Vermont League of Cities and Towns "Local Gov't Day" on February 10. Ms. Barry and Mr. Barsanti attended this event also.

On February 24, GAC Chair Bob Fischer attended the Agency of Natural Resources (ANR) "Listening Tour" where the newly appointed ANR secretary, Julie Moore, spoke and answered questions.

On March 23, the GAC held its first Regulators' Meeting. Along with the ANR secretary, the



As promised, Senator Bernie Sanders held a follow-up meeting in Vermont on May 5 with GMWEA GAC members to discuss affordability issues

heads of various Department of Environmental Conservation divisions answered questions by members of the GAC. The GAC prepared an agenda and managed the meeting. The ANR secretary decided to continue to meet quarterly extending future meetings from 60 minutes to 90 minutes, and the second Vermont Regulators' Meeting took place on July 13.

As promised by Senator Bernie Sanders at the NEWEA GAC meeting in his office during the NEWEA Washington D.C. fly-in this year, he held a follow-up meeting in Vermont on May 5 with GMWEA GAC members to discuss affordability issues. This meeting was a direct result of the NEWEA fly-in. Affordability can be calculated in several ways, but the traditional method is based on median household income (MHI), which is usually obtained from the U.S. Census Bureau. The Total of Water-Wastewater Bills for One Year for a Residential Customer ÷ Median Household Income of Residential Customers = Percent MHI. Various municipalities were represented at the meeting, including Johnson Village, which has a MHI of 3.1 percent. MHI is used by utilities in rate-making, by agencies in determining eligibility for funding, by EPA in administering certain regulations, and by advocacy groups and researchers in analyzing affordability of rates in local and regional areas. Generally, any MHI above 2.5 percent can affect the ability of a municipality to borrow funds at the most favorable rates.

Other Meetings

On March 29, two events were held. Members attended Vermont Clean Water Day hosted by the Sierra Club, and Mr. Fischer spoke at the program's press conference. On the same day, GMWEA held the annual Legislative Lunch, where Vermont legislators listened and asked questions of various GMWEA experts in water, wastewater and stormwater.

Mr. Fischer, along with GMWEA members Kendall Chamberlin and Kevin McLaughlin, attended the Lake Champlain International Governor's Day Fishing Derby on June 8, placing third this year.

Additionally, there have been two initial meetings of a biosolids working group on April 28 and June 15 that were attended by GAC members Jim Jutras and Josh Tyler, Mr. Fischer, and NEWEA and North East Biosolids & Residuals Association members, including Ned Beecher and Shelagh Connelly.



LCI fishing derby (L to R) Kendall Chamberlin, Kevin McLaughlin, Bob Fischer, James Ehlers (LCI Ex-Director) & son, Governor Scott, Julianna Dixon (LCI staff)

World Water Monitoring Day

Once again, GMWEA gave out 100 water testing kits to Vermont educators in celebration of the World Water Monitoring Challenge and for classes for 2017's World Water Monitoring Day on September 18.

Upcoming Events

The GMWEA Fall Trade Show will take place at the Burlington Sheraton on November 9, where GMWEA will host the NEWEA Exchange Operator from Rhode Island. The second Vermont/NEWEA Young Professionals Poo and Brew is scheduled for scheduled for November 8 at Champlain Water District and Switchback Brewery.



For Massachusetts questions or suggestions, please contact me at jdemello@woodard , curran.com.

The Massachusetts Water Pollution Control Association (MWPCA) is in the midst of another eventful year. With more than 750 members across the state, MWPCA is still the leading provider of training opportunities and a place for operators and water quality professionals to exchange information and network.

Following our June Election Meeting the board of directors unanimously approved the slate of officers that included Bob Greene, Eric Smith, and John Downey returning for second terms as president, president-elect, and vice president, respectively. MWPCA also welcomed new faces to the board of directors including Ben Smith of New England Interstate Water Pollution Control Commission (NEIWPCC) and Robert Delgado of the town of Amherst's wastewater treatment plant. This year, the board is committed to steady progress on several key initiatives including expanding training and education opportunities, advocating for the industry, promoting membership involvement, and increasing networking opportunities. With a nice balance of experience and energy, we are excited about the year to come. For those of you interested in joining the association or being more active on a committee, we are seeking members interested in professional growth to transition into the leadership roles of secretary, treasurer, and meeting management coordinator.

In alignment with our initiatives of expanding training and education opportunities, advocating for the industry, promoting membership involvement, and increasing networking opportunities, allow me to recap the last few months and highlight the plan moving forward.

Spring Meeting

After a late winter, a four-letter "s-word" (I would not dare utter that word at this time in the year) forced us to postpone our event for two weeks, MWPCA finally hosted the spring meeting on March 28, 2017, at the Devens Common Center. Despite the rescheduling, the event attracted nearly 90 members and a series of great presentations. Tommy Azevedo kicked things off with an engaging discussion on identifying and combating hydrogen sulfide at your facility and collection system. Jim Sturgis continued the theme with a presentation on wastewater treatment facility structural assessments and concrete repairs. The meeting was closed out with informative presentations from Chris Davis





on a redesigned progressive cavity pump and Jim DeLuca on a valve product.

Legislative Event

MWPCA, together with Massachusetts Water Works Association (MWWA) and the American Council of Engineering Companies of Massachusetts (ACEC/MA), hosted the annual legislative day on May 23 at the State House in Boston. For the first time, MWPCA teamed up with MWWA and ACEC/MA to create a stronger message around the importance of water and infrastructure investment. The event included meetings with state representatives and legislators in the morning followed by a networking lunch that included a riveting speech on the importance of the environment and investment in water from the former EPA Administrator Gina McCarthy. With more than 150 in attendance, our presence resonated and our message was clear. We hope to build upon the successes of this year's event and double the turnout next year.

Summer Meeting

MWPCA hosted its summer meeting on June 14, 2017, at the Log Cabin in Holyoke. The meeting was nutrient-focused with technical presentations from local industry experts. Andrew Fisk of the Connecticut River Conservancy presented on how Massachusetts could help with nutrient removal and the biological condition gradient. Paul Hogan and Sue Guswa presented on nutrient permitting in western Massachusetts. National expert Paul Dombrowski and Roger Ignazio of Canton's water pollution control facility followed up with a case study of nutrient removal at a fixed film plant. The meeting was closed out with a presentation by Paul Moran on phosphorus removal treatment alternatives. The event was well attended with 80 members partaking, but more important, members glowed about the quality of the presentations. For those of you who missed the meeting, the presentations can be found on the MWPCA website at mwpca.org/events/guarterly_meeting_presentations.

Golf Outing

On June 20, MWPCA was greeted with a picturesque day for its Annual Golf Tournament at Shaker Hills in Harvard. The venue is spectacular and the turnout was good. We have already renewed for Tuesday, June 19, 2018, so sign up early!

Poo & Brew

The NEWEA Young Professionals Committee continues to organize and host successful Poo & Brew events that include a tour of a treatment facility followed by networking at a local craft brewery. While organized by Young Professionals, "old professionals" who enjoy learning, networking, and beer are encouraged to attend. This summer, NEWEA and MWPCA co-sponsored a tour of the Greater Lawrence Sanitary District facility in North Andover followed by socializing at Oak & Iron in Andover and and in early October there was a tour of Deer Island Treatment Plant followed by a gathering at the Mystic Brewery in Chelsea.

Management Training

NEIWPCC, the Massachusetts Department of Environmental Protection, and MWPCA are several months into their Massachusetts Wastewater Management Training Program. The program has 28 registrants from facilities all over Massachusetts. While this year's training is already under way, the program sponsors encourage all wastewater operators interested in furthering their careers and one day assuming a management or superintendent position to consider joining a future management training program.

Operator Exchange

This year, the NEWEA operator exchange happens between Massachusetts and Connecticut. MWPCA looks forward to hosting a lucky Connecticut operator and whisking them around to a series of treatment facilities across the state. This is a great opportunity to see new facilities, learn about new technologies, and make lasting friendships.

Water Warriors Initiative

Spearheaded by Dustin Price of Seabrook, the New Hampshire Water Pollution Control Association, and the Maine Water Environment Association, the Water Warriors initiative that promotes jobs in the water industry for returning servicemen will expand into Massachusetts. MWPCA is engaged and eager to assist. We encourage those of you with a military background or others with an interest in becoming an advocate for this program to get involved and help start this train moving.

Upcoming Event	Date	Location
Winter Meeting	Dec 6	Holiday Inn, Mansfield, MA



Rhode Island State Director Report

by Michael Spring mspring@narrabay.com



The Narragansett Water Pollution Control Association (NWPCA) has been busy in 2017. We are on track with our goal to assist with operator training as well as participation within our community and our state.

Legislative Events

In March, NWPCA participated in the NEWEA Congressional briefing in Washington, D.C. NEWEA Director Michael Spring attended the kick-off meeting at the Cannon House. During this well-attended event, NEWEA provided six speakers who instructed us on what to say and how to speak with elected officials, as well as good presentation pointers and bills to talk about. The evening concluded with a meet and greet at the hotel with members of NEWEA as well as WEF delegates.



Washington DC fly-in: NEWEA members discussed the lack of funding for water and wastewater infrastructure with Rhode Island, U.S. Senator, Jack Reed (center-right)

Wednesday, March 24, was the kick-off of Water Week with rallies at Capitol Hill. Ray Willis, Dane O'Rourke, Peter Garvey, Susan Guswa, Judith Underwood, and Mr. Spring met with Senator Jack Reed in his office. Senator Reed was understanding and receptive to our message. He also talked a lot about the new administration in the White House and how things are getting better but said it may take time to see eye to eye on many issues. We also met with Senator Sheldon Whitehouse staffer Adena Liebman. She was receptive and up to speed with our issues and our urgent message

of the need to better the Rhode Island water and wastewater infrastructure. In the afternoon our group was scheduled to meet with Congressman James Langevin, who was unable to meet with us and instead sent his staffer Peter Fountain. Our message of supporting Rhode Island infrastructure was well taken.

On June 15, NWPCA and NEWEA sponsored the Clean Water Legislative Luncheon at the Rhode Island State House as a forum about Rhode Island's clean water issues and how we can work together to address important concerns for public health, the water environment, and the future economic well-being of the Ocean State.

Scott Goodinson, NWPCA president, presented opening remarks, and NEWEA President-elect and Master of Ceremonies Janine Burke-Wells introduced an array of speakers. This year's speakers included Vincent Mesolella of the Narragansett Bay Commission, Bill Patenaude of the Department of Environmental Management, Jeffrey Diehl of the Rhode Island Infrastructure Bank, and Topher Hamblett from Save the Bay. An informative question-and-answer session with the speaking panel followed.

Continuing Education Efforts

In May, two classes were delivered: an Introduction to Wastewater class taught by Mr. Spring and attended by 13 future wastewater operators; and a Math Refresher for Operators course, taught by Diane Johnson, and attended by 30 wastewater operators and staff who declared it informative and successful.

Operations Challenge

At the NEWEA Spring Meeting in June at the Sea Crest Beach Hotel, in Falmouth, Massachusetts, Rhode Island's Ocean State Alliance team



Peter Connell and Bill Wilber-Mr. Wiber" is awarded a NWPCA Life Membership Award

Dominic Tutela presents the Mattera Safety Award to the Warwick Sewer Authority, Charles Labbe accepting

participated in the Operation Challenge events. The team had begun preparation for the event in early March and met every Wednesday afternoon for training. Overall, many hours of dedication and hard work were the catalyst for the team's success; however, team captain and Ops Challenge veteran Eddie Davies was the driving force behind this operation. His years of knowledge and connections within the industry made their success a reality.

The Ops Challenge is a venue that allows wastewater professionals to showcase their skills and Awards were given as follows: improve upon them in a fun and challenging environ-• James Marvelle Award — James DeLuca ment. There are Maintenance, Lab, Safety, Collections, and Process events. Each one touches upon different Ponte • A. Joseph Mattera Safety Award — Warwick Sewer skills and aspects of the wastewater field, helping the participants understand the bigger picture of why Authority we are here doing what we do. As Mr. Spring would • Life Membership — Bill Wilber say, "at the end of the day we are here to make clean The 2016 Gold Award for zero permit violations water and send everyone home safe to their families." went to eight facilities: Burrillville, East Greenwich, Every position within the industry is valuable, and we Jamestown, NBC–Fields Point, New Shoreham, are all fighting for a common cause, clean water, and a Quonset, Narragansett, and Warren. clean environment.

The Rhode Island team had two historic moments at Veolia Water Cranston and West Warwick. the competition this year: It earned a first place trophy for each of the five events, and the team had its first The following 2017 NEWEA Award winners (awards female member, Kim Sandbach, who was instrumental to be presented at the 2018 NEWEA Annual Meeting) in the first-place win. The rest of the team included: were announced: Captain Eddie Davies, Pete Rojas, Peter Hassel, Tyler • Alfred Peloguin Award – Edward Davies Ippi, and Russ McGinnis. • Operator of the Year – Chris Petrone

Everyone's hard work and sacrifices helped to put Rhode Island on the map. With the pump primed both figuratively and literally, the team worked even harder as they trained for the national stage at the WEFTEC event in early October.

Other Events

On May 20, Wastewater Treatment Appreciation Day, two Rhode Island wastewater treatment facilities, City of Warwick Wastewater Treatment Facility and Narragansett Bay Commission Fields Point, opened





Trace Pena, Marisa Desautel, and Janine Burke-Wells volunteer at the NWPCA Golf **Classic at Potowomut Golf Club**

their doors for public tours of the wastewater facilities. We are looking forward to continuing and expanding this event in the future.

The NWPCA Annual Awards Banquet was held on May 24 at the Potowomut Golf Club, in Warwick. President and Master of Ceremonies Scott Goodinson welcomed NEWEA Executive Director Mary Barry and Department of Environmental Management Principal Engineer Bill Patenaude, who both offered encouraging remarks to the award winners and attendees.

- Collections System Operator of the Year Michael

The 2016 Silver Award for operating for the entire year with only one violation went to two facilities:

The annual NWPCA Pawsox night at McCoy Stadium was offered on June 17 to NWPCA members and their families with the support of local sponsors. It was a fantastic family event that was followed up with spectacular fireworks.

NWPCA held its Annual Golf Classic on June 26 at the exclusive Potowomut Golf Club in beautiful East Greenwich, Rhode Island. This was our fourth consecutive sellout of 144 golfers. NWPCA is thankful for the support of the volunteers and our many vendors.



Connecticut State Director Report by Virgil Lloyd

Connecticut's First Operator Appreciation Day Event

Connecticut Water Pollution Abatement Association (CWPAA) conducted its first Operator Appreciation Day Event on May 18, 2017, at the Connecticut River Museum in Essex. More than 25 people attended this first-ever event and enjoyed the fantastic late afternoon weather at this informal social mixer, conducted on the deck of the Connecticut River Museum with a panoramic view of the lower river.



CWPAA Operator Appreciation Day Event at the Connecticut River Museum in Essex, Connecticut

The event included social networking and tours of the Connecticut River Museum. Attendees were also treated to an early season back-flip into the river by Andrew Fisk, executive director of the Connecticut River Conservancy! Admission was free to all operators, courtesy of CWPAA, to demonstrate the organization's deep appreciation for the hard work and dedication of Connecticut's wastewater operators. Feedback from the attendees was universally positive and enthusiastic. Expect to see this event on the calendar again next year.

CAWPCA Spring Workshop

The Connecticut Association of Water Pollution Control Authorities (CAWPCA) conducted their Spring Workshop on May 18, 2017, at the Aqua Turf Club in Southington. More than 115 people attended the half-day event, which featured presentations or panel discussions on long-term management contracts, trends in utility regionalization, and wastewater management options in unsewered towns.

info at

ctwpaa.com

The workshop also featured the passing of the gavel to incoming CAWPCA President Denis Cuevas. Mr. Cuevas, who is general manager of water pollution control in Waterbury, takes over from Tom Saroi, director of engineering for the Greater New Haven Water Pollution Control Authority (WPCA). As president for the past three years, Mr. Sgroi has increased the financial health of CAWPCA and strengthened the connections with NEWEA, as well as promoted the group's leadership in legislative initiatives and collaboration with CWPAA on a host of issues. Mr. Cuevas plans to continue to enhance the collaboration with other organizations with common missions, particularly in education, advocacy, government affairs, and young professional development.

Poo & Brew Comes to Hartford

More than 50 people attended the Poo & Brew event on June 3 in Hartford. This event, jointly sponsored by NEWEA, CAWPCA, CWPAA, and the New York Water Environment Association, featured a tour of the Hartford Water Pollution Control Facility (HWPCF), which is operated by the Metropolitan District (MDC). The HWPCF is the largest facility in Connecticut, with 80 mgd (300 ML/D) secondary & 30 mgd (114 ML/d) wet weather capacities, with an average daily flow of more than 60 mgd (230 ML/d). The facility is undergoing \$350 million in upgrades to improve overall treatment quality and facility resiliency, remove nitrogen to aid in protection of the Connecticut River and Long Island Sound, and decrease combined sewer overflow discharge. The group then sampled fine food and grog at the popular Hog River Brewing Company on Park Street in Hartford.

Operations Challenge: Connecticut's Franken Foggers Head for Chicago

For the first time in more than 10 years, Connecticut fielded an Operations Challenge team at the NEWEA Spring Meeting in North Falmouth, Massachusetts. The Connecticut team, known as the Franken Foggers, surprised the competition and earned a third-place finish, good enough to qualify for a trip to Chicago to compete at WEFTEC this year (September 30 to October 4). The Franken Foggers, who all hail from the Greater New Haven WPCA, are Jason Nenninger, Dan Wolff, Dan Sullivan, Chris Findley, and Gary Zrelak, team coordinator.

Scholarship Awards Announced at the Sewer Open Golf Tournament

Despite threatening skies, the weather cooperated for the players on June 16 at the Sewer Open at Skunkamaug Golf Club in Coventry. A field of 136 golfers enjoyed the cool conditions and helped raise \$3,600 for the CWPAA scholarship fund. The winners of this year's scholarship awards were announced at the banquet following play. The scholarships are competitive and open to all Connecticut high school seniors who plan to attend college this fall and pursue an environmental degree. This year's winners are Natalie Schafer of Mystic, Kaitlyn Watts of Colchester, Sarah Schecter of Danbury, and Ryan Palzere of Bristol. The board of directors wishes this year's recipients a successful academic career.

CWPAA and **CAWPCA** Continue Collaboration

Connecticut is unique among the New England states in having two organizations that focus on supporting the community of wastewater professionals, with each group focusing on distinctly different constituencies. From a high-level view, CWPAA, which last year celebrated its 50th anniversary, has programs targeted to operators, while CAWPCA, which was established roughly 12 years ago, generally provides programs geared for the professionals and volunteers in the management ranks, but of course there is much overlap in these generalizations.

Recognizing this overlap, the two organizations in June started a dialog to explore other opportunities for further collaboration to enhance the value of our programs to the community of





A field of 136 golfers helped raise \$3,600 for the CWPAA scholarship fund at the Sewer Open Golf Tournament

wastewater professionals. Areas such as working together on coordinating programs for young professionals and training for operators were identified as prime opportunities. The dialog will continue and will include reaching to the boards and the membership of both groups. Expect to see and hear more about the two groups working together.

CWPAA Welcomes New Board Member

The CWPAA board of directors is pleased to welcome Chris Lund from the town of Groton as our newest board member. In addition to a career in the U.S. Coast Guard where he retired with the rank of commander, Mr. Lund is a graduate of Connecticut's Manager's Leadership Program.

The CWPAA board of directors meets on the second Thursday of each month, from September to June. Meetings are at 9:00 AM at the offices of Fuss & O'Neill in Manchester. The board meetings are open to all membership, and all are invited to attend. Anyone interested in becoming active in the organization can contact Mike Bisi (860-652-7774 or mike.bisi@glastonbury-ct.gov) or Virgil Lloyd (860-646-2469 or vlloyd@fando.com).

The Stockholm Junior Water Prize This year's state winners from New England



The Stockholm Junior Water Prize national and international competitions are open to young people between the ages of 15 and 20 who have conducted water-related projects of proven environmental, scientific, social, or technological significance. The projects aim to increase students' interest in water-related issues and research, raise awareness about global water challenges, and improve water quality, water resources management, water protection, and drinking water and wastewater treatment.

Connecticut

Crowd-Sourced Detection and Mapping of Nitrate Water Pollutants via a Mobile Web-Based Image Analysis System



Luca Barcelo Greenwich High School Greenwich. Connecticut

The rampant eutrophication crisis present in waterways throughout the world has proven to be a dangerous foe. Nitrate contamination in water systems causes a myriad of problems, both environmental and health related. Nitrate over-saturation may lead to eutrophication, the process by which algae and plant blooms spawn in abundance and subsequently die off when temperatures are unfavorably cold to growth (autumn time). This process produces large "dead zones" whereby biotic factors in aquatic ecosystems suffocate. When ingested in higher quantities (10 mg/L or higher), nitrates can also become toxic to warm-blooded animals through carcinogenic properties, as well as cause birth defects. A social lack of awareness perpetuates the nitrate issue and makes individuals who are not directly compromised by a deadly issue to turn a blind eye.

To combat nitrate contamination and eutrophication in waterways, a simple and easy method was devised by Analytics for Water Action (AWA). Using colorimetric spectroscopy through a mobile application, data acquisition and analytics can be undertaken out in the field, right at the source, rather than taking samples back into the lab. AWA's method has a percent error of 3 percent, when detecting at the low range (0.2 to 2 mg/L) and a percent error of 1 percent at the medium to high range (2 to 100 mg/L). This process leads to cheaper and therefore more widespread nitrate detection throughout the world, allowing for data analytics to be undertaken with a more accurate and larger sample set.

A custom-designed application (iOS and Android) receives nitrate concentrations

from a photo through a sequence of image analysis processes, dependent on the red value of the photo produced from a reaction with the Griess reagent. Following the user-collected nitrate concentration of his or her sample, all the data is sent to a cloud database that interfaces with AWA's website. On the app and website, users have access to a mapping interface that is constantly updated with app-collected values. These data points are plotted to the map, which further interpolates data from National Oceanic and Atmospheric Administration to recognize trends in nitrate presence.

The final stage in the analysis portion involves database integration with academia, non-governmental organization initiatives, industrial bodies, and governmental administrations for further remediation and benchmarking. A heavy focus on public policy reform is undertaken through the recognition of periods and locations of increased nitrate concentrations. This increase may result from fertilizer overuse in certain areas, manure disposal from meatproducing facilities, and other factors that are associated with human activity.

AWA is built on user interaction with global environments. Through a crowd sourcing method of data collection, a larger and more responsive data set can be created for mass implementation and use. Given the ease of access and widespread use of smartphones in the world, a crowd sourcing method that involves the smartphone platform can access a huge percentage of the global population.

New Hampshire

Novel and Economical Approach for Testing Lead in Water at Home by Using a Combination of Infrared Spectroscopy and Colorimetry



Meghana Avvaru Nashua High School South Nashua, New Hampshire

Maine

Testing the Effectiveness of Mycorrhizae in the **Remediation of Phosphorus** from Stormwater



Bangor High School Bangor, Maine

Lead contamination in water poses a serious and mostly undetected threat. There are several ways to test for the presence of lead in water today; however, the existing methods are either expensive or inaccurate. An economical option to test water drunk in homes is necessary. The focus of my research is to detect lead content between 0 and 50 parts per billion (ppb). Unfortunately, devices to detect these levels are not available. Infrared spectroscopy is the interaction of infrared radiation with molecules. Photons of the infrared region excite molecular vibrations in the bonds of molecules. The bonds oscillate at a frequency specific to the molecule. Raman spectroscopy is the inelastic scattering of a photon by molecules, which are excited to higher vibrational or rotational energy levels. The Raman scattered component can be shown to shift the frequency of the incident light by plus or minus the frequency of the molecular vibration. The increase in frequency is known as an anti-Stokes shift, and the decrease in frequency is known as a Stokes shift. Colorimetry is the science and technology used to quantify and describe physically the human color perception.

world today is the decreasing availability of freshwater due to water pollution. Excess phosphorus, brought into a body of water by stormwater runoff, leads to the rapid acceleration of eutrophication. Phytoremediation, the use of plants to remediate pollutants from contaminated sites, has gained popularity in recent decades due to its costeffective and environmentally non-intrusive characteristics. Mycorrhizae are fungi that form a symbiotic relationship with a host plant in which the mycorrhizae increase the uptake of water and nutrients for the plant while the plant provides the mycorrhizae with a source of carbon. Given this, it was hypothesized that the mycorrhizae would increase the removal of phosphorus from stormwater. To test its effectiveness, a filter was designed based on phytoremediation in which cucumber plants were planted in Tupperware containers and watered once a week with a phosphorus-containing nutrient solution. Two treatments were tested: a mycorrhizal filter and a nonmycorrhizal filter. At the end of eight weeks, the plants' roots were stained to confirm

A combination of infrared spectroscopy, Raman scattering, colorimetry, and spot testing can be used to determine the lead content in spot test samples of water. Infrared spectroscopy and the Raman Scattering effect changes the intensity and frequency shifts of the light passing through the molecules. This change in light intensity and frequency shift is unique to each molecule. It can be mapped to variation in color characteristics of the light. The color characteristics of the light can be captured using a red-green-blue (RGB) color sensor in a controlled environment. If the RGB values of the light reflected by the spot test can be captured before and after infrared light exposure, a pattern can be established and a lead testing device can be created.

A spot test on filter paper was performed and a device was created that can capture the color variation before and after infrared light exposure to the spot test. The testing device consists of a data capturing device using an Arduino Uno microprocessor connected to a color sensor, infrared LEDs, a Bluetooth module, and an iPhone app, which processes the color sensor values obtained (continued on page 77)

One of the biggest problems facing the

for mycorrhizal infection, and the filtered solution was analyzed for total phosphorus concentration weekly.

Results from the total phosphorus analysis showed a treatment effect in which the concentration of phosphorus in the filtered solution was lower for the mycorrhizal filters than that of the non-mycorrhizal filters. However, a paired t-test was conducted to test the significance of this difference, and it was found that this difference was not quite statistically significant by standard conventions. The plant leaf tissue was also analyzed for total phosphorus, and results indicated that the percent of phosphorus found in the tissue of the mycorrhizal plants was higher than that of the non-mycorrhizal plants. This result was found to be statistically significant with a p-value of 0.0116.

Furthermore, it was found that the percent of magnesium in the mycorrhizal plant leaf tissues was also significantly greater, with a p-value of 0.0046, than that of the nonmycorrhizal plants. A chlorophyll molecule is responsible for photosynthesis in a plant, and at the center of a chlorophyll molecule (continued on page 77)

Vermont

Effect of Different Nitrogen to Phosphorus Ratios on the Growth of Cyanobacteria



Aida Arms South Burlington High School Burlington, Vermont

This project was developed in response to the harm that cyanobacteria, commonly referred to as blue-green algae, inflict on ecosystems, particularly that of Lake Champlain.

The nutrient over-enrichment of bodies of water has allowed for cyanobacteria to reproduce rapidly, forming dense concentrations called blooms. The specific nutrients that influence cyanobacteria growth, known as limiting nutrients, are phosphorus and nitrogen (though phosphorus is regarded as the primary nutrient that influences growth). Inordinate levels of nitrogen and phosphorus exist in ecosystems subject to farm runoff, stormwater runoff, and emissions from wastewater treatment plants.

As you can probably guess, the cyanobacteria blooms that result are incredibly harmful to the ecosystems they dominate. The dense blooms decrease the amount of sunlight available to various phytoplankton, which are beneficial to their ecosystems, and the suppression of phytoplankton in turn harms the zooplankton and fish that depend on them. A decaying cyanobacteria bloom depletes its ecosystem of oxygen, subsequently killing fish and other aquatic life. Additionally, the toxins produced by certain cyanobacteria genera threaten the health of wildlife, pets, and humans.

Vermont, in response to the decline of water quality in Lake Champlain, developed a Total Maximum Daily Load for phosphorus in 2002, placing a cap on phosphorus inputs. This policy corresponds with the typical assumption that phosphorus input regulation is a be-all and end-all solution, placing no regulation on nitrogen inputs.

By examining the effect of different nitrogen to phosphorus ratios on the growth of cyanobacteria, my project attempted to determine whether it would be wise to implement policy in regards to nitrogen inputs as well. Through experimentation, I concluded that Anabaena, a genus of cyanobacteria found in Lake Champlain, experiences the most growth in a low nitrogen to phosphorus ratio (compared to an equal nitrogen to phosphorus ratio and a low nitrogen to phosphorus ratio). While the data reinforces the commonly held belief that phosphorus is the primary nutrient that influences growth, the results should not necessarily be taken at face value. Nitrogen's (continued on next page)

Rhode Island

Impacts of 1,2-Propanediol Effluent Discharge on Reproductive Rates and Dispersion Patterns of Anabaena inaequalis and Chlamydomonas reinhardtii



Nicolas Berg Bishop Hendricken High School Warwick, Rhode Island

1,2-Propanediol, more commonly known as propylene glycol, is a colorless and odorless hygroscopic liquid primarily used as deicing fluid on airplanes and in car engine systems. Airports are authorized under effluent discharge permits to release up to 40 percent of industrial glycols into nearby ecosystems in dilute concentrations. Some major airports dump more than 100,000 gallons (380 m³) of propylene glycol annually directly into aquatic ecosystems every winter. Regulations on glycol are primarily intended to limit its potential to cause hypoxic conditions and fish kills. Previous research has shown that enzymatic pathways (propanediol dehydratase, CoA-dependent aldehyde dehydrogenase, alcohol dehydrogenase, phosphate acetyltransferase) can allow glycol to be digested by even small amounts of bacteria extremely rapidly. This study examines how glycol affects the behaviors of photosynthetic, selectively heterotrophic microorganisms that are unable to use glycol as a carbon source.

Cultures of cyanobacteria (Anabaena inaequalis) and algae (Chlamydomonas reinhardtii) both grew at an extremely accelerated rate in the presence of propanediol, despite lacking the enzymes needed to metabolize the molecule. The cultures exhibited signs of heterotrophic behavior, such as reduced chlorophyll levels and altered buoyancy. Clumping distributions in experimental groups were altered as well. Biofilms formed in the cultures exposed to glycol much faster than in control groups, even prior to the ordinary quorum.

Because these cyanobacteria and algae are unable to metabolize glycol, further experimentation was conducted to uncover the cause of their explosive reproductive rates and odd behavioral patterns. 1,2-propanediol degrades spontaneously in the presence of dissolved oxygen into a multitude of products, and it breaks down even more rapidly when heterotrophic bacteria are present. New cultures were prepared in solutions of decomposed glycol, and levels of growth were compared to samples grown in unadulterated glycol. After one week of incubation, the samples inoculated in decomposed propanediol medium had reproduced about four times more than the samples grown in normal propanediol. (continued on next page)

Massachusetts

Utilization of Food Dyes as Photosensitizers for Enhanced Solar Disinfection of Water



Sangwon Cha (photo), Ji Yeon Kwon, and Jin Young Shin Lourus Academy Irvine, California

Conventional methods for disinfecting water, such as boiling, chlorination, filtration, and solar disinfection, possess limitations. Solar disinfection (SODIS) has recently received much attention, as it possesses an economical, practical, and sustainable advantage. SODIS primarily uses UV radiation and thermal heating to disinfect water. However, its efficiency is intrinsically limited, as UV light covers only a small portion of the solar spectrum. One way of enhancing the efficiency of SODIS would be to use a larger portion of the solar spectrum by making use of the visible light portion, and we propose that this could be achieved using dyes, specifically FDA-approved food dyes. For dye-enhanced SODIS, six food

dyes—Allura Red, Brilliant Blue, Erythrosine, Fast Green, Indigo Carmine, and Tartrazine—were investigated. Our first experiment used the six dyes to investigate the degree of photobleaching and amount of singlet oxygen production under visible light using the spectrophotometer. Results demonstrated that all dyes except for

New Hampshire

(continued from page 75) and calculates the lead content in the spot test sample. The color sensor captures the color characteristics before and after infrared exposure in pulses and transmits the data to the iPhone for accurate lead calculation. The iPhone app calculates the lead content based on prior calibration. This calibration was done by creating various spot test samples and by finding RGB variations of each sample due to infrared exposure. Linear relationships between the concentrations of each sample and the RGB variations were established and used in the iPhone app to yield the lead concentration.

Maine

(continued from page 75) is a magnesium atom. This larger presence of magnesium may suggest an increase in the photosynthetic ability in the mycorrhizal plants. This shows that not only are mycorrhizae effective at taking up phosphorus but that it may also result in an overall increase in the general health of the plant

that it may also result in an overall increase in the general health of the plant. The hope is to eventually implement mycorrhizal filters around rivers and detention ponds, and help to improve the quality of local water bodies. However, stormwater pollution is a global problem. These costeffective and natural filters could mitigate the effects of stormwater pollution worldwide and protect the Earth's precious waters. Future work will consist of testing the filter in situ.

Erythrosine showed no noteworthy change in relative absorbance, due to insufficient singlet oxygen production. In our second set of experiments, high-performance liquid chromatography was used to quantify and confirm singlet oxygen production, using furfuryl alcohol as the quencher for singlet oxygen. Results confirmed that Erythrosine was the only dye that produced singlet oxygen, consistent with our previous findings. Erythrosine displayed singlet oxygen production and photobleaching under all three light sources tested (UV-A, LED, and Xenon lamp), and both phenomena were most efficient under LED. The degree of virus inactivation was calculated, and more than 3-log inactivation (99.9 percent decrease in the number of pathogens) was seen under all three light sources, above the standard for which water is considered safe to drink.

Overall, the results demonstrate great potential for Erythrosine to improve the efficiency of SODIS for a sustainable, economical, practical, and effective method of water treatment.

Vermont

(continued from page 76) role may be smaller than that of phosphorus, but it should not be dismissed. There needs to be further experimentation that isolates the impact of nitrogen to determine the exact extent to which nitrogen promotes cyanobacteria growth. From those results it can be determined whether or not there needs to be a revision in how nutrients are regulated.

Rhode Island

(continued from page 76) Based on this experiment, the biochemical properties of glycol may require reevaluation before widespread discharge is permitted. If microorganisms can use the decomposition products of glycol, whether spontaneous or through a consortium with other microbes, the environmental implications are profound. This presents an entirely new carbon source to photosynthetic microbial life in aquatic environments. Events such as blooms, nuisance biofilm layers, and eutrophication are much more possible when local algae and cyanobacteria are given a new energy input.

This experiment could call for reassessment of how glycol is regulated as an effluent agent worldwide.



2017 Spring Meeting & Exhibit PROCEEDINGS



1. The bus load of attendees ready for their tour of the Woods Hole Oceanographic Institute 2. Cynthia Wigren, Atlantic White Shark Conservancy, treats the Monday breakfast crowd to intriguing information about sharks 3. Sunday in Falmouth was a perfect beach day 4. President Jim Barsanti poses with his family and their quests at the President's Reception 5. Kim Sandbach, Nora Lough, and Katelyn Biedron at the Tuesday evening reception and dinner 6. Lunchtime in the exhibit hall afforded time for networking and idea-sharing

SESSION 2 **STORMWATER 1: COASTAL RESILIENCE** AND FLOOD MITIGATION

Moderators:

 Jerry Potamis, Town of Falmouth, MA (retired)

Developing a Consensus-based Coastal Resiliency Strategy in Brewster, MA

 Geraldine Camilli, Horsley Witten Group Mark Nelson, Horsley Witten Group

Increasing the Coastal Resilience of Cape Cod and the Islands—Two Case Studies

- Anastasia Rudenko, GHD
- Marc Drainville, GHD

• Guy Campinha, Town of Wareham, MA

Assessing the Water Quality Impacts in a Tidal Embayment from the Closure of Proposed Tidal Barriers during 1-in-10year and 1-in-25-year Rainfall Events

- Richard Isleib, HDR
- James Fitzpatrick HDR • Nicholas Kim, HDR

SESSION 1

WATERSHED: PLANNING, RESTORATION AND CONTAMINANT IMPACTS Moderators:

he New England Water Environment Association held its Annual Spring

Massachusetts. Meeting registrants totaled 249. Registrants included

159 members, 29 non-members, 19 Operations Challenge participants,

Meeting on June 4–7, 2017, at the Sea Crest Beach Hotel in North Falmouth,

• Sara Greenberg, GHD

and 17 guests. The meeting also featured 25 exhibit booths.

- Jennifer Johnson, Nitsch Company
- Massachusetts Watershed-Based Plans—A New Web-Based Tool for Statewide Watershed Planning
- Robert Hartzel, Geosyntec Consultants A Worrisome Watershed—The Journey to Restore the Iconic Three Bays Estuary
- Zenas "Zee" Crocker, Three Bays Preservation, Inc., & Barnstable Clean Water Trust
- Surface Water Nutrient Impacts—Why So Variable?
- Andrew Thuman, HDR
- Richard Isleib, HDR

• Thomas Gallagher, HDR • Cristhian Mancilla, HDR

- Pharmaceuticals and PFASs In Coastal Estuaries on Cape Cod Impacted by Septic Systems
- Laurel Schaider, Silent Spring Institute
- Amy Costa, Center for Coastal Studies
- Patrick Phillips, Dana Kolpin, Edward Furlong, David Alvarez, U.S. Geological
- Survey
 - Rainer Lohmann, University of Rhode Island

- meeting with Committee Chairs was held on Sunday, June 4, with NEWEA President Jim Barsanti presiding.
- In addition to the Opening Session, there were seven technical sessions and one tour.

BREAKFAST & GENERAL OPENING SESSION

A full NEWEA Executive Committee

Moderator:

• Helen Gordon, NEWEA Program Committee Chair, Woodard & Curran Welcome

- Jim Barsanti, NEWEA President, Town of Framingham, MA Featured Speaker
- Cynthia Wigren, Atlantic White Shark Conservancy

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SESSION 3

STORMWATER 2: EMERGING TOOLS FOR STORMWATER MANAGEMENT AND RESILIENCY

Moderators:

Chris Miller, Town of Brewster, MA

Natural Resources Department



• Jennifer Doyle-Breen, AECOM

James Drake, CDM Smith

Porous Pavement Where? A Green Infrastructure Success Story in an Unlikely Place

Designing Dispersed, Small-Scale Green Infrastructure Systems for Stormwater Management in Dense Urban Residential Streets of Cambridge, MA Katie Friedman, Charles River Watershed

Association

Association **Emerging Tools for Communication** of Climate Change Impacts Towards Improved Resiliency

Looking Beyond the Levee: Nonstructural Flood Mitigation Alternatives Cynthia Baumann, CDM Smith • James Michel, Town of Greenwich, CT

Russell Parkman, Ramboll Environ

• Sott Turner, Nitsch Engineering, Inc.

• Julie Wood, Charles River Watershed

• David Roman, Geosyntec Consultants Andrea Braga, Geosyntec Consultants

Soaking Up the Rain in Our Backyards-Challenges of Achieving Water Quality Goals in A Suburban Community

- Elisabeth Cianciola, Charles River Watershed Association
- Pallavi Mande, Charles River Watershed Association
- Kate Sjoberg, Town of Franklin, MA
- Shawn Mayers, groundSwell Designs

SESSION 4 **PUBLIC EDUCATION: PUBLIC** ENGAGEMENT FOR A SUSTAINABLE FUTURE

Moderators:

• Ken Carlson, Woodard & Curran • Amy Anderson, ARCADIS

The Public Aspect of Private Inflow Removal—The Development and Implementation of a Private Inflow **Removal Program**

- Marina Fernandes, CDM Smith
- Nicholas Rystrom, City of Revere, MA
- Kara Johnston, CDM Smith



1. Charlie Tyler enjoying Virgil Lloyd's 12-string Guild 2, Jim Barsanti and Steve Small treated the open mike audience to some classic songs 3. Neal and Elena Proakis-Ellis, perform as "Polyethylene" at the Sunday open mike 4. Helen Gordon joined Janine Burke-Wells in a spirited rendition during the Sunday open mike

Get Inspired on How to Grow Awareness Among the Public and Decision Makers about the Value of Water (An Interactive Presentation on the Value of Water Tool Kit)

• Katelyn Biedron, CDM Smith

NPDES Permit Delegation for Massachusetts—Is It the Right Move or the Right Time?

• Paul Hogan, Woodard & Curran

Community Resiliency Assessments: A New Application for Climate Change Risk Management Developed for the Hunts Point Neighborhood in the Bronx, New York City

- Julie Stein, HDR
- Louise Yeung, NYC Economic Development Corporation
- Jessica Colon, NYC Mayor's Office of Resiliency and Recovery

SESSION 5 COLLECTION SYSTEMS 1: REHABILITATION AND TECHNOLOGY Moderators:

• Tom Loto, Kleinfelder • Scott Naiva, Milliken Infrastructure Solutions

Interceptor Sewer Rehabilitation in Rockland County, New York

• Tom Perry, Multi Utilities Ventures The City of Nashua Decreases CSOs with Trenchless Rehabilitation and Green Infrastructure

- Nick Ellis, Hazen and Sawyer
- Joe Mandola, City of Nashua, NH The Big Data Behind the Flush—How the City of Portland, ME Collects,

Manages and Analyzes Their Wastewater Collection System Asset Data • Jessica Gooch, City of Portland, ME

A Mobile App to Evaluate and Categorize Maintenance for Residential Sewer Grinder Pumps

- Michael Vosnakis, Town of Chelmsford. MA
- Aileen Murphy, Weston & Sampson • Henry Albro, F.R. Mahony & Associates

SESSION 6

COLLECTION SYSTEMS 2: RESPONDING TO COASTAL AND ODOR CONTROL CHALLENGES

Moderators:

• Scott Lander, Retain-It Matt Brown, ADS Environmental Services

Falmouth Case Study: Traditional Engineering Solutions Become the Cornerstone of Adaptive Management Strategy

• Sandra Tripp, GHD

• Amy Lowell, Town of Falmouth, MA DPW

Impacts and Identification of Tidal Intrusion Sources in Manchester-by-the-Sea's Wastewater Collection System • Steve Landry, Tata & Howard

- James Hovt, Tata & Howard

• Allison Shivers, Tata & Howard

Variations in Hydrogen Sulfide

Concentrations in a Wastewater Pumping Station With An Odor Control System Mohamed Hamoda, Kuwait University

An Economical, Low-Impact Wastewater Collection System

• Garry-Lee Espinosa, Orenco Systems

SESSION 7 SUSTAINABILITY AND ENERGY-FROM **BIOGAS REUSE TO PUMP EFFICIENCY**

Moderators:

• Jessica Dzwonkoski, JK Muir, LLC Nick Ellis, Hazen and Sawver

Biogas Reuse and Nutrient Removal from Anaerobic Centrate via Microalgal Assimiliation

- Nihar Mohanty, University of Massachusetts Lowell
- Dingnan Lu, University of Massachusetts Lowell
- Jackie Zhang, University of
- Massachusetts Lowell

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- Resilience, Water, and Tools • Roya Rezaee, Perkins+Will

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TOUR

A tour of the Wood Hole Oceanographic Institute took place on Tuesday, June 6. Attendees participated in a guided walking tour of the facility with an option to explore the Ocean Science Exhibit Center.

1. Nihar Mohanty speaks regarding biogas and nutrient removal in microalgae research 2. Jessica Dzwonkoski introduces a speaker in the Sustainability and Energy session 3. Steve Landry presents on tidal intrusion detection 4. Mark Nelson listens as Ed Whatley poses a question during a presentation on microconstituents 5. The educational technical sessions were well-attended

Hidden Threats—Inefficiencies and Vulnerabilities in Anaerobic Digestion (AD) and Combined Heat & Power (CHP)

• Matthew Williams, WesTech Engineering,

 Brian Mitchell, WesTech Engineering, Inc. • Rachelle Tippetts, WesTech Engineering,

 Andrew Bennett, Perkins+Will Mark Smith, The Nature Conservancy

Pump Efficiency and System Optimization • Benjamin Stevens, A.W. Chesterton

OPERATIONS CHALLENGE

Operations Challenge Committee: Travis Peaslee, Chair; Scott Goodinson, Vice Chair

Operations Challenge was held on Tuesday, June 6. Four teams participated in the competition:

Connecticut – Franken Froggers: Jason Nenninger (Captain), Christopher Findley, Dan Sullivan, Dan Wolff

Maine – Force Maine: Alex Buechner (Captain), Riley Cobb, Dan Laflamme, Scot Lausier

New Hampshire – Seacoast Sewer Snakes:

Michael Carle (Captain), Patty Chesebrough, Dustin Price, Mike Tibbetts

Rhode Island – Ocean State Alliance: Eddie Davies (Captain), Peter Hassel, Tyler Ippi, Russ McGinnis, Pete Rojas, Kim Sandbach



1. Tristin O'Connor and Deb Primeau Mahoney converse with Joe Boccadoro 2. 5-S inductees enjoy a laugh during the induction ceremony: (L-R) Geri Ciardelli, Paul P. Casey, Amy Anderson, Mike Bisi, Ginny Roach 3, Attentive listeners to a presentation on nutrients in groundwater 4. Russ Adams signs Mike Bisi's 5S certificate as Scott Haynes, Mr. Bisi, and Virgil Lloyd look on

The Operations Challenge Awards Reception was on Tuesday, June 6, at 4:00 PM. Committee Chair Travis Peaslee and each event coordinator, assisted by NEWEA President Jim Barsanti. presented trophies to the winning teams of each event and to the overall first-, second-, and third-place winning teams. The results of the competition are reported as follows:

First Place Individual Events:

- Process Control Rhode Island
- Safety Rhode Island
- Collection Systems Rhode Island
- Laboratory Rhode Island
- Pump Maintenance Rhode Island

Overall Competition:

- Third Place Connecticut
- Second Place Maine
- First Place Rhode Island

During the reception, it was announced that NEWEA would support the first-, second-, and third-place teams in the 2017 WEF National Operations Challenge competition to be held in Chicago, Illinois in October.

Event Coordinators:

- Process Control Paul Dombrowski, Michael Harris
- Safety André Brousseau
- Collection Systems Michael Armes
- Laboratory Marylee Santoro
- Pump Maintenance Nate Melanson

Scorekeeping:

- Overall Travis Peaslee, Scott Goodinson Judges:
- Process Control Operations Challenge Committee
- Safety Nate Melanson, Jason Swain,
- André Brousseau
- Collection Systems Tim Vivian, Mike Armes
- Laboratory Marylee Santoro, Margie Bower, Nora Lough, Walter Palm, Jim Galasyn, Andy Fish, Phyllis Rand • Pump Maintenance — Nate Melanson, Jason Swain, André Brousseau, Scott Goodinson

Miscellaneous:

- Trophies Joseph Kruzel, Michael Burke
- Shirts Daniel Marks

SELECT SOCIETY OF SANITARY **SLUDGE SHOVELERS**

- During the Monday evening reception, Influent Integrator Charles W. Tyler inducted eight new members into the Select Society of Sanitary Sludge Shovelers:
- Amy Anderson
- Kate Biedron
- Mike Bisi
- Paul P. Casey
- Geri Ciardelli
- Bob Fischer Peter Goodwin
- Ginny Roach

MISCELLANEOUS

A variety of committee meetings were held throughout the Spring Meeting. The Tuesday evening reception and dinner as well as the Annual Spring Meeting Golf Tournament was held at the Sea Crest Beach Resort. Attending spouses and guests enjoyed a number of recreational and social activities during the meeting.

1. Force Maine performs in the Collections event: (L-R) Alex Beuchner, Scot Lausier, and Dan Laflamme (missing from photo; Riley Cobb) 2. New Hampshire Sewer Snakes: (L-R) Dustin Price, Mike Carle, Patty Chesebrough, and Mike Tibbetts 3. Connecticut's Franken Foggers: (L-R) Chris Findley, Jason Nenninger, Gary Zrelak, Dan Wolff, Dan Sullivan 4. Ocean State Alliance: (L-R) Peter Rojas, Kim Sandbach, Tyler Ippi, Eddie Davies, Peter Hassel, Russ McGinnis

MEETING PLANNERS

- Conference Arrangements Ron Tiberi
- Program Helen Gordon
- Registration NEWEA Staff
- Operations Challenge Travis Peaslee
- Guest Program Joy Lord
- Golf Tournament Peter Kibble

MEETING MANAGEMENT

• Director – Elena Proakis Ellis • Sponsors – Dennis Vigliotte

EXHIBITORS

ADS Environmental AP/M Permaform BETA Group, Inc. CSL Services, Inc. CUES Duke's Root Control. Inc. EST Associates, Inc. Flow Assessment Services LLC HACH IPEX USA LLC Lystek International Mechanical Solutions Orenco Systems, Inc.

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Upcoming Meetings & Events

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Managing Residuals in a Complex World The Northeast Residuals & Biosolids Conference Oct. 25–27, 2017 • Burlington, VT



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NEWEA 2018 Annual Conference & Exhibit January 21 – 24, 2018 **Boston**, MA

JOINT STORMWATER CONFERENCE-MEWEA AND NE STORMWATER COLLABORATIVE October 23 – 24, 2017 Holiday Inn. Portland, ME

NORTH EAST RESIDUALS & BIOSOLIDS CONFERENCE October 25 – 27, 2017 Hilton, Burlington, VT

POO & BREW #11 November 2, 2017 Hampton, NH WRRF/Smuttynose Brewing Co.

NO WATER NO BREW November 8, 2017 Champlain Water District/ Switchback Brewing Co., Burlington, VT

EXECUTIVE COMMITTEE MEETING WITH ALL CHAIRS January 21, 2018 Boston Marriott Copley Place Hotel, Boston, MA

NEWEA ANNUAL CONFERENCE & EXHIBIT January 21–24, 2018

Boston Marriott Copley Place Hotel, Boston, MA ASSET MANAGEMENT AND ENERGY

CONFERENCE April 11-12, 2018 Merrimack, NH

NATIONAL WATER WEEK - DC FLY-IN April 16, 2018 Washington DC

AFFILIATED STATE ASSOCIATIONS AND OTHER EVENTS

GMWEA FALL TRADE SHOW & CONFERENCE November 9, 2017 Sheraton Conference Center, Burlington, VT

NHWPCA WINTER MEETING December 8, 2017 Newmarket WWTF Newmarket, NH

This is a partial list. Please visit the state association websites and NEWEA.org for complete and current listings.



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New Members June – September 2017

Brian Baumgaertel Barnstable Dept. of Health & Environment Barnstable, MA (PRO)

Zachary P. Donahue Sturbridge, MA (YP)

Joshua A. Earnest Sturbridge, MA (YP)

Wayne E. Johnson Sturbridge, MA (PWO)

Walter Chaffee Geocomp Corporation Acton, MA (PRO)

Christopher Hack King Gage Engineering Mendon, MA (PRO)

Carrie Lewis Portland Water District Portland, ME (PRO)

Paul Frazier MFN Regional Wastewater District Providence, RI (PWO)

Christopher Petrone Narragansett, RI (PWO)

Tess Laffer Daytona Beach, FL (STU)

Catherine Moskos Boston, MA (STU)

William Roseberry Sterling, MA (STU)

Erika Towne Boston, MA (STU)

Ashley Hammond Hazen and Sawyer Boston, MA (YP)

Dong Yu Hartford, CT (STU)

Chelsea Mandigo South Hero, VT (PWO) Gary Simpson Acton, MA (YP)

Meghan Trahan Nashua, NH (YP)

Shelby Basel CDM Smith Providence, RI (YP)

Michael Hanlev Attleboro, MA (YP)

Robert Drake Beta Group Inc Lincoln, RI (PRO)

Jenna Calvi Burlington Dept. of Public Works Burlington, VT (YP)

Don Wuerdeman Hollis, NH (PRO)

Martin Lee Burlington Dept. of Public Works Burlington, VT (YP)

Thomas Simbro Wright Pierce Topsham, ME (PRO)

Virginia Adams Framingham, MA (STU)

Seth Macdonald Arcadis Wakefield, MA (YP)

Sandra Petrakis Framingham, MA (YP)

Alisa Feilhauer Swansea, MA (STU)

Jack Habzda CDM Smith Boston, MA (YP)

Ashley Chang Deerfield, MA (STU)

Christian Haupt West Haven, CT (STU) Christian Ramos Stratford, CT (STU)

Connor Li Cos Cob, CT (STU)

David Rubin Bangor, ME (STU)

Elizabeth Parkinson North Attleboro, MA (STU)

Jin Young Shin Windsor, CT (STU)

Julia Todeasa Orange, CT (STU)

Kate Yuan Woodbridge, CT (STU)

Keri Tenerowicz Bethany, CT (STU)

Luca Barcelo Greenwich, CT (STU)

Meghana Avvaru Nashua, NH (STU)

Mei Tian Bangor, ME (STU)

Michelle Xiong Riverside, CT (STU)

Mitchell Green Foxborough, MA (STU)

Morgan Jones Bangor, ME (STU)

Ryan Murray Westfield, MA (STU)

Sangwon Cha Byfield, MA (STU)

Wongeun Park Wilbraham, MA (STU)

Nicholas Bosonetto City of Lowell, MA Lowell, MA (PRO)

Fred Lybrand East Walpole,

Kattie M. Collir Wright-Pierce Portland, ME (

Edward Whatle Providence, RI

Adam McNair Tighe & Bond, Worcester, MA

Adam Hess Boston, MA (P

Jordan Heath City of Portland Portland, ME (

Larry Scola Gardner, MA (

Jaimye Bartak Springfield Wa Commission Springfield, MA

Molly Welsh Jamestown, RI

Gisele Trivino AECOM Chelmsford, MA (YP)

William Paulitz, City of Peabody

Peabody, MA (PRO)

Adam Korabowski, North Brookfield Sewer Department North Brookfield, MA (PWO)

Laura Nolan Kleinfelder Westborough, MA (YP)

Trine Stausgaard Munk Cambridge, MA (YP)

Ralph Guevarez, Watts Water Technologies North Andover, MA (PRO)

MA (EXEC)	Hariharan Vasupuram Opti Boston, MA (PRO)
PRO)	Justin Hines Cambrian Innovation Watertown, MA (YP)
I (PRO)	CJ Spellman Rocky Hill, CT (STU)
, Inc. A (YP)	Bryanna Dague FTL Labs Corp. Amherst, MA (STU)
RO)	Gabriel Varca Greater New Haven WPCA, New Haven, CT (PRO)
YP)	Mark Brown Canandaigua, NY (DUAL)
PRO)	
, ater & Sewer	
A (PRO)	
I (STU)	

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onsider what you're good at or jump into a new area and start building your skills. Worried about over-committing? Based on a recent survey, members spent on average two hours a month on their NEWEA volunteer work! Choose from one of more than 44 active committees—from technology and process, communications and outreach, meeting and event planning, or leadership and ad hoc. For more information please visit newea.org.

NEWEA Committees

COLLECTION SYSTEMS/ WATER RESOURCES

Director: John Digiacomo

- Collection Systems Certification
- Collection Systems
- CSO/Wet Weather Issues
- Industrial Wastewater
- Stormwater
- Sustainability
- Water Reuse
- Watershed Management

TREATMENT, SYSTEM OPERATIONS, AND MANAGEMENT

- Director: Marylee Santoro • Asset Management
- Energy
- Laboratory Practices
- Microconstituents
- Operations Challenge
- Plant Operations
- Residuals Management
- Small Community
- Utility Management

MEETING MANAGEMENT

- Director: Elena Proakis Ellis
- Conference Arrangements
- Exhibits
- Manufactures' Representative
- Program
- Registration

COMMUNICATION

Director: Jennifer Lachmayr

- Journal
- Media Relations
- Newsletter
- Public Awareness
- Website

MANAGEMENT REVIEW

Past President: Raymond Willis III

- Assessment and Development
- Awards
- Bylaws
- Committee Member Appreciation
- Nominating
- Sponsor

OUTREACH

- Director: Jonathan Kunay
- Government Affairs
 - Humanitarian Assistance and Grants
 - Membership
 - Project Delivery Alternatives
- Public Education
- Safety
- Scholarships
- Student Activities
- Water for People
- Young Professionals

AD-HOC

Vice President: Raymond Vermette
• Utility Council



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NEWEA/WEF^{*} Membership Application 2017

Personal Information Last name Business Name (if applicable) Street or P.O. Box City, State, Zip, Country Home Phone Number Mobile Phone Number Email Address □ Check here if renewing, please provide current member I.D. *NEWEA is a member association of WEF (Water Environment Federation). By joining NEWEA, you also become a member of WEF. **Employment Information (see back page for codes)** 1. ORG Code: Other (please specify): 3. Focus Area Codes: Signature (required for all new memberships) **Sponsorship Information** WEF Sponsor name (optional) Membership Categories (select one only) Professional Package Individuals involved in or interested in water Young Professional New members or formerly student members of experience in the industry and less than 3 Package package is available for 3 years. Professional Wastewater Individuals in the day-to-day operation of wa treatment or laboratory facility, or for facilities **Operations (PWO)** mgd or 40 L/sec. Package Academic Package Instructors/Professors interested in subjects Students enrolled for a minimum of six credit Student Package college or university. Must provide written de letterhead verifying status, signed by an adv Upper level managers interested in an expa Executive Package products/services. If you are already a member of WEF and wis □ Dual Corporate Membership Companies engaged in the design, construct management of water quality systems. Desi (member benefits for one person) contact New England This membership category is a NEWEA only Agencies, including: USEPA Region 1, CT De **Regulatory Membership** Environmental Protection, MA Department of WEF Utility Partnership Program (UPP): NEWEA participates in the WEF Utility Partnership Program (UPP) that supports utilities to join WEF and NEWEA while Payment Canal

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NEWEA/WEF* Membership Application 2017





To help us serve you better, please complete the following: (choose the one that most closely describes your organization and job function) *NEWEA is a member association of WEF (Water Environment Federation). By joining NEWEA, you also become a member of WEF.

What is the nature of your ORGANIZATION?

(circle one only) (ORG)

Municipal/district Water and Wastewater Plants and/or Systems

2 Municipal/district Wastewater Only Systems and/or Plants

3 Municipal/district Water Only Systems and/or Plants

4 Industrial Systems/Plants (Manufacturing, Processing, Extraction)

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10 Water/Wastewater Product Distributor or Manufacturer's Rep.

11 Stormwater (MS4) Program Only

Public Financing, Investment Banking

13 Non-profits (e.g., Trade, Association, NGO, Advocacy, etc.)

> 99 Other _____ (please specify)

Optional Items (OPT)

Years of industry employment? _____ 1 (1 to 5) 2 (6 to 10) 3 (11 to 20) 4 (21 to 30) 5 (>30 years)

> Gender?_____ 1 Female 2 Male

What is your Primary JOB FUNCTION?

(circle one only) (JOB)

1

1. Upper or Senior Management (e.g., President, Vice President, Owner, Director, Executive Director, General Manager, etc.)

2

Engineering, Laboratory and Operations Management (e.g., Superintendent, Manager, Section Head, Department Head, Chief Engineer, Division Head, Landscape Architect etc.,)

3

Engineering and Design Staff (e.g., Consulting Engineer, Civil Engineer, Mechanical Engineer, Chemical Engineer, Planning Engineer, Landscape Architect, Environmental/ Wetland Scientist etc.)

£.

Scientific and Research Staff (e.g., Chemist, Biologist, Analyst, Lab Technician, Environmental/Wetland Scientist etc.)

5

Operations/Inspection & Maintenance (e.g., Shift Supervisor, Foreman, Plant Operator, Service Representative, Collection Systems Operator, BMP Inspector, Maintenance, etc.)

6

Purchasing/Marketing/Sales (e.g., Purchasing, Sales Person, Market Representative, Market Analyst, etc.)

7 Educator (e.g., Professor, Teacher, etc.)

> 8 Student

9

Elected or Appointed Public Official (Mayor, Commissioner, Board or Council Member)

> 10 Other _____

Education level? (ED) _

1 High School 2 Technical School
3 Some College 4 Associates Degree
5 Bachelors Degree
6 Masters Degree 7 JD 8 PhD

Education/Concentration Area(s) (CON)

2 Biological Sciences 3 Engineering Sciences 4 Liberal Arts 5 Law 6 Business What are your KEY FOCUS AREAS?

(circle all that apply) (FOC)

Collection Systems

2 Drinking Water

Industrial Water/Wastewater/ Process Water

> 4 Groundwater

5 Odor/Air Emissions

6 Land and Soil Systems

Legislation

(Policy, Legislation, Regulation)

8 Public Education/Information

9

Residuals/Sludge/Biosolids/Solid Waste

10 Stormwater Management/ Floodplain Management/Wet Weather

> **11** Toxic and Hazardous Material

12 Utility Management and Environmental

> **13** Wastewater

14 Water Reuse and/or Recycle

15

Watershed/Surface Water Systems

16

Water/Wastewater Analysis and Health/ Safety Water Systems

> 17 Other _____



Water quality professionals, with fewer than 5 years working experience and under the age of 35, are eligible to join WEF as an Active Member, while

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