JOURNAL

OF THE NEW ENGLAND WATER ENVIRONMENT ASSOCIATION

VOLUME 47 NUMBER 3 | ISSN 1077-3002 **FALL 2013**

STORM SURGE

Springfield rehabilitates sewer main critical to collection system and at risk for failure

Innovative approach in Nashua meets CSO requirements while minimizing costs

Ogunquit seeks long-term solution to wastewater treatment in anticipation of rising sea levels

New England storm water collaborative launched

Grit removal comparison reveals benefits of advanced, compact, high-efficiency systems

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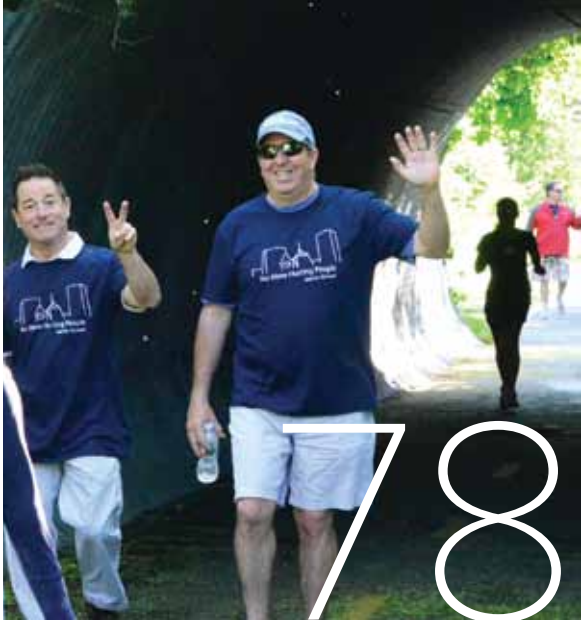

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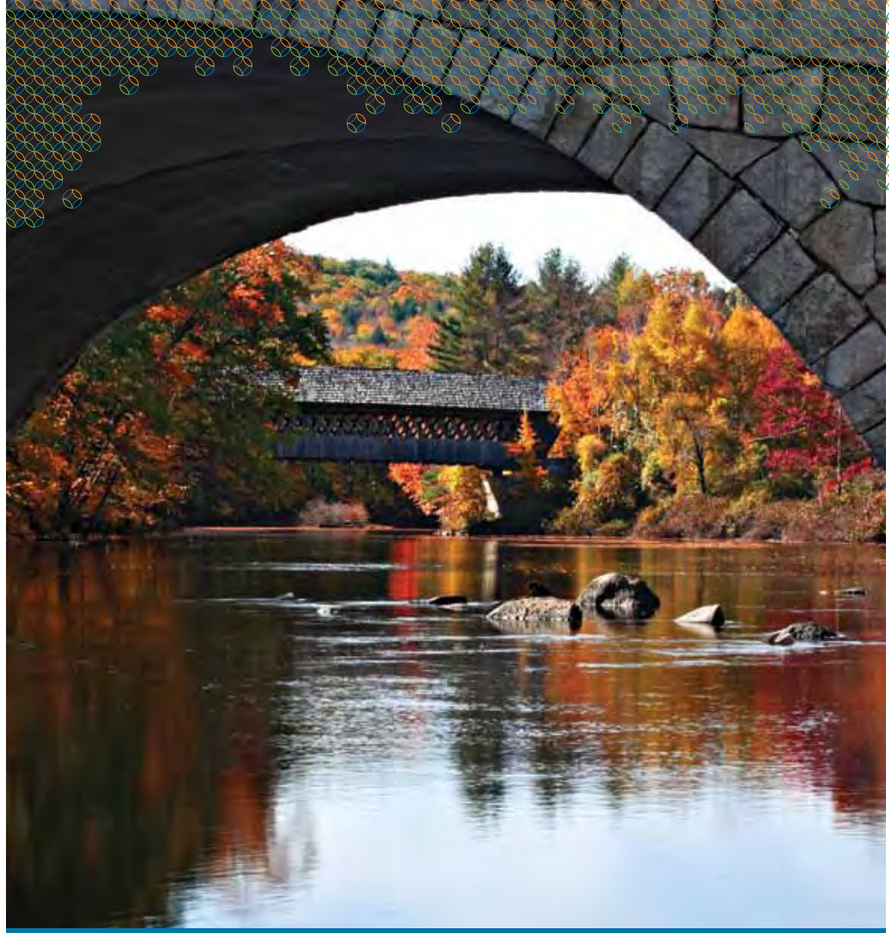

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MEMBERSHIP

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Join us

OUR ASSOCIATION WAS ORGANIZED EIGHTY FOUR 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:

A 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.

An 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.

A 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.

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

A 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.

A 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.

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

2013 RATES

Professional	$126.00
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BECOME A NEWEA MEMBER TODAY:

- Complete and mail the membership application form on pages 67–68
- Download a membership application from **newea.org** by clicking How Do I Join?
- Join online at **wef.org** by clicking Become a Member

Water Environment Federation
Preserving & Enhancing the Global Water Environment

New England Water Environment Association | Statement of Ownership, Management and Circulation

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President's Message
Water's Worth It

Dear NEWEA Member,
We have enjoyed another beautiful fall in New England this year, and I've been most fortunate to travel throughout the region to various state association events during this time. As we leave this glorious season and transition into winter, we recognize another transition that we too at NEWEA will experience. Our executive director, Elizabeth Cutone, has announced her retirement in June 2014.

As I have said to many people, there is no replacing Elizabeth. Her experience, people skills, knowledge of NEWEA, ability to juggle the many events and initiatives as well as her 23 years of dedicated service is not replaceable. We will begin a search for a new executive director, but it will be different. Change is an inevitable fact of life. NEWEA will survive this change and will continue to thrive and be the terrific organization I have witnessed and been part of these past 11 years. The change for Elizabeth will allow her to be a full-time mother. The good news is we have Elizabeth until this June so that gives us plenty of time to plan a party, but shhhh, it will be a surprise.

Technical excellence is one reason NEWEA is relevant, a leader, attracts and retain members, and is at the center of water environment issues in New England. One such issue is non-flushables. NEWEA members have worked diligently with WEF and INDA to educate and advocate for change. At the heart of this issue is the problem of wipe products (baby wipes, etc.) that are not dispersible and cause pump fouling, premature failure and extra cost to wastewater collection and treatment system maintenance. While there is no agreement yet by the industry to change manufacturing standards and no regulations yet requiring change, the efforts are getting noticed by media outlets throughout the country. Keep up the good work Utility Management Committee and Non-Dispersibles Task Force!

Stormwater is another significant issue that affects all municipalities and water resource management. Drinking water supply, wastewater collection system and treatment, and public works are all affected by stormwater issues. Recognizing the significance of stormwater management, the leadership of NEWEA, New England Water Works Association (NEWWA) and the New England Chapter, American Public Works Association (NE APWA) have held several meetings and through a Memorandum of Understanding (MOU) have created a New England Stormwater Collaborative.

Although we are still in the formative stages of this collaborative, a mission statement has been set that establishes the goals to:

- Engage the stormwater community
- Provide the forum for information and education exchange
- Advocate the realm of stormwater

A complete copy of the Stormwater Collaborative mission can be found on page 52 of this *Journal*.

Through our Government Affairs Committee, NEWEA has established legislative events in each New England state as well as an annual legislative breakfast in Washington D.C. These events help create a forum for dialogue between NEWEA members and the legislators and regulators on the need for continued investment in and attention to wastewater management issues. Our members are recognized for their technical knowledge and experience, and we continue to be the "go-to" resource for education and information. Thank you to all who have participated and led these important state and federal events. If you have never attended a Washington D.C. legislative breakfast you need to do this at least once to experience walking the halls of Congress and meeting with our legislators on issues where you are the expert. It is a rewarding experience. The state events are also important, and I encourage all NEWEA members to get involved and attend the event in at least your home state.

Our Awards Committee does a terrific job every year recognizing the contributions of those that have gone "above and beyond" within our New England region. Nationally, WEF has its award ceremony every year at WEFTEC. John Hart, Saco, Maine, has been a long-time contributor to NEWEA and WEF, serving as vice chair and chair of numerous WEF committees. John recently concluded his three years of service on the WEF Board of Trustees and indicated he will likely retire from WEF service. Many thanks, John, for all you have done! A shout out of congratulations goes to NEWEA members and 2013 WEF Award recipients Gary R. Johnson (Environmental Operating Solutions), Ray Vermette (Dover, N.H.), and Robert Marini (CDM Smith, retired). Gary, along with co-authors James Thurrott and Manjiang (MJ) Chen, was awarded the Gascoigne Wastewater Treatment Plant Operational Improvement Medal for the article: "Optimizing Low-Level Nitrogen Removal," Water Environment & Technology, June 2012. Ray Vermette was a winner of the 2013 WEF Operator Ingenuity Contest for two of his innovative solutions to challenges at the Dover facility. Retired member Bob Marini received the WEF Fellows award in recognition of his contribution to the water environment during his long and productive career. Congratulations Gary, Ray and Bob on being recognized for your technical excellence!

Drinking water supply, wastewater collection system and treatment, and public works are all affected by stormwater issues.

A note of thanks to all those who put together the fall 2013 NEWEA Specialty Seminars. These include Emergency Preparedness, jointly sponsored with NEWWA; Wet Weather Issues/CSO; Small Community, jointly sponsored with CT LabACT; and Biosolids, jointly sponsored with NEBRA. Much planning and committee work goes into these events, and the committee's efforts are very much appreciated.

Finally, our Public Awareness initiatives. Waters Worth It continues to be our theme nationally (WEF) and regionally (NEWEA), and our Public Awareness Committee continues to lead our efforts. Together with your help the committee is developing Op Ed pieces, advocating for education at the grammar and high school levels, and promoting political and public awareness for continued infrastructure investment. We did have disappointing news from WEF when we learned an agreement could not be reached with the Ad Council on a national "Waters Worth It" campaign. There is, however, a silver lining. As a result of the collaborative efforts of many water-related organizations and companies, a Voice of Water Coalition was formed that will continue to promote our message. As we learn more, we will pass the information on to you, our members.

I look forward to seeing you in January at the Annual Conference. The cappuccino is on me!

Mike Bonomo
2013 NEWEA President

Stormwater Collaborative mission begins on page 52

NEWEA
WORKING FOR WATER QUALITY

From the Editor

View NEWEA's Climate change position paper at newea.org/Resources/GovernmentAffairs

When you open this quarter's *Journal* you may think that the topics are disparate. I would invite you to consider how they are intertwined. From the moment we begin to discuss infrastructure in the Northeast, let alone throughout the nation, we know we are dealing with multiple deficits: funding, time and personnel. We are essentially running out of each. As an industry, we must simultaneously balance infrastructure replacement with infrastructure protection on the climate-change and sea-level-rise front. These complex overlapping challenges can become daunting; read how our industry is dealing with these challenges in two of our four feature articles.

In 2009, NEWEA ratified a position paper on "Climate Change and Water Resources." This position paper was updated in 2010, and I imagine we will continue to further update it in the coming years. The water industry has a major challenge. Our facilities in some cases date back to the 1800s, and if dealing with funding infrastructure upgrades isn't enough, now we have to deal with pending climate change and sea level rise. Based on the science we can no longer deny that climate change and sea level rise are both an immediate and long-term reality. I encourage you to read the article highlighting how the community of Ogunquit, Maine, is dealing with its infrastructure located in a Coastal Sand Dune System. You may be surprised. As we learn more in our profession, it has become evident that success for utilities is the ability to leverage current assets (infrastructure) with limited funds and added regulations. Since we in our profession are working with the physical nature of our environment we must become adaptive to change and open to innovation. The answers for yesterday's problems are no longer the answers for today's. I invite you to read the feature article about how Springfield rehabilitated its aging infrastructure, reducing liability risk and saving money at the same time.

In our Spring 2012 *Journal* we presented one project —the Nashua CSO Long Term Control Plan of 2003—that discussed the planning and installation of a slide gate to throttle flow and induce in-system storage upstream. In this *Journal* see how that plan has progressed and read about the plan's capstone project, a screening and disinfection facility under construction.

Our goal on the Journal Committee is to provide technical articles to facilitate the exchange of knowledge throughout our profession. Our fourth paper presents a comparative look at grit removal technologies (AGB, vortex grit removal systems, and detritus tanks). The goal of the paper is to help owners and engineers select grit removal technologies by identifying a consistent peer-reviewed test standard for grit sampling and analysis.

Helen T. Gordon,
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I take this opportunity to thank my Journal Committee colleague, James Barsanti, who served as associate editor for this issue. Over a number of months Jim identified appropriate topics and worked with the article authors as they refined their documents for the *Journal*.

I also want to thank the *Journal* advertisers for your continued support during this challenging time of rebranding for the association. Your understanding is much appreciated concerning the impact of these changes on the timeliness of the *Journal*s for 2013. As important as it is to keep up with the times and change, our commitment to our members must be our priority. We have spent most of 2013 with coordination of the new layout. The team is confident we are back on schedule.

Please also read some of our standard topic areas, including NEBRA Highlights, State Director Reports and NEWEA events.

I would like to wish the entire NEWEA staff and NEWEA Members a healthy and happy holiday season.

Helen Gordon
Journal Committee Chair and Editor

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March 20, 2013

Industry News

New England leaders convene to help communities prepare for climate change challenges

by David Deegan, EPA Region I News Release

Answering the challenge in President Obama's Climate Action Plan, the U.S. Environmental Protection Agency (EPA) is spearheading a regional response to identify and launch actions to help New England communities become more resilient to climate change. Along with the six New England states, the Consensus Building Institute, Johnson & Wales University and the New England Interstate Water Pollution Control Commission (NEIWPCC), EPA held a Climate Leaders' Summit on Nov. 8, 2013, at Johnson & Wales University in Providence, R.I.

While all New England communities will likely be affected by increasing severe weather events, fewer than 10 percent have adaptation efforts underway. Regional leaders representing the private and non-profit sectors, interstate organizations, and local, state and federal governments are committing to identify and develop systemic solutions to help New England improve resiliency before the next big storm. Quotes from the attendees at the Climate Leaders' Summit are noted below.

"As climate change continues to contribute to sea level rise and load the dice for more powerful storms, coastal New England homes and businesses will face increasing risk of damage," said U.S. Senator Sheldon Whitehouse, a lead advocate in the Senate for addressing climate change and cofounder of the Bicameral Task Force on Climate Change. "We must proactively work to bolster our coasts' natural defenses and make our communities more resilient to the harmful effects of climate change. I applaud EPA for convening this group of leaders from the region so we can work together to address this issue head on."

"Climate change is a reality, and we must face this challenge together," said Curt Spalding, regional administrator of EPA's New England regional office. "Like all environmental challenges, the impacts of climate change won't stop at political or geographic boundaries. We are committed to working together to overcome existing barriers, and develop high-level, systemic solutions."

"With more severe and extreme weather on the horizon we must take action to reduce the toll that changes in climate could take on our region," said Commissioner Daniel C. Esty of Connecticut's Department of Energy and Environmental Protection. "The storms of the past few years make clear the need to work closely with our communities on effective steps to protect property, infrastructure such as roads, rail lines, government facilities, and wastewater treatment plants as well as valuable natural resources."

"Maine's economy is intertwined with our natural resources and they rely on the 'built infrastructure' functioning properly," said Maine Department of Environmental Protection Commissioner Patricia Aho. "Our economic reliance on our built and natural resource environment means that decision-makers must address vulnerabilities and prepare for severe weather events. By bringing together key people, we can take next steps to develop specific tools, coordinate and recommend appropriate strategies, and identify potential challenges for natural resource and infrastructure decision-makers."

"When Governor Patrick announced that climate change adaptation is one of my office's top three priorities for the remainder of his term, he stressed that forming partnerships across all levels of government will be essential in meeting the coming challenges," said Massachusetts' Executive Office of Energy and Environmental Affairs (EOEEA) Secretary Rick Sullivan. "I am pleased that EPA is bringing together leaders from throughout the region to make sure we're all better prepared, and look forward to utilizing the tools developed at the Climate Summit to assist Massachusetts communities in creating a safer commonwealth."

"The New Hampshire Department of Environmental Services is working with communities across the state to help them better prepare for the "new normal" conditions that we have been experiencing due to climate change. By using existing planning tools communities can identify vulnerable infrastructure in their hazard mitigation plans and use their capital improvement plans to phase in necessary upgrades. This proactive planning will help New Hampshire communities become more resilient and reduce the expense of recovering from extreme weather events in the future," said Commissioner Tom Burack of the New Hampshire Department of Environmental Services.

"Climate change is one of the biggest challenges we face when it comes to ensuring the health and resilience of our natural resources, infrastructure and quality of life," said Rhode Island Department of Environmental Management Director Janet Coit. "Kudos to EPA for bringing together partners from across New England at today's summit to develop an action plan that will address the impacts of climate change on our region."

"In Vermont, we have learned from our experience responding to Tropical Storm Irene that collaboration by local, regional, state and federal governments is critical to our ability to respond effectively to the impacts of the global climate disruption we are currently experiencing," said David Mears, Vermont's Environmental Conservation Commissioner.

"The water programs in our member states have expressed deep concern about climate change and its impacts. As we have seen with recent storm events such as Tropical Storm Irene and Superstorm Sandy, our water resources and water infrastructure are particularly vulnerable to existing and projected climate threats. We look forward to collaborating with the diverse stakeholders brought together by EPA at this forum to advance resiliency in our region," said Ron Poltak, executive director of NEIWPCC.

"Johnson & Wales University and EPA have a vested interest in the topic of climate change. Not only is JWU determined to beautify our Harborside Campus, transforming what was once a shipyard and a dumpsite from a landfill to a landmark, but also, as one of the top educators for the world's chefs, we are particularly concerned with how climate change will affect the food supply," said John Bower, chancellor of Johnson & Wales University.

EPA will issue a report following the Climate Summit, which will provide more information on the actions, participants and outcomes of the day. Other resources include:

Damage from flash flooding following record rains in northern Vermont on May 23, 2013

- New England climate leadership summit (epa.gov/region1/climatesummit/)
- President Obama's Climate Action Plan (whitehouse.gov/share/climate-action-plan)
- NEWEA Position Paper—Climate Change and Water Resources (newea.org/LinkClick.aspx?fileticket=UqGskkOdt6E%3d&tabid=389)

EPA software helps reduce water pollution as part of president's climate action plan

by Cathy Milbourn, EPA News Release

As part of President Obama's Climate Action Plan, EPA today released the National Stormwater Calculator, an innovative addition to the administration's virtual climate resilience toolkit. EPA's new calculator will help property owners, developers, landscapers, and urban planners make informed land-use decisions to protect local waterways from pollution caused by stormwater runoff. Preventing stormwater runoff, which can impact drinking water resources and local ecosystems, protects people's health and the environment

The calculator, which is Phase I of the Stormwater Calculator and Climate Assessment Tool Package announced in the president's Climate Action Plan in June, is a desktop application that estimates the annual amount of stormwater runoff from a specific site, based on local soil conditions, slope, land cover, and historical rainfall records. Users can enter any U.S. location and select scenarios to learn how specific green infrastructure modifications, including inexpensive changes such as rain barrels and rain gardens, can prevent pollution. This information helps users determine how adding green infrastructure can be one of the most cost-effective ways to reduce stormwater runoff.

"EPA's research is providing innovative solutions to protect our nation's water resources," said Lek Kadeli, principal deputy assistant administrator for EPA's Office of Research and Development. "The stormwater calculator demonstrates different types of green infrastructure approaches which can result in protection from flooding, energy savings, improved air quality, increased property values, healthier communities, and cost savings for the American people."

Each year billions of gallons of raw sewage, trash, household chemicals, and urban runoff flow into our streams, rivers and lakes. Polluted stormwater runoff can adversely affect plants, animals, and people. It also adversely affects our economy—from closed beaches to decreased fishing and hunting in polluted areas. Green infrastructure is an affordable solution to promote healthy waters and support sustainable communities.

An update to the stormwater calculator, which will include the ability to link to several future climate scenarios, will be released by the end of 2013. Weather-related projections indicate that heavy precipitation events are likely to become more frequent as the climate changes.

- More information about the National Stormwater Calculator: .epa.gov/nrmrl/wswrd/wq/models/swc/
- More information about the virtual climate resilience toolkit: whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf
- More information on EPA's Green Infrastructure research: water.epa.gov/infrastructure/greeninfrastructure/index.cfm
- EPA's National Stormwater Calculator: youtube.com/watch?v=ibZTm4_ZQxg

EPA announces 2012 report card grades for the lower Charles River and the Mystic River watersheds

by David Deegan, EPA Region I News Release

In conjunction with the Charles River Watershed Association (CRWA) and the Mystic River Watershed Association (MyRWA), EPA announced water quality report card grades for 2012. These report cards represent the 18th and seventh public reporting on bacterial water quality conditions for the Charles River and Mystic River watersheds, respectively, since kicking off collaborative efforts addressing water quality issues in these urban rivers.

Lower Charles River

EPA announced a grade of "B+" for the lower Charles River. The grade is based on bacterial contamination in analyzed samples collected by CRWA over the past year at 10 monitoring sites from the Watertown Dam to Boston Harbor. In 2012, the lower Charles River met state water quality standards for boating 87 percent of the time and swimming 67 percent of the time. In dry weather, the lower Charles River met swimming standards 93 percent of the time, which is the highest percentage in 17 years since calculation of the grade began. CRWA has been collecting data at these sampling sites since 1995. From the inception of this report card, EPA has relied solely on qualitative criteria when determining the grade for the lower Charles River. These criteria are:

A - always met standards for boating and swimming
B - met standards for 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 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. As collaborative efforts among EPA, state and local government, private organizations and environmental advocates continue, the goal of a consistently healthy river becomes closer to an everyday reality.

"The Charles has improved measurably in the last 15 years," said Bob Zimmerman, executive director of CRWA. "We still have more work to do to achieve an "A" grade, but we are encouraged by the collaborative efforts of CRWA and other organizations who share our goal of a fully restored Charles River."

Mystic River Watershed

EPA announced a grade of "D" for the Mystic River watershed. The grade is based on bacterial contamination in analyzed samples that were collected by volunteers over the past year at 15 monitoring sites throughout the watershed. This year, the Mystic River watershed met state water quality standards for boating 75 percent of the time, while swimming standards were met only 47 percent of the time.

Unlike the grade determination for the lower Charles, when assessing water quality to assign a grade to the Mystic River watershed, EPA uses an average of the overall percentages that met water quality state criteria for swimming and boating (for 2012, it was 61 percent), as well as qualitative criteria that are similar to those developed for the Charles River Initiative, as follows:

A - met swimming and boating standards nearly all of the time
B - met swimming and boating standards most of the time
C - met swimming standards some of the time, and boating standards most of the time
D - met swimming and boating standards some of the time
F - failed swimming and boating standards most of the time

Other differences between the grades include the locations where water quality samples are taken. In the lower Charles River, monitoring samples are collected in the middle of the river's main stem from the Watertown dam to the New Charles River Dam in Boston, whereas in the Mystic River watershed, samples are taken throughout the entire watershed and often in the tributaries before they discharge into the main stem of the river. These methods represent long-established sampling locations and monitoring used by the two watershed associations. The watershed-wide approach in the Mystic is different from the approach EPA began using in the lower Charles in 1995, and allows EPA and other stakeholders to better identify "hot spots" as well as better understand water quality problems in the tributaries. For these reasons, as well as the use of numerical averaging in the Mystic River watershed, grades cannot and should not be compared. However, these grades do provide a basis to track annual progress and water quality within each watershed.

In dry weather, the lower Charles River met swimming standards 93 percent of the time, which is the highest percentage in 17 years since calculation of the grade began

"Although the current grade and water quality data do not yet show significant improvement, we will continue to focus on improving water quality in this watershed," continued EPA New England's Curt Spalding. "We have taken a number of actions to remove contamination sources from these waters, and we anticipate seeing improvements over the next several years."

The past year saw continued efforts to improve water quality conditions in the Mystic River watershed. Both EPA and the Massachusetts Department of Environmental Protection continue to pursue a number of active enforcement actions to improve water quality throughout the watershed. This enforcement has removed more than 14,000 gallons per day of sewage from storm drains in the Mystic River watershed, with many additional illicit connections identified and scheduled for removal this year. A number of additional repairs have prevented tens of thousands of gallons of sewage from discharging to the river during rain events. These aggressive efforts continue to address violations of water quality with regard to bacteria.

EkOngKar Singh Khalsa, executive director of MyRWA, said, "Unfortunately this year's grade reflects that in 2012, the Mystic River system as a whole was deeply compromised by bacterial contamination. This is particularly true for wet weather. It is important also to note, however, that the data confirm the main stem of the Mystic River and the Mystic Lakes remain safe and rewarding destinations for recreational boating and for safe swimming in designated areas. MyRWA will continue to gather essential water quality information to assist stakeholders and to support efficient deployment of local resources. It is hoped that, in the near term, the data will begin to reflect the improvements in local environmental conditions we anticipate will result from recent efforts to reduce sewage inputs in the Mystic. More needs to be done, however, to address this public health concern. New funding sources must be found and applied to accelerate long overdue repairs and renovations required in Mystic River sewer and stormwater infrastructure to eliminate this impairment."

Long-term watershed improvements will be achieved through collaboration among all stakeholders. Earlier this year, the Mystic River watershed initiative steering committee carried forward its mission and set of priorities to continue guiding its actions for the next year. The focus is on water quality as well as open space and public access. The water quality subcommittee continues to focus on reducing and eliminating sanitary sewer overflows (SSOs) in the watershed, providing stormwater technical assistance to municipalities, reducing nutrient inputs to the watershed, and better understanding and remediating legacy pollution in the Malden River area.

More information:

- EPA's Clean Charles River Initiative (epa.gov/region1/charles)
- EPA's Mystic River Watershed Initiative (epa.gov/mysticriver)

New study of endocrine-disrupting chemicals in Chicago area waterways

by Allison Fore, Public and Intergovernmental Affairs Officer
Metropolitan Water Reclamation District of Greater Chicago

Three university researchers and a Metropolitan Water Reclamation District of Greater Chicago (MWRD) scientist have chronicled the presence and biological effects of endocrine-disrupting chemicals (EDCs) in Chicago area waterways to determine the impact of these unregulated chemicals on urban waterways. Their findings concluded that EDCs are found throughout the waterways, but exposure to the waterways showed no immediate harm to fish populations.

EDCs are found in many household and industrial products such as pharmaceuticals and personal care products. Because there is uncertainty on the impact of these unregulated chemicals on urban waterways, Thomas Minarik, MWRD senior aquatic biologist, and others began studying the presence and biological effects of these chemicals throughout the waterways. Joining Minarik were Dr. Heiko Schoenfuss, St. Cloud State University in St. Cloud, Minn.; Dr. Dalma Martinovic-Weigelt, University of St. Thomas in Minneapolis, Minn.; and Dr. Melissa Schultz, College of Wooster in Wooster, Ohio.

The team collected and archived more than 1,000 water samples from 45 locations on the waterways from January 2009 through July 2012. Approximately 3,000 fish were analyzed, and a mobile laboratory trailer was used to investigate sources of EDCs.

Sunfish were tested for evidence of endocrine disruption

"Collaboration between academia and industry was exemplary for this study as both complemented one another toward the challenge of understanding this complex issue for an entire urban area," said Minarik.

The group discovered that EDCs, including estrogens and personal care products, are common in the waterways, a finding consistent with other studies both nationally and globally. These compounds originate from street runoff after

Scientists deploy a cage of fish in the Chicago-area Salt Creek to determine the presence and biological effects of endocrine-disrupting chemicals

snowmelt and heavy rains, from treated wastewater, and from other sources. Water reclamation plants are not designed to completely remove these chemicals.

Many EDCs can be controlled by properly disposing pharmaceuticals and pet waste, using bio-degradable cleaning supplies, and discontinuing the use of soaps that contain antibacterial agents.

"Most endocrine active compounds begin their journey into the aquatic environment in our own households and with our own actions. Every one of us can contribute to a reduction of these compounds in the wastewater stream by being more aware of the products used and their appropriate means of disposal," said Dr. Schoenfuss.

Findings from this study will be published in Environment International and the Journal of the American Water Resources Association in three papers cited below. Also, the research team was recently awarded a National Science Foundation grant to continue its research in the Chicago area waterways as the MWRD upgrades two of its water reclamation plants by adding disinfection, which may lower the concentrations of endocrine-disrupting chemicals in their effluents.

ARTICLES TO BE PUBLISHED:

- Martinovic-Weigelt D, Minarik TA, Curran EM, Marschuk JS, Pazderka MJ, Smith EA, Goldenstein RL, Miresse CL, Matlon TJ, Schultz MM, Schoenfuss HL. 2013. Environmental estrogens in an urban aquatic ecosystem: I. Spatial and temporal occurrence of estrogenic activity in effluent-dominated systems. Environment International
- Schultz MM, Minarik TA, Martinovic-Weigelt D, Curran EA, Bartell SE, Schoenfuss HL. 2013. Environmental estrogens in an urban aquatic ecosystem: II. Biological effects. Environment International
- Minarik TA, Vick JA, Schultz MA, Bartell SE, Martinovic-Weigelt D, Rearick DC, Schoenfuss HL. In press. On-site exposure to treated wastewater effluent has subtle effects on male fathead minnows and pronounced effects on carp. Journal of the American Water Resources Association

Four New England students win EPA research fellowship awards

Undergraduate students at four New England colleges were awarded EPA research fellowships of up to $50,000 each to pursue degrees in environmental science and related fields.

The students who won were: Katherine Ann Corcoran, an environmental studies student at Wellesley College in Wellesley, Mass.; Marissa Sarah Giroux, a marine science major at University of Maine/Orono, who has a minor in neuroscience; Lydia-Rose Keisich, a biology major at Smith College in Northhampton, Mass., and Jessica Zielinski, a sustainability studies major at University of New Haven in West Haven, Conn.

These grants were among more than $1.65 million given to 33 students nationwide through EPA's Greater Research Opportunities Fellowship program. This year marks the 30th anniversary of EPA's undergraduate grant program.

"For 30 years, EPA's undergraduate grant program has nurtured and supported new generations of America's workforce as they prepare to enter the environmental science and public health fields," Lek Kadeli, acting assistant administrator for EPA's Office of Research and Development. "This year's recipients truly reflect EPA's commitment to research that promotes a sustainable and healthy nation."

The 2013 recipients are eligible to receive a fellowship of up to $50,000 for studies in natural and life sciences, environmental sciences and interdisciplinary programs, engineering, social sciences, physical and earth sciences, and mathematics and computer sciences. This program also supplements the students' education with an EPA internship.

Past winners continue to make a significant impact in their field of study and in their communities. For instance, Sacoby Wilson, director of Community Engagement, Environmental Justice, and Health at the University of Maryland, is addressing environmental injustice and environmental health disparities in the Washington, D.C. region. Wilson's work illustrates how science, community organizing, and civic engagement can be used to address environmental health issues at the local level.

The Greater Research Opportunities Fellowship, created in 1982, has funded the education of nearly 400 undergraduates as they pursue degrees related to the environmental science and public health fields.

More information:

- 2013 GRO awardees: epa.gov/ncer/gro13
- EPA's Greater Research Opportunities Fellowship: epa.gov/ncer/fellow
- Student opportunities at EPA: epa.gov/careers/internships

FEATURE

Springfield's rehabilitation of egg-shaped brick sewer

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ABSTRACT | The Springfield Water and Sewer Commission (SWSC) is conducting a collection system assessment program of its combined wastewater collection system within the city of Springfield, Mass. This involves performing National Association of Sewer Service Companies' (NASSCO) inspections of collection system assets and inserting that data into a risk and criticality model. This model indicated that the sewer main within Pine Street, between Maple Street and Central Street, was in failure mode and highly ranked in criticality to the collection system as well as risk associated with failure. This section of 1.60-meters-high by 1.07-meters-wide (63-inch-high by 42-inch-wide) egg-shaped brick combined sewer was constructed in 1882, is 408 meters (1,340 feet) long and has an average depth of about 14 feet to invert.

In March 2011, SWSC began to review information, collect supplemental information, evaluate viable alternatives, and design the replacement or rehabilitation of the Pine Street combined sewer.

KEYWORDS | Alternatives analysis, CIPP lining, sewer, access manholes, service connections, bypass pumping

EXISTING CONDITIONS

Following examination of NASSCO inspections' data and verification of the risk model output, it was found that the sewer was in failure mode, causing roadway surface depressions. Timely rehabilitation or replacement was necessary to address safety concerns and avoid a potential sewer collapse. The most significant defects included;

- Severe mortar joint loss and evidence of mortar joint corrosion
- Minor deformations (i.e., undulations in the sewer crown and walls)
- Major deformations (i.e., sewer wall missing layer of bricks)
- Circumferential and longitudinal cracking

ALTERNATIVE ANALYSIS

To address the defects and restore structural integrity to the existing conduit, viable methods of rehabilitation and/or replacement were evaluated.

Initially, an open cut replacement was considered. Factors such as utility congestion, high wet weather flows up to 75,708 m^3/d (20 million gallons per day [mgd]), and high replacement costs, made open cut replacement an unfavorable alternative.

Trenchless technologies were then evaluated. It was recognized that trenchless technology options offer a number of benefits, including:

- Minimizing cost via sewer rehabilitation instead of replacement
- Reducing construction time
- Reducing disruption to pedestrian and vehicular traffic
- Reducing environmental disruption
- Minimizing disruption to landscape, streetscape and surface features
- Improving hydraulic characteristics through use of smoother materials
- Providing a structural repair independent of the structural condition of the host conduit
- Resisting hydrogen sulfide corrosion

During the preliminary evaluations, it was acknowledged that a number of trenchless technologies have been developed over the years that facilitate rehabilitation of conduits without the need for open cut procedures. Many of the methodologies were either new or have improved with experience and technological advancements with respect to products and/or installation equipment and methods.

Springfield, Mass.

Professionals specializing in such technologies—engineers, contractors, and vendors—were consulted. The following four methodologies were considered:

- Cured-in-place pipe (CIPP) lining
- Spiral-wound polyvinyl chloride (SWPVC) lining
- Centrifugally cast concrete pipe lining
- Epoxy lining

Given the size of the conduit, flows being conveyed by it, and the critical nature of the Pine Street sewer, the primary objectives for the initial trenchless technologies screening included:

- The selected technology needed to be a proven methodology that would provide an independent structural liner within the host conduit without a loss of hydraulic capacity.
- The selected technology needed to be a methodology previously used successfully by SWSC.

Based on the project's objectives, three of the four originally identified rehabilitation alternatives were immediately dismissed: The SWPVC liner had never been used by SWSC; the centrifugally cast concrete pipe lining could not provide an independent structural solution without having a reduction in conduit size and a loss hydraulic capacity; and the epoxy lining could not provide a fully structural solution without adequate adhesion to the host conduit—a condition that raised concern given the poor structural condition of the host conduit.

A CIPP lining for the rehabilitation of the Pine Street sewer was recommended, allowing the Pine Street combined sewer to maintain its conveyance capacity and provide for its long-term structural integrity.

CIPP lining is used to rehabilitate storm drains or sewers that show signs of deterioration and/or failure. It has been used for more than 30 years throughout the U.S., and evidence suggests that CIPP lined sewers will not deteriorate when exposed to hydrogen sulfide, which was a significant concern.

Prior to lining, the interior of the conduit (i.e., the sewer) must be cleaned and inspected. Any debris that could hinder inspection and lining must be removed. Typically, cleaning and inspection is performed using a jet truck and a robotic CCTV camera crawler working in tandem. The CCTV inspection is performed to record locations of sewer service laterals and determine any defects that may affect the lining process or the end product.

CIPP lining begins with the insertion of a flexible, resin-impregnated liner into the sewer. Steam or heated water is introduced into the flexible liner, putting pressure on the liner and causing the liner to invert itself tightly against the interior of the sewer. The heat causes the liner to cure. Cure time varies with size of liner, but is typically 24 hours or less. Once the liner is cured, a fully structural conduit is created inside the sewer that does not depend on adhesion to or structural integrity of the sewer.

Installation of the CIPP liner is best accomplished via access through an existing manhole. The size of the access opening should generally be at least equal to the cross-sectional area of the sewer being lined. Typically,

Liner with sewer service lateral cut

for large-diameter conduits, this requires removal of the manhole frame and cover and possibly the tapered riser section. Alternatively, if the liner size exceeds the size of the manhole risers, as on the Pine Street sewer, the top of the sewer can be exposed and a portion of the top of the sewer can be removed to provide the required opening dimension.

During the installation, sewer flows normally carried by the

Longitudinal crack observed in the host brick pipe

host sewer are re-routed around the work area via a bypass pumping/piping system so that service remains uninterrupted. A temporary plug, or other means of flow control within the conduit upstream of the liner installation, is required to prevent flows from passing through the host conduit during liner installation.

As part of the upstream flow control system and the requirements for bypass pumping/piping, the need to pass flows expected to occur during the liner installation must be considered. Also to be considered is the need for the emergency removal of the temporary flow control system in case of a system surcharge or in anticipation of a wet weather event that may produce flow rates in excess of the bypass pumping/piping system.

Service connections are typically restored within the installed liner, without excavation, via the use of a remote-controlled device that cuts a hole in the liner at the point of the lateral's connection. If the sewer is larger than 0.61 meters (24 inches) (as is the case at Pine Street), it is generally safe to reinstate the service connections by manual entry into the lined sewer and a hole cut through the liner at each service connection. Budgetary costs for the Pine Street CIPP liner alternative were estimated to be approximately $500 to $700 per linear foot.

CONDITION OF THE CONDUIT RELATIVE TO THE CIPP LINER

As mentioned above, there were a number of observable defects in the Pine Street combined sewer, most notably joint corrosion, undulations in the conduit crown and wall, missing bricks in the wall of the conduit, and circumferential and longitudinal cracking. These defects raised concern relative to the installation of the CIPP liner.

Representative photographs of the most significant areas with defects were reviewed by, and discussed with, a CIPP liner installation contractor. The deficiencies did not warrant repairs prior to installing the liner. During the insertion process, the liner is pressed against the interior surface of the sewer. After the curing process, the resulting liner provides a structural replacement to the sewer along its entire length, including the areas of sewer defects.

BYPASS PUMPING/ EMERGENCY FLOW CONSIDERATIONS

During the design of the project, SWSC established a requirement that residents could not be without sewer service for more than eight hours at any time during sewer rehabilitation and construction. Given that the recommended liner installation would require a continuous 24-hour-a-day operation for two to three days for each segment of the liner, maintenance of sewer service connections would be needed.

For flows through the Pine Street sewer, SWSC reported that the modeled average flow rates during dry weather conditions were 644 m^3/d (0.17 mgd) at the upstream project limit to 1,703 m^3/d (0.45 mgd) at the downstream project limit. Peak dry weather flow rates were reported to be 1,098 m^3/d (0.29 mgd) at the upstream project limit and 2,536 m^3/d (0.67 mgd) at the downstream project limit.

For wet weather conditions, SWSC reported that the peak flow rates within the Pine Street sewer were 73,437 m^3/d (19.4 mgd) at the upstream project limit to 84,793 m^3/d (22.4 mgd) at the downstream project limit for the one-year return-period event, and 89,336 m^3/d (23.6 mgd) at the upstream project limit to 102,963 m^3/d (27.2 mgd) at the downstream project limit for the two-year return-period event. SWSC also reported the peak five-year return-period event flow rates to be 108,263 m^3/d (28.6 mgd) at the upstream project limit to 124,540 m^3/d (32.9 mgd) at the downstream project limit.

The contract documents required the contractor to submit a bypass pumping plan to convey the Pine Street sewer flows and the local sewer service flows around the section of sewer to be lined. The modeled flow rates previously mentioned were also included in the contract documents to aid in bypass system design.

The contract documents also required that the weather forecast be monitored daily to ensure the contractor had a dry weather period of at least three days for installation of each liner segment. Provisions were defined within the contract documents that required the contractor to remove temporary obstructions (i.e., plugs, weir walls, etc.) from within the conduit, to re-activate the full cross-sectional area of the conduit, in a predicted storm event of greater than 0.01 meters (0.5 inches) of rainfall in less than a 24-hour period.

TRAFFIC MANAGEMENT

Traffic management along Pine Street, within the limits of the proposed rehabilitation, was a requirement established by Springfield's Department of Public Works. The manholes, and alignment of the Pine Street sewer, are generally centered within Pine Street. Local traffic was allowed access to properties within the limits of the work area, while through traffic was detoured around the work area during active construction within the roadway.

To assist with traffic management, police details were required to be on-site at each end of the project area, providing 24-hour, around-the-clock coverage during installation and curing of the CIPP liner. Signage, in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), was also required along the route of the detour.

CHALLENGES DURING DESIGN AND CONSTRUCTION

During design and construction several challenges were met and addressed:

- Access manholes
- Service connections and bypass pumping
- Construction scheduling/ weather conditions
- Location and reinstatement of service connections
- Quality of the finished product
- Full-time on-site engineering services

ACCESS MANHOLES

Installation of the CIPP liner required access into the combined sewer. The size of the access manhole needed to accommodate the liner insertion was established as a dimension approximately equal to the diameter of the host conduit; in this case the Pine Street sewer measures 1.60-meters-high by 1.07-meters-wide (63-inches-high by 42-inches-wide). The manhole risers were undersized to accommodate the proposed liner, so an access manhole was designed to accommodate site and liner configuration. The designed access manhole required a 3.05-meters-long by 3.05-meters-wide by 3.66-meters-deep (10-foot-long by 10-foot-wide by 12-foot-deep) excavation and the removal of the top of the sewer.

During design, experienced CIPP lining professionals were consulted and past CIPP lining projects similar in scope of work to the Pine Street lining project were considered. Typically, CIPP liners similar in size are installed in 152 meters (500-linear-foot) sections or less. Liner length is governed by factors such as slope/configuration of conduit, available means of liner transportation to site, weight of the liner, and available pressure for inversion of liner. To be conservative, the contract documents included two proposed access manholes for the 408 meters (1,340-linear-foot) installation. This would allow for three separate liner sections to be installed at approximately 152 meters (500 linear feet) or less.

Upon further review of the Pine Street sewer configuration by the liner installation contractor, it was determined that the proposed installation could be achieved via the construction of only one access structure rather than two. The liner installation contractor recommended that the proposed liner be installed in two segments, one that extended from the proposed access manhole to an existing manhole at the downstream end of the Pine Street sewer at Maple Street and the other that extended from the proposed access manhole to an existing manhole at the upstream end of the Pine Street sewer at Central Street. Upon receiving this proposal, SWSC and the engineer met with the general contractor and the liner installation contractor and agreed that the second access manhole would not be required. This change resulted in a cost savings credited to the project.

The construction documents also acknowledged that installation of the CIPP liner at the access manholes would result in the liner not being continuous through the location of the structure. Once the liner is inverted through the entire section of sewer to be lined and fully cured, the liner is cut and removed at the start of the conduit, leaving

Access manhole for liner insertion

the section of sewer at the access manhole unlined. To protect the host conduit along the invert and along the walls of the host conduit through the access structures, a hydrogen sulfide resistant cementitious liner was applied. This product provided a permanent seal against corrosion, infiltration and exfiltration within the new manhole structure.

The integrity of the existing manholes was also considered during design. The liner is installed through the existing manholes from the liner access manhole to either end of the liner limits. This effectively replaces the manholes from invert to crown, and then the top of the liner is cut out at the manhole to allow for future access. However, the risers on these manholes were constructed of brick and had similar deterioration issues as the sewer main. The contract included rehabilitation of these manhole risers with a hydrogen sulfide-resistant cementitious liner, which was sprayed on in multiple layers from the top of the liner to the base of the frame and cover.

SERVICE CONNECTIONS AND BYPASS PUMPING

Prior to liner insertion, each service connection within the limits of the proposed liner installation was excavated and flows were diverted into HDPE sumps

Manhole rehabilitation spray liner

installed adjacent to each service. The sumps were accessible via capped HDPE risers, which were raised up to grade in the tree belt. The available capacity of each sump was monitored daily throughout construction. Using a vactor truck, the contractor pumped out the sumps as necessary to avoid service backups.

To address flows within the main line conduit, the contractor proposed to build a weir wall within the conduit at the first manhole upstream of the liner installation. From that point, a bypass pumping system would convey flows to a manhole downstream of the work area. The proposed weir wall was designed to accommodate the contractor's bypass system plan. The weir wall was constructed of eight-inch solid concrete blocks set in mortar and built to the spring line height of the existing sewer. Through the bottom of the weir wall, the contractor installed an 18-inch PVC pipe that was fitted with an inflatable plug.

The sewer main bypass system was only necessary during insertion and curing of each section of liner. When the bypass system was not necessary, it was agreed that the plug would be removed by the contractor and flows would be allowed to flow through the conduit or cured sections of liner. Per contract requirements, the entire weir wall and any temporary flow controls would need to be removed with a wet weather event forecasted to produce 0.01 meters (0.5 inches) of rainfall or more within a 24-hour period. Wet weather events exceeding 0.01 meters (0.5 inches) per 24 hours could cause system surcharging and overflows if temporary flow controls were to be left in place. The contractor assured SWSC that the proposed system could be removed within two hours if necessary to restore the full flow capacity of the existing conduit.

CONSTRUCTION SCHEDULING/WEATHER CONDITIONS

A CIPP liner installation schedule was developed. It was estimated that up to 36 continuous hours would be required for each section of the liner to be fully installed, which included cleaning the host conduit, marking the existing active services, installing and curing the liner, cooling down, reinstating manhole riser sections, and reinstating the active service connections.

Installation of the CIPP liner was scheduled for the beginning of September 2012. In accordance with the project specifications, weather forecasts were monitored daily to ensure a minimum three-day dry-weather period for each liner segment installation.

The contractor installed the first of two liner segments as scheduled. Upon completion of the first liner segment installation, a wet weather event was forecasted to produce more than 0.01 meters (0.5 inches) of rainfall in less than a 24-hour period. This event was anticipated to exceed the bypass system capacity and forecasted to affect the Springfield area coinciding with the start of the second segment of liner. It was determined that the installation of the second segment of liner would need to be delayed and that the Contractor needed to remove all temporary flow controls and restore the existing conduit to its full flow-carrying capacity.

As forecasted, the wet weather event occurred and flow rates exceeded the capacity of the bypass system. Flows were conveyed via the existing combined sewer conduit, and because precautions had been taken prior to the start of the wet weather event, in accordance with the technical specifications, no damage resulted along the length of the newly installed liner, and no additional repairs or cleaning were required along the length of conduit section yet to be lined. Had the installation of the second segment of the liner been allowed to continue, damage would likely have occurred to the uncured liner as well as from upstream system surcharging and overflows.

FULL TIME ON-SITE ENGINEERING SERVICES

During the entire liner installation, SWSC required full-time, on-site construction inspection services by staff with experience observing installation of CIPP liners. Three staff members were assigned to the project, working alternate shifts to provide 24-hour coverage.

LOCATING AND REINSTATEMENT OF EXISTING SERVICE CONNECTIONS

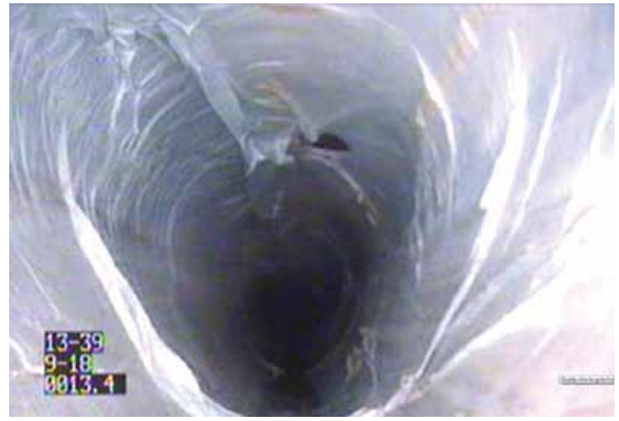
Upon completion of the second segment of liner installation, the contractor located the active service connections within that segment of newly lined conduit, as part of the reinstatement of those services. Prior to liner insertion, active service connections were recorded via CCTV distance logs as well as via a lag screw within the wall of the host conduit at each active service connection. After insertion and curing of the liner, the lag screw was then located using the CCTV distance log and by visually observing a dimple in the newly installed liner.

During the lagging relocation process, the contractor noted difficulty in finding a number of the lag locations. It appeared that some of the lags had been pushed into the deteriorated joints of the host conduit, during the insertion and curing of the liner. This resulted in exploratory drilling through the liner to locate the service connections and the need to repair the liner at the locations of these exploratory holes. The contractor was required to repair the holes via application of hydraulic cement.

QUALITY OF THE FINISHED PRODUCT

Upon reviewing the CCTV inspection videos of the completed second segment of liner, several wrinkles, fins and minor folds were noted within the upstream-most portion of the installed liner. This occurrence was reported by the installers to be the result of excess liner material at a location within the host pipe where the dimensional circumference of the host pipe was said to be slightly reduced, possibly due to a bulge in the wall of the host conduit or to a slightly different size of the host conduit. Since the liner had been manufactured based on a constant circumferential dimension of the host conduit, a change in the actual circumferential dimension resulted in excess liner material at the referenced location.

It was further determined from the CCTV inspections that most of the wrinkles, fins and minor folds had occurred near the top of the conduit and would not be detrimental to the performance of the liner or to the condition of the conduit. Nearly all the observed wrinkles, fins and minor folds were of a lesser height that five percent of the equivalent diameter of the host conduit. Where the height of the wrinkles, fins and minor folds exceeded five percent of the equivalent diameter, the contractor was required to trim the height to no greater than three percent of the equivalent diameter of the host sewer. Trimming was achieved through a saw that was also being used by the contractor to open each of the service connections.



Wrinkles and folds observed in new liner

SUMMARY

The cost to complete the installation of 408 meters (1,340 linear feet) of the 1.60-meters-high by 1.07-meters-wide (63-inch-high by 42-inch-wide) CIPP liner was approximately $720,900, or roughly $540 per linear feet. This cost included the installation of the CIPP liner, reinstatement of the sewer service connections, installation of the access manhole, rehabilitation of the manholes, temporary bypassing of the flows, and temporary bypassing of "active" service connections. Not included in this cost are the police details, traffic management, roadway pavement restoration, and mobilization and demobilization costs. The liner was installed in one week's time, from September 19 through September 26, 2012, including the loss of one day due to a wet weather event. This did not include the time needed to rehabilitate the manhole risers within the lining limits, remove sumps at each sewer service, reconnect diverted sections of services, remove the bypass pumping system, repair the roadway excavations via the placement of bituminous pavement, and complete final punch-list items. All work associated with the Pine Street sewer rehabilitation was completed in early November 2012.

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Gravity-in/gravity-out
a unique approach for CSO treatment that minimizes O&M costs

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ABSTRACT | Across the U.S., municipalities are experiencing unprecedented regulatory requirements, budgetary limitations, and shortage of available space and resources. To manage these challenges and preserve water quality, municipalities must seek innovative solutions. A recent project demonstrates that with thorough understanding of the collection system, hydrologic/hydraulic modeling, a comprehensive study of alternatives, and a little ingenuity, municipalities nationwide can meet (or exceed) regulatory requirements while saving money along the way.

KEYWORDS | Consent Decree, CSO, LTCP, screening and disinfection facility

Table 1. CSO control program major elements

Major element	Construction finish date
Mandated controls	
South Main St./Main St./stormwater outfall and detention ponds	June 2005
Ledge St area sewer separation	June 2006
Wet weather treatment facility at NWTF	Jan. 2009
System optimization & infrastructure improvements	July 2009
CSO 005 drop-over structures	Oct. 2010
Automated sluice gate at CSO 006	Nov. 2010
CSO 004 storage tank	Nov. 2013
Harbor Avenue sewer separation	Oct. 2012
CSO 005/006 screening & disinfection facility	August 2015

BACKGROUND

The city of Nashua, the second largest city in New Hampshire, has a sewer system that serves a population of about 90,000, and is approximately 25 percent combined, with pipes ranging in size from 8 to 108 inches in diameter. The flow generated in the system is eventually conveyed to the Nashua wastewater treatment facility but can be relieved at eight combined sewer overflow (CSO) outfalls throughout the system, discharging to either the Nashua or Merrimack rivers.

The city is under a Consent Decree from the U.S. Environmental Protection Agency (EPA) to reduce CSOs and established a program to meet the requirements of that Consent Decree. The 12-year, $80 million CSO control program is being implemented in a phased approach. A summary of the program elements is listed in Table 1.

One of the final pieces of the city's long-term CSO control program (LTCP) is the design and construction of a screening and disinfection facility (SDF) to provide partial treatment for the two largest CSO discharges at CSO 005 and 006. Both a collection system model and a bacterial (i.e., pathogen) water quality model were developed during LTCP planning to evaluate baseline condition performance and the potential impact of CSO controls. The modeling indicated that the recommended CSO control technologies would satisfy the requirements to screen and disinfect CSOs up to a two-year "actual" design storm event before discharging it to the Merrimack River or returning it to the sewer system for eventual treatment at the NWTF downstream. The optimal site and conceptual facility layouts were evaluated in developing the final design, which serves as the capstone in the city's LTCP.

Construction of the facility began on August 1, 2013, and is required by consent order to be completed by August 2015

SDF DESIGN CONSIDERATIONS

Several sites were considered, and the potential environmental, permitting, and economic ramifications of each option were weighed. After a comprehensive siting study, four options were identified and a final site was selected. The facility will be on Bancroft Street, and on adjacent land owned by the city of Nashua. The facility is being constructed with a combination of cast-in-place concrete structures that make up the screening chamber, drain chamber and effluent chamber as well as pre-cast box culvert sections that will make up the remaining volume of the facility. These pre-cast sections are composed of 20-foot (6.096 m)-wide by 9-foot (2.743 m)-tall reinforced concrete box culverts. Most of the approximately 25-foot (7.62 m)-deep facility will be underground, except for an above ground process control building required for housing the chemical storage, pumping, instrumentation and control equipment.

A new 60-inch reinforced concrete outfall pipe, approximately 550-feet (167.64 m) in length, will be microtunneled under an existing Army Corps of Engineers flood protection levee and convey treated effluent into the Merrimack River. The new facility and associated outfall will be added to the city's list of permitted CSOs. Figure 1 illustrates the proposed location of the new facility and associated outfall.

In addition to minimizing capital costs, the city sought to minimize O&M costs of the facility. The facility, expected to be activated an average of eight times per year, will be unmanned, and as such, significant operational considerations had to be considered when selecting a design alternative.

As part of the design process, several modeling tools (InfoWorks, three-dimensional CAD, and Computational Fluid Dynamic

Figure 1. Study area, CSO 005-006 screening and disinfection facility

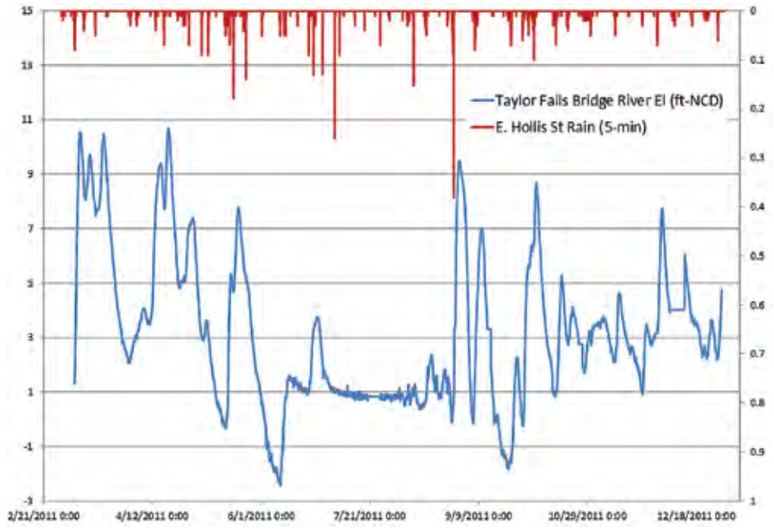


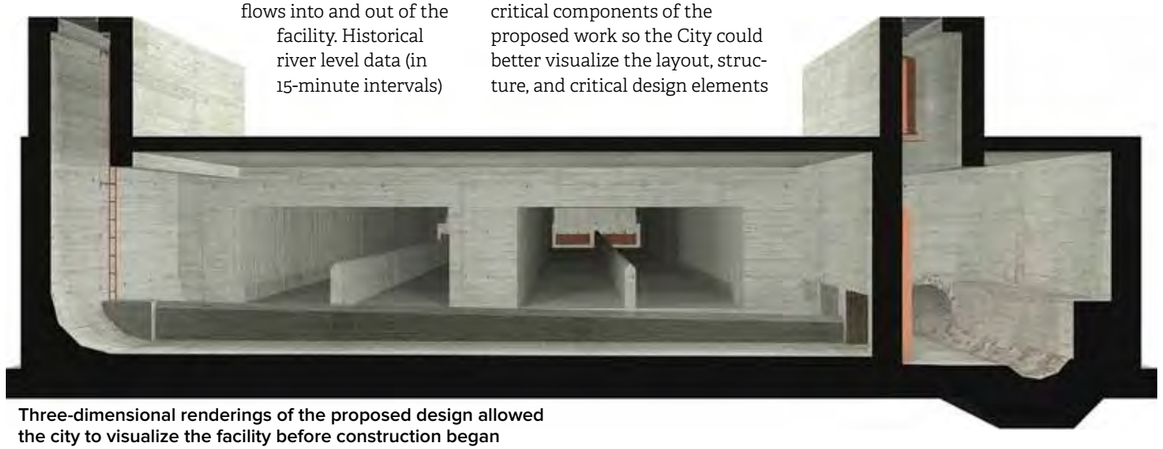
Figure 2. Merrimack River level vs. rainfall (March – December 2011)

(CFD) modeling) were used. The city's latest InfoWorks model established the peak flow rates into the proposed facility, which formed the basis of design for the screens, disinfection system, and chamber volume regarding contact time. The model setup included all other elements of the city's CSO control program, as well as the proposed CSO 005/006 screening and disinfection facility.

The model was also used to understand the performance of the facility under varying conditions (e.g., rainfall and river levels) that may affect the gravity flows into and out of the facility. Historical river level data (in 15-minute intervals) was obtained for the Merrimack River from the National Oceanic and Atmospheric Administration (NOAA). Based on the data evaluated, the lag time between the peak of the rainfall events and the peak of the river stage is typically two days and never exceeded elevation 11.0 (ft-NCD) during the observed period (see Figure 2). Model results indicated zero untreated CSO discharges at both CSO 005 and 006 under all river elevations evaluated during the observed period.

Three-dimensional CAD design was used to better illustrate critical components of the proposed work so the City could better visualize the layout, structure, and critical design elements early in the process—this enhanced design tool provided a higher level of clarity, avoiding potential conflicts and preventing costly construction delays later.

In addition, various CSO disinfection strategies were evaluated, and CFD modeling analyses confirmed flow routing and disinfection contact times through the facility. The facility was ultimately designed for a peak wet weather flow of 90.9 million gallons per day (3.99 cubic meters per day) and a minimum disinfection contact volume of 900,000 gallons (3,410 cubic meters), which corresponds to the two-year "actual" design storm event.



Three-dimensional renderings of the proposed design allowed the city to visualize the facility before construction began

PROJECT COMPONENTS

One unique aspect of the facility is the passive-operation (gravity-driven) influent and effluent controls. The entire process is gravity-driven and eliminates the pumping component, thereby reducing O&M costs and requirements associated with traditional pumped-tank systems.

Another feature that reduces O&M is horizontally installed CSO fine-slotted screens that eliminate on-site handling and disposal of screenings. These screens provide high operational reliability, automatic mechanical cleaning driven by a hydraulic power unit, low maintenance requirements, and discharge of the screenings back into the waste stream for ultimate removal at the city's wastewater treatment facility. A bypass overflow weir will be provided for protection against a blinded screen, ensuring that flows will be allowed to enter the facility for disinfection

The facility will also feature optimized chemical storage and feed systems that dose based on flow rate. A vacuum liquid doser will be used with a pressurized water source across an educator. Chemical dosing will be controlled by multiple ultrasonic flow meters to adjust chemical flow rate based on CT setpoint and flow. This setup offers simplicity of operation, reduced maintenance, higher turn-down capability, and enhanced mixing.

CFD modeling maximized static mixing and plug flow, and the need for mechanical mixing was eliminated by installing diffusers. Disinfection will occur in the tank, which will allow a 15-minute contact time for mixing. This disinfection approach uses sodium hypochlorite (NaOCl) and will accept delivery of a 5-percent NaOCl solution. Dechlorination will be achieved with sodium bisulfite ($NaHSO_3$).

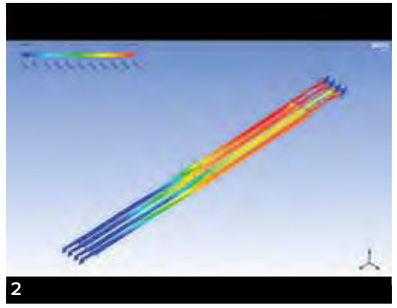
Another facet of the project is automatic cleaning and flushing systems that will consist of a combination of tipping buckets and flush gate systems. These systems will be programmed to automatically operate post-event in sequence so the entire facility is cleaned within hours following a wet weather activation of the facility.

CONTROL/OPERATION

Control and operation of the facility will be fully automated and remotely monitored. When an event begins, depth and velocity sensors at the influent weir will activate the CSO screening equipment and chemical dosing systems. Levels of water in the tank as well as in the interceptor will be monitored. Flows over the facility's influent weir will be calculated and used for chemical dosing. Sampling equipment is also provided to conduct sampling of total residual chlorine in the effluent.

Following a wet weather event where the facility is activated, the tank emptying and cleaning sequence will begin without operator involvement. As capacity becomes available in the collection system, the facility will automatically drain back into the collection system through a series of flap valves. Cleaning of the facility after a storm event will be accomplished through flushing gates for the box culvert sections, and then cross-flushing into the collection system interceptor will be carried out using tipping buckets. Slide gates will control the discharge of flush water back into the interceptor during this cleaning operation. A diesel-powered backup generator is also provided to ensure operation of the facility during power outages.

The Nashua CSO 005-006 Screening and Disinfection Facility is expected to complete construction by August 2015 in accordance with the city's Consent Decree milestone schedule. The lessons learned and the techniques used in this project can be applied to other municipalities facing similar challenges.



1. Horizontal installation of screening equipment allows the screen to be completely loaded during operation 2. Computational Fluid Dynamic (CFD) modeling was used to maximize static mixing of disinfection chemicals through the facility 3. Automatic cleaning and flushing systems utilizing tipping buckets and flush gates, similar to those shown above, will be used to automatically clean the facility within hours following a wet weather activation

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Adaptation options to protect against sea level rise, coastal floods, and storm surge at the Ogunquit, Maine wastewater treatment plant

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ABSTRACT | The Ogunquit wastewater treatment plant (WWTP) is in a regulated coastal sand dune system and coastal barrier resource system (CBRS), between the Ogunquit River estuary and the Gulf of Maine. The facility has flooded during major historic storm events and faces ever-increasing risks from such events because of rising sea levels and greater storm frequency. Adaptation options to address potential flooding, storm surge, and sea level rise (SLR) were desired. A study assessed the aforementioned risks, along with anticipated changes in regulatory requirements, aging infrastructure, changes in population demographics, and increased competition for funding. This study also outlined mitigation strategies.

Regulatory limitations, aging infrastructure, and anticipated SLR impacts suggest that there is no practical long-term solution that would allow the town to continue using the existing WWTP site beyond 2032-2052, given Ogunquit Sewage District's current risk tolerance.

KEYWORDS | Sea level rise (SLR), coastal flooding, storm surge, wastewater treatment plant (WWTP), coastal hazard, mitigation, coastal barrier resource system (CBRS), highest annual tide (HAT), national pollutant discharge elimination system (NPDES), Natural Resource Protection Act (NRPA)

Maine coastline from Ogunquit WWTP to York

INTRODUCTION

Background

The Ogunquit Wastewater Treatment Plant (WWTP) is in a coastal sand dune system between the Ogunquit River estuary and the Gulf of Maine. In addition to being in a coastal sand dune system, which is regulated by the Maine Department of Environmental Protection (MaineDEP), the facility is also within a coastal barrier resource system (CBRS), which is a habitat for endangered species. The facility and its associated coastal pump stations have experienced flooding from major storm events, such as the Patriot's Day Storm in April 2007, and are facing ever-increasing risks from such events because of rising sea levels and increasing storm frequency.

The Ogunquit WWTP provides secondary treatment for approximately 1.28 million gallons per day (gpd) of sanitary wastewater and operates 12 pumping stations and approximately 20 miles of sewer lines. It is critical infrastructure for the community, protecting both public health and the health of the coastal environment, which supports an abundance of wildlife and much of the town of Ogunquit's economy. The Ogunquit WWTP is a mature facility, with the last major upgrade in 1993. While the facility is complying with MaineDEP requirements, upgrades are scheduled to update major equipment and to address the potential of changing regulations.

Objective

In 2011, the Maine Geological Survey (MGS) and the Southern Maine Regional Planning Commission (SMRPC) collaborated with the town of Ogunquit on the Coastal Hazard Resiliency Tools (CHRT) project, which identified the Ogunquit WWTP as vulnerable to sea level rise (SLR). The MGS generated simulations for CHRT demonstrating the facility's vulnerability to both SLR and storm surges.

Faced with these risks, adaptation options to protect the WWTP and associated wastewater pump stations against floods, storm surges, and SLR had to be identified and evaluated.

DESCRIPTION OF WORK AND METHODOLOGY

The impact of SLR and coastal processes at the Ogunquit WWTP over a 100-year period was assessed. The assessment was conducted with consideration of other high-level risks such as anticipated changes in regulatory requirements, aging infrastructure, changes in population demographics, and competition for funding. A key question in the analysis was, "Which mitigation strategies, if any, would allow the Ogunquit WWTP site to be used over the long-term?"

Potential mitigation strategies and various adaptation options, such as regionalizing with a neighboring municipality, were identified. In parallel, estimates of 100-year SLR and storm flooding elevations were developed for the Wells WWTP, using the same assumptions and methods outlined in the report developed for the Ogunquit WWTP. These findings were used to assess the Wells WWTP as a potential alternative treatment site for the town of Ogunquit due to the proximity of the two facilities. Other sites for regionalization might have been possible but were not evaluated at the time of this study.

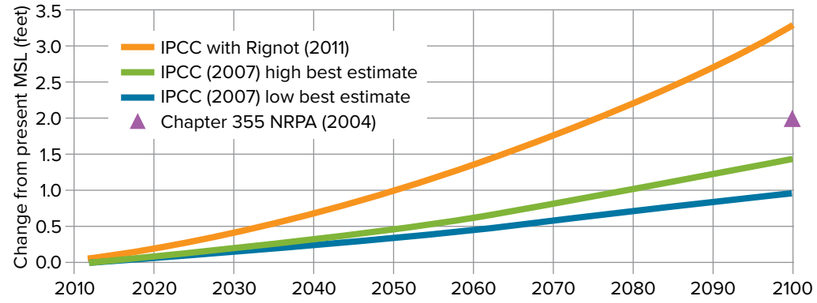

Figure 1. Relative sea level rise at Ogunquit

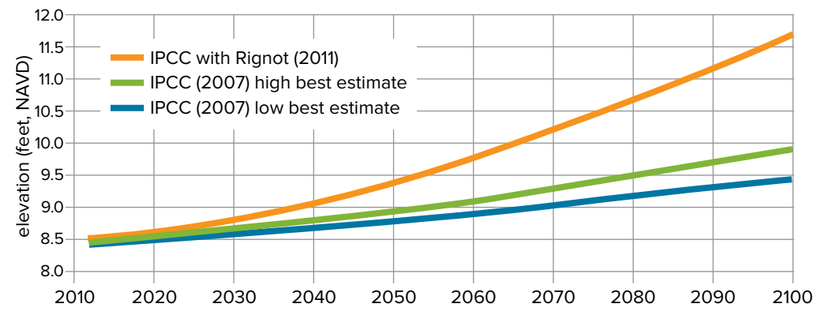

Figure 2. 100-year flood elevation increase with SLR

RESULTS AND DISCUSSION

PREDICTIONS OF SEA LEVEL RISE, FLOODS, AND STORM SURGE

Sea level rise

SLR is estimated to range from an additional one-foot increase by 2050 and a 3.2-foot increase by 2100. These estimates represent a conservative upper bound to SLR predictions, which account for the contribution of ice sheets to SLR. Ultimately, SLR could be exacerbated by ice cap melting, causing it to accelerate over time in a non-linear fashion.

Figure 1 shows SLR estimates for Ogunquit from 2012 to 2100 based on three methods.

Flooding from storm surge

The access road to the Ogunquit WWTP, and part of the site itself, are susceptible to flooding during major storm events. An additional five inches of flooding is anticipated during 100-year storm events by 2050. This would cover the access road to the plant.* If the potential for ice sheet melting is included (Rignot, et al. 2011) the storm surge in 2050 could be as high as 9.5 feet, which is one foot above the current 100-year storm surge. This would exacerbate flooding of the access road, and perhaps some of the low lying portions of the site. The estimate for the 2100 100-year storm surge,

* The Ogunquit WWTP has backup power and fuel storage sufficient for one week's supply; fuel trucks will need adequate access to the site to keep the facility running. Without power, the facility cannot operate. The beach will need to close when the plant is not running due to inadequate treatment. Each day that the beach is closed will ultimately cost the town significant amounts of money.

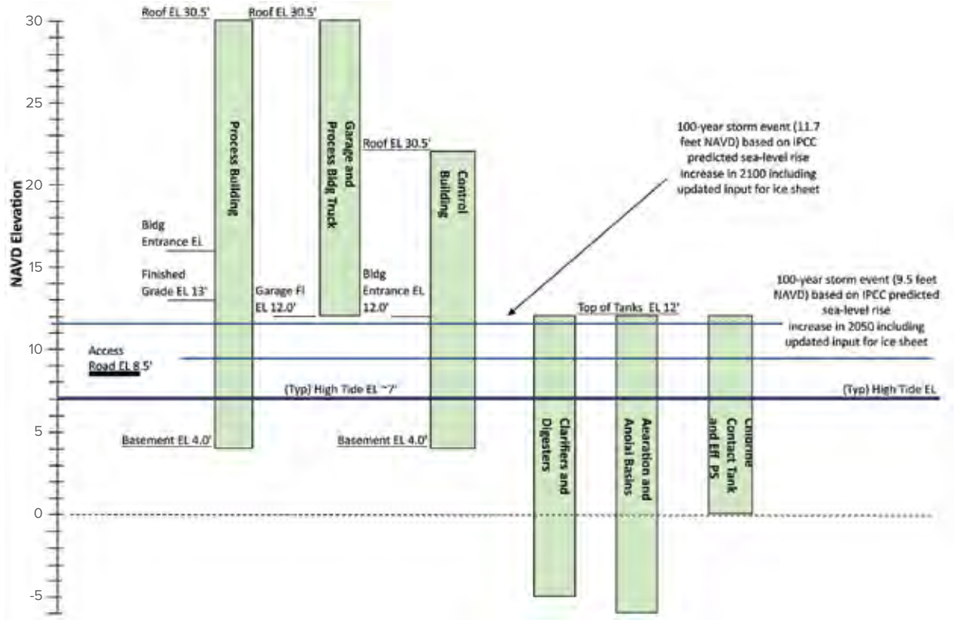

Figure 3. Ogunquit WWTP structures elevations

when considering contributions from the ice sheets, may be as high as 11.75 feet, which is 3.25 feet above the current 100-year storm surge; this would inundate most of the site and be close to inundating the outside process tanks.

SLR and storm surge are directly correlated and the increase in SLR will exacerbate storm surge, causing the frequent minor storm events experienced in the present day to appear more severe and just as frequent in the future, much like ice cap melting accelerates SLR. Figure 2 shows a graph of the various predicted 100-year flood elevations, which account for the various SLR estimates for Ogunquit from 2012 to 2100 based on three methods used.

The analysis for SLR indicates that the structures within the Ogunquit WWTP will not be at severe risk from a 100-year storm until approximately 2100. At that time, if ice sheet contribution has accelerated SLR to the extent predicted by Rignot, et al. (2011), the plant would be inundated in such a storm. Based on these predictions, it is likely that access to the plant during a 100-year storm will be in jeopardy by 2050. This is illustrated in Figure 3.

Shoreline change

Shoreline erosion will continue to shorten the width of the dune system, which helps to protect the facility from storm surge. The eroding dune will become more susceptible to failing during storm events over time. Regardless of SLR, dune erosion represents the most certain risk to the Ogunquit WWTP. Dune or shoreline movement is historically demonstrated and will continue. SLR will only exacerbate the issue of dune erosion. It is estimated that the dune will deteriorate completely in the next 30 to 50 years.

Discussion of predictions

We consider the Ogunquit WWTP to be at high risk from a combination of SLR and shoreline change within the next 20 to 30 years, potentially sooner as SLR and flooding increase over time. Depending on the risk tolerance of the Ogunquit Sewer District, the risks associated with site flooding will likely become unacceptably high to remain on the existing site without much mitigation 20 to 30 years into the future. Based on this analysis, it is recommended that the Ogunquit Sewer District should begin strategic planning to identify alternatives to the current WWTP location. The basic options will be to build a new treatment facility in Ogunquit or to regionalize with Wells and/or perhaps with York. Because risk will increase slowly over time, there will be ample opportunity to coordinate planning with growth, infrastructure renewal, and other issues of concern.

REGIONALIZATION: ASSESSMENT OF WELLS FACILITY AS AN ALTERNATIVE TREATMENT SITE

Wells WWTP background

The Wells WWTP is on a 10-acre site. The collection system consists of 10 pump stations and approximately 50 miles of newer (approximately 35 years old), large, deep PVC and concrete pipes. This system ranges right up to the Wells/Ogunquit town line, which provides opportunities to connect to the Wells collection system

Figure 4. Map of PS#1 and PS#12

Figure 5. Map of PS#4

or redirect the flows from the Ogunquit WWTP.

The Wells WWTP has not experienced flooding, as most components are at a higher mean elevation than Ogunquit, assets are maintained inside of an elevated building structure, and the plant site lies further inland off the barrier structure. The pump stations, which have flood gates as necessary, have not experienced flooding.

Aging infrastructure

The Wells WWTP was built in 1970. It has been about 12 years since its last major upgrade. HVAC upgrades are underway. Major upgrades are not expected in the next 5 to 10 years.

Changing regulations

The Wells WWTP provides secondary treatment for the town's wastewater and discharges to the ocean, similar to the Ogunquit WWTP. It is anticipated that any changes in regulations that will affect the Ogunquit WWTP will also affect the Wells WWTP and that nutrient removal will be a future requirement for all WWTPs. If this happens, the Wells facility has ample space on site for necessary additions.

Growth & increased demands

The Wells WWTP has a two-million-gallon-per-day (mgd) license and receives approximately 1.2 mgd. The Wells WWTP does not have adequate capacity to accept the sewage flows from Ogunquit; however, the Wells WWTP staff anticipates expanding to add new pump stations for growth north of Route 95. There are extra tanks and adequate land for considerable expansion. Because the facility does not have charter restrictions, accepting sewage flows from other towns, such as Ogunquit, would be permissible. The size and layout of the Wells sewer collection system would likely accommodate the additions that would be necessary to accept flows from Ogunquit during dry weather periods.

Competition for funding

Like Ogunquit, the Wells WWTP is a District-owned facility; however, it is not within a CBRS. It is therefore anticipated that the Wells WWTP will not face the same funding challenges that Ogunquit will have.

Discussion of regionalization option

The analysis of the Wells WWTP site shows some on-site flooding during a 100-year event in 2100, but the level of flooding does not appear to have much impact on the process. Furthermore, the size of the existing site, and need for additional capacity if the Wells WWTP took flows from Ogunquit, would permit construction of new facilities that could be located to mitigate future flood risks.

There appear to be opportunities to connect to the Wells collection system and redirect the flows from the Ogunquit WWTP to the Wells WWTP. Wells has indicated that the amount of infiltration and inflow in the Ogunquit collection system will need to be addressed. Given the risks associated with the Ogunquit WWTP site, it is not recommend converting the plant into a pump station, so as to redirect flows to the Wells WWTP. A specific tie-in point to the Wells collection system, and a reassessment of the Ogunquit collection system, should be evaluated in regards to costs and risks.

ASSESSMENT OF OTHER SIGNIFICANT RISKS TO THE OGUNQUIT WWTP

Facility concerns

There are significant long-term risks to the Ogunquit WWTP related to dune erosion and SLR. The timeframe for planning and addressing these threats is estimated to be 20 to 50 years. There are also other risks to consider during planning, some

Figure 6. PS#1 during present day flooding

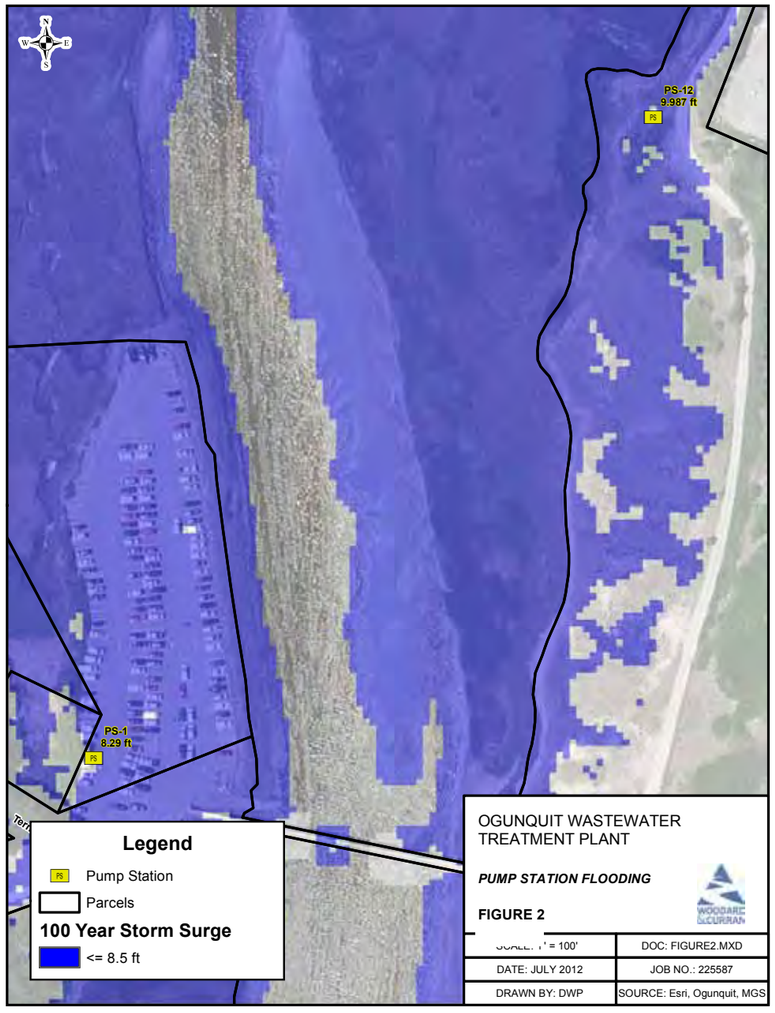

Figure 7. Existing 100-year storm surge at PS#1 and PS#12

of which will need to be mitigated more immediately. It is suggested that they be considered in parallel with the decision about how long to keep investing in the operability of the current plant at the current site.

Yet another planning consideration will be understanding what needs will emerge for implementing improvements to the collection system (pipes, pump stations, manholes, etc.), as there is a significant amount of infiltration and inflow (I/I) to the Ogunquit WWTP. If investing in a new WWTP or sending flow to a neighboring plant, such I/I will likely need to be reduced significantly. This will be driven by economics and regulations. CMOM (Capacity, Management, Operations, and Maintenance) regulations requiring higher levels of collections system performance are now a requirement of the National Pollutant Discharge Elimination System (NPDES) permit renewal process. The Wells plant would have great difficulty in dealing with the I/I currently associated with the Ogunquit collection system.

Pump stations

At a kickoff meeting on April 9, 2012, at the Ogunquit WWTP, concern was expressed for the facility's pump stations; specifically, pump stations (PS) #1, #4, and #12. PS#1 and PS#12 are both near the plant site, as shown in Figure 4. PS#1 has already experienced issues with flooding during such storm events as the Patriot's Day storm on April 16, 2007, as shown in Figure 6. Figure 7 shows how the rim elevations of PS#1 and PS#12 compare to the present-day 100-year storm flood elevation, confirming existing flooding issues. As discussed in Section 3.1 of this Report, this flooding will only get worse over time and exacerbate an existing issue.

PS#4 is in Perkins Cove, as shown in Figure 5, and also has issues with flooding; however,

this pump station, and others further inland and away from the WWTP, is outside the range of the analysis conducted. Data on specific flooding and storm surge impacts is unavailable. Nevertheless, based on the available storm surge elevations, it is anticipated that the storm surge elevations in Perkins Cove are similar to other nearby coastal areas. Although no protective dune exists in this area and the landform along the eastern side of the cove is relatively low-lying, this region is relatively protected from open ocean waves. It should not be subjected to direct impacts from waves, even at the higher water levels predicted by the relative sea-level rise analysis; this would need to be confirmed by modeling.

Aging infrastructure

With the last major upgrade to the Ogunquit WWTP facility occurring in 1993, rehabilitation and/or replacement of components of the facility will be required in the coming years. The costs to maintain and renovate the facility long-term may ultimately outweigh the benefits. In the next five years alone, it is anticipated that the pump room will require work, and an ultraviolet (UV) disinfection system will be installed to maintain the quality of the WWTP.

Changing regulations

The Ogunquit WWTP provides secondary treatment for the town's wastewater, and discharges through an ocean outfall several hundred feet off-shore at a depth of about 30 feet. Although the impact of nutrients (nitrogen and phosphorus) in the Ogunquit WWTP effluent to the receiving waters is not fully understood, nutrient removal will likely be required as a future limitation, as this is anticipated to be applied to all WWTPs as a standard requirement. If this happens, the site has adequate space to add

Figure 8. Coastal sand dune geology (Maine Geological Survey)

tankage and equipment within the plant boundary limits, in addition to existing tankage that may be repurposed for nutrient removal (see Figure 9). However, such upgrades will likely require a significant investment by the sewer district, and state regulations may restrict the construction of additional structures.

Growth & increased demands

Changes in population demographics, including seasonal residents and visitors, can increase sewer usage patterns and put a higher demand on the Ogunquit facility. Summer is a peak season for the town of Ogunquit, and flows spike considerably. Population growth and sewer system expansion are not anticipated to greatly increase wastewater flows to the WWTP in the short term, but must be considered in any facilities planning for the next 20 years.

Competition for funding

The CBRS that the facility is within has regulations that could affect funding for any proposed work. In accordance with the Coastal Barrier Resources Act (CBRA) of 1982, certain activities to develop or rebuild within CBRSs cannot be funded using federal subsidies. Consultation with the U.S. Fish and Wildlife Service may grant the use of federal monies for certain exempted activities within a CBRS, such as emergency assistance. Additionally, if the facility attained federal flood insurance before 1982, the policy may not be renewed upon substantial improvements or damages to the facility.

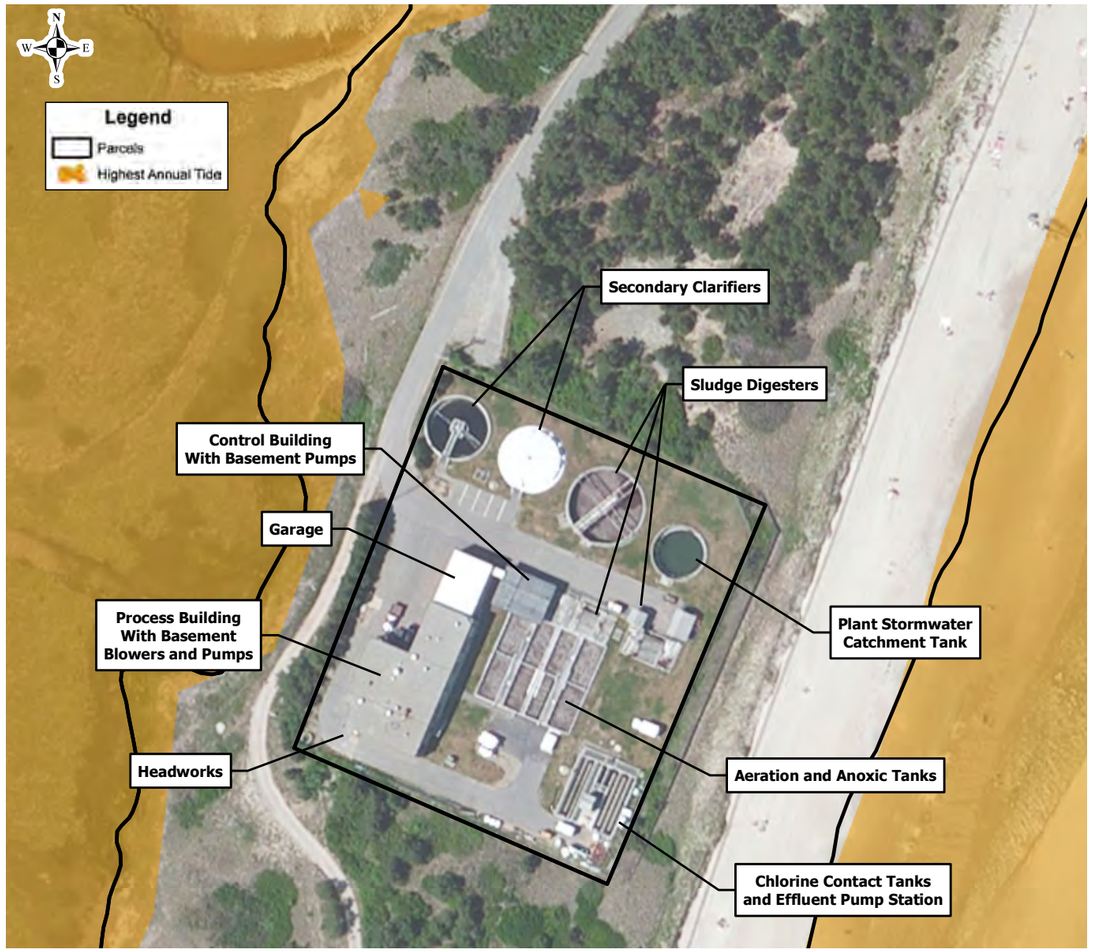

Figure 9. Ogunquit WWTP site layout

The state of Maine recently accepted the federal designation of a CBRS and created the Maine Revised Statute Title 38, Chapter 21: Coastal Barrier Resource System. The governing statute prohibits state funding or financial assistance for any development within the CBRS, unless the project maintains, replaces, reconstructs, repairs, or in limited circumstances, expands state-owned or state-operated structures, facilities or roads identified in §1903(1)(A) of the act. The Ogunquit WWTP may therefore have trouble attaining funds for certain types of projects on the current site.

State and municipal Considerations

The Ogunquit WWTP is wholly within a coastal sand dune system. Coastal Sand Dunes are regulated by Chapter 355 of the MaineDEP Rules, and construction within these systems typically requires a Maine Natural Resource Protection Act (NRPA) permit. Section 5.C. of Chapter 355 stipulates: "A project may not be permitted if, within 100 years, the property may reasonably be expected to be eroded as a result of changes in the shoreline such that the project is likely to be severely damaged after allowing for a two-foot rise in sea level over 100 years. Beach nourishment and dune restoration projects are excluded from this requirement." This scenario is entirely likely.

No new seawalls or expansions of the existing seawall are permitted within the frontal dune system; however, beach nourishment and dune creation, similar to the existing man-made dune that fronts the facility, would be allowed. Figure 8 shows an aerial photograph of the dune system limits. The D1 area represents the frontal dune, and the D2 area represents the back dune system. Frontal dune systems have stricter regulations than do back dune systems. Because of coastal erosion and dune recession (mapped every 10 years), the frontal dune system will eventually progress to engulf larger areas of the project site, so that it will become increasingly difficult to permit any activities that may be needed to maintain or upgrade the facility.

Also, the project site is adjacent to marshlands, indicated by the highest annual tide (HAT) line or 100-year flood elevation, which are regulated by Chapter 310 of the MaineDEP Rules. Activity in and around this resource may also require NRPA permitting. As previously discussed, this area will also begin to engulf more of the site over time, so that permitting certain activities will become more difficult. Refer to Figure 9 for a layout of the site with respect to the current HAT.

Parcel coverage issues could also restrict the level of permitted site work, as the OSD owns the parcel that the facility is on, but the land abutting that parcel is owned by the town of Ogunquit. The rights to construct any work outside the boundaries of the OSD's parcel would need to be granted by the town. If the town of Ogunquit uses the Wells site, or any other neighboring facility, varying municipal requirements may be another factor to consider in that the town's ordinance may need to be evaluated and revised to accommodate another town's potentially more stringent requirements.

Structural concerns

The record drawings for the 1990 facility upgrade indicate that the control building has a finished floor elevation of 12.5 feet, and most tank structures have grade elevations in the range of 10 to 12 feet. The outfall plan and profile record drawings indicate that the extreme high water line at the time of the design was approximately 7.9 feet, and by 2050 this is expected to increase to as much as 9.5 feet during a 100-year storm event. Because of water damage to the structural record drawings, it is unclear which assumptions for design ground/sea water elevations were used for the structural design of tanks and building foundations at the facility.

Increased SLR and storm surge could result in a higher risk of leakage into inhabited basement spaces, as well as floatation of structures. Leakage into the basement of the control building, for example, could severely damage critical electrical and process equipment (refer to Figure 9 for the location of the control building). Because of these expected increases in groundwater elevations (likely above those used as a basis for the original design), if the town of Ogunquit continues to use the existing treatment site, floatation checks should be performed by a structural engineer to ensure that all structures are not at risk for flotation. Furthermore, a structural condition assessment should be performed to evaluate the current condition of structures and the presence of leakage, moisture damage, cracking, deterioration, etc. This further evaluation will provide a more thorough understanding of how much and what type of impact the increased SLR will have on the structures at this facility.

COST ANALYSIS

The capital cost for a new facility the size of the Ogunquit WWTP is roughly $20 million. Without additional information and further study at the Wells facility, it is not certain what the costs will be to upgrade the Wells facility to be regionalized (Wells and Ogunquit); a rough estimate for construction costs at the Wells facility would be $4 million to $12 million. However, the expenses for upgrading and maintaining the collection system and addressing infiltration and I/I will affect the overall construction cost for either a new plant or an upgraded Wells facility.

Aerial view of the Ogunquit WWTP looking north

Without a clearer understanding of the magnitude of the I/I issues at the Ogunquit facility, it is not possible to accurately assess the cost impact.

If a new WWTP is built, the operating costs of the new Ogunquit facility are expected to be similar to the operating costs of the existing facility. The current operation is well managed, and the staffing level and annual expenditure level is good. These factors are not expected to change significantly if a new facility is built. The 2011 audited operating expense for the District was $1,281,847. If a combined facility is established at Wells, staffing will need to increase to accommodate the Ogunquit collection system; however, a combined facility is anticipated to have three to four fewer employees than two separate facilities. Fewer employees

and operating expenses for one combined facility will realize savings in comparison to operating two separate facilities.

The impacts to the sewer rates for Ogunquit have not been studied for either scenario. It is certain that, within 20 to 30 years, either a new plant will be built in Ogunquit or a combined facility at Wells will be established, and there will be significant expenses associated with either alternative. Ultimately, it appears that building a new plant for Ogunquit will likely be the highest cost alternative in both capital and overall operational costs.

POTENTIAL STRATEGY

Included below is an outline of a potential strategy to be considered moving forward. This list includes issues and additional studies discussed above, and which will need to be resolved or completed.

0 to 15 years

- Conduct engineering evaluation of existing structures and identify temporary safeguards for future coastal flood events
- Reduce I/I
- Conduct river flooding study
- Apply for grants & evaluate funding options
- Prepare financial plan

15 to 25 years

- Decide whether to regionalize or construct new facility
- Evaluate potential sites
- Evaluate ordinance and conduct town negotiations
- Begin permitting process

CONCLUSIONS

Ultimately, even under the best case scenarios, there appears to be no practical long-term solution that would feasibly allow the town to continue using the existing treatment site without mitigating the anticipated impacts from SLR and storm surge, which would involve major permitting, funding, and construction, such as elevating the site's assets and/or dune nourishment (rehabilitating a man-made dune retention system) in the frontal dune and salt marsh enhancement in the back dune. If the facility becomes inundated, or needs to shut down for lack of power, the beach will be closed.

Several mitigation strategies were considered in this assessment, such as elevating equipment, installing dune retention systems, relocating equipment, relocating the WWTP, and redirecting sewage flows from Ogunquit to Wells. The best long-term strategy for the Ogunquit WWTP appears to be to move off the existing site. The Ogunquit Sewer District should begin preparing a 20- to 50-year strategic plan that will explore its options. This planning must consider the assets of the entire collection, conveyance, and treatment system to determine the most cost-effective transition plan and timeline. This will enable the district to develop the financial plan or model to determine the future impact to sewer rates. In this way, the district will be able to explore options and set sustainable rates in the coming years to fund the short-term plant investments, as well as longer-term investments that will be necessary for the transition to a regional solution or a new treatment plant. Options to explore may include the formation of an enterprise fund or other capital reserve funding measure.

SUMMARY OF RISKS

Table 1 illustrates the various risk factors as they apply to facility assets or processes. This table compares relative risk assessment based on the criticality of the asset or process with the various vulnerabilities to be considered. In this risk assessment model, the risk number is determined by multiplying the relative criticality ranking with the highest relative vulnerability ranking.

ACKNOWLEDGEMENTS

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- Applied Coastal Research and Engineering, Inc. (2012) Analysis of Sea-Level Rise and Coastal Processes for the Ogunquit WWTP
- Applied Coastal Research and Engineering, Inc. (2012) Memorandum on the Increase in 100-Year Storm Flooding at the Wells WWTP

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| SEA LEVEL RISE, COASTAL FLOODS, AND STORM SURGE AT THE OGUNQUIT, MAINE WASTEWATER TREATMENT PLANT |

Table 1. Vulnerabilities and associated risks on the short-, mid-, and long-term horizons

Ogunquit WWTP Assets/ Process	Asset Criticality	Vulnerability												Comparitive Risk		
		Growth & Expansion Risk			Sea Level Rise/ Beach Erosion/ Storm Risk			Regulatory Risk			Age Related Degradation Risk					
		S	M	L	S	M	L	S	M	L	S	M	L	S	M	L
Headworks	2	1	1	3	1	2	4	1	2	2	1	3	3	2	6	8
Aeration Tanks	3	1	1	2	1	2	4	1	2	2	1	2	3	3	6	12
Clarifiers	3	1	2	2	1	2	4	1	1	2	1	2	3	3	6	12
Disinfection and Eff Pumping	3	1	1	2	1	2	4	1	2	2	1	3	3	3	9	12
Ocean Outfall	3	1	1	2	1	1	4	1	2	2	1	1	2	3	6	12
Sludge Digesters	2	1	1	1	1	2	4	1	1	1	1	2	3	2	4	8
Back up Power	3	1	1	1	1	3	4	1	2	2	1	3	3	3	9	12
Sludge Dewatering	2	1	1	2	1	2	4	1	1	2	1	2	3	2	4	8
Garages	1	1	1	1	1	2	4	1	1	1	1	1	1	1	2	4
Control Building	3	1	1	1	1	3	4	1	1	1	1	1	2	3	9	12
Process Building	3	1	1	1	1	3	4	1	1	1	1	1	2	3	9	12
Site Piping	3	1	1	1	1	2	4	1	1	1	1	2	3	3	6	12
Pumping Stations	3	1	1	2	1	2	3	1	1	1	1	2	3	3	6	9
Collection System	3	1	1	2	1	2	2	1	2	3	2	3	4	6	9	12

Asset Criticality is rated 1-3 (3 highest) and color coded (**1 green**, **2 orange**, **3 red**)

S Short Term (1-10 yrs), **M** Mid-Term (10 – 25 yrs), **L** Long Term (25 – 50 yrs)

Vulnerability is rated 1-4 (4 greatest) and color coded (**1 green**, **2 orange**, **3 purple**, **4 red**)

Comparitive Risk is rated 1-12 (12 highest) and color coded (**1-3 green**, **4-6 orange**, **7-9 purple**, **10-12 red**)

Relative performance of grit removal systems

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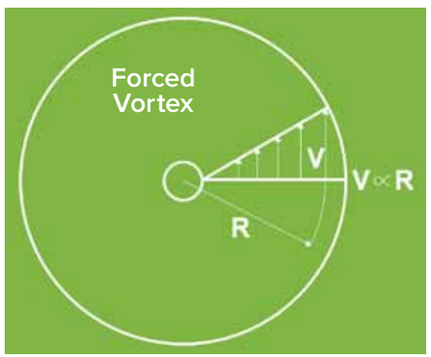
PATRICK HERRICK, Hydro International, Hillsboro, OR

ABSTRACT | Grit is a nuisance material that causes abrasive wear to mechanical equipment, increasing maintenance and operational costs while reducing equipment performance and useful life. Grit that is not captured in the headworks accumulates throughout the plant, reducing capacity and detention time, and adversely influencing flow and circulation patterns.[1] Deposited grit must be manually removed, handled, hauled and disposed. Abrasive wear, process inefficiencies and basin cleaning increase treatment plant operating expenses.

Choosing a grit removal technology has often been based on equipment price with little regard for device efficacy and consequent grit removal efficiency. Owners and engineers must navigate a field of, what can be conflicting, performance claims by various equipment manufacturers. This situation is perpetuated by lack of an accepted peer-reviewed test standard for grit sampling and analysis. This paper encapsulates various grit removal system performance data from a repeatable sampling and analysis methodology to compare virtually all grit removal technologies for effectiveness.

KEYWORDS | Grit, removal efficiency, aerated grit basin, mechanically induced vortex unit, stacked tray system, structured flow unit, detritus tank, test methodology, grit sampling, surface loading rate

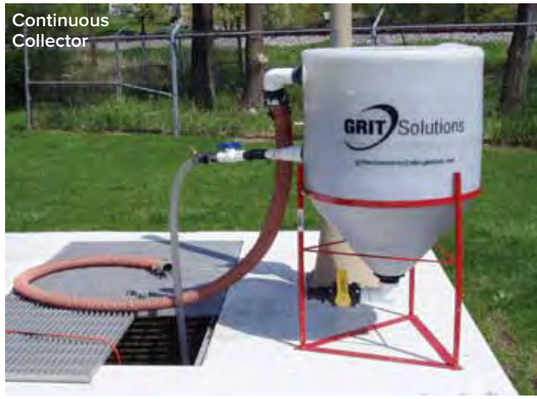


Forced vortex wall velocity increases nearer the edge

INTRODUCTION

As biological processes evolve toward better effluent quality in a smaller footprint, the current trend of housing these processes and systems in smaller and smaller footprints implies an inherent inability to store grit and debris. Treatment plants now operate with reduced numbers of maintenance and operations staff, which in turn is significantly reducing the available resources and time to tackle and address the negative impacts of grit and debris.

Headworks screening and grit removal are the primary protection for all treatment processes and equipment in a wastewater treatment plant, yet it has been the most neglected part of the plant. To improve solids removal, screen openings on influent screens have trended progressively smaller over the past 10 to 15 years. Years ago, screen openings were frequently 25-mm (1 inch) and larger. Today, screens are commonly supplied with 6-mm (¼-inch) openings. Advanced grit removal processes, to effectively remove incoming grit, are logically becoming a higher priority in plant designs.



Some of the equipment used to achieve the objective and repeatable measurement of grit

Selecting grit removal technologies can be a challenge. As there are no standard methods for the comprehensive measurement and analysis of sampled grit, most parties use conventional ASTM D-422 to obtain the physical particle size distribution of grit collected by various means. Standard Method 2540 for solids testing is used for determining total, fixed, and volatile solids. A method that engineers and owners have found effective splits the sample with half being tested via ASTM D-422 and the other half being wet sieved and characterized based on settling velocity.[2] In addition to physical size distribution, settling velocity is often the most important and useful criterion in grit system design.

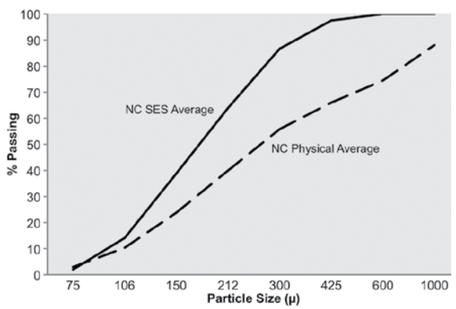
Settling velocity is central to grit system design as technologies used to collect influent grit are predominantly sedimentation processes.[2] Sedimentation basins and aerated grit basins (AGB) are recognized as gravity processes. Vortex processes using a forced vortex-type flow regime also rely predominantly on gravity for separation. When the force balance on a particle is evaluated within a forced vortex-type flow regime in a basin, gravity is shown to be the predominant force, well in excess of the centrifugal forces generated by slow rotational velocity.

While settling velocity is important in grit system design, the removal efficiency data presented in this paper is based on particle size distribution alone and does not consider settling velocity. Settling velocity is discussed elsewhere.[3] As most performance guarantees are based on 2.65 specific gravity (SG) observed performance can vary widely from performance claims. While some of the variance is certainly attributed to the SG of grit being less than 2.65 and other factors,[3] wide variations from performance claims are likely influenced by other factors such as short circuiting and/or inaccurate sizing.

METHODOLOGY

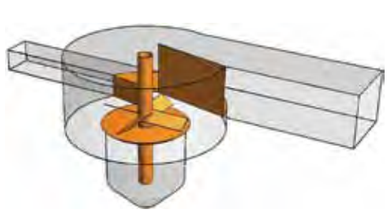
Effective test methodology must provide accurate, consistent, repeatable and reproducible results. One of several grit sampling methods used by owners and engineers is the vertical slot sampler (VSS). The VSS draws off a known vertical slice of the influent water column to provide an accurate sample of incoming solids. Although not detailed in ASTM manuals or standard methods, sampling using the VSS has produced repeatable, effective results that allow efficiency comparisons at different treatment plants.[4] Further, results determined with the VSS corroborates with the operating history and performance at those plants with respect to grit removal, suggesting the accuracy of the test method.[5] This same test methodology can be used for comparison of grit removal efficiency of various technologies.

The VSS methodology in the referenced studies provides a repeatable sampling and analysis methodology that allows relative comparison of removal efficiency for different devices. The test methodology typically includes a margin of error of +/- 5 percent



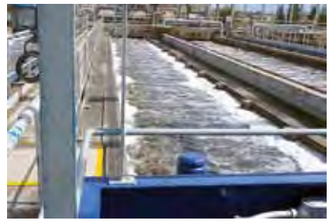
North Central Average	% Cumulative Passing							
	75	106	150	212	300	425	600	1000
Physical	2.96	10.35	23.8	39.93	55.81	65.99	74.48	88.08
SES	2.03	14.11	38.82	63.91	86.64	97.49	100	100

USA north central states* regional average gradation SES/physical data
*MO, KS, KY, IN, OH, IL, MI, WI, IA, MN, ND, SD, NE



Mechanically induced vortex unit

Detritus tank



Aerated grit basin

and is described elsewhere.[2, 4] Data collected and presented herein has been made available in various industry publications and reports as cited.

Hampton Roads Sanitation District (HRSD) performed comprehensive testing at five of its wastewater treatment plants in 2007 and 2008 using the VSS sampling method. The equipment tested included three different mechanically induced vortex systems (MIV), a Detritor system and an aerated grit system (AGB).[4] During the same period, HRSD conducted a side-by-side pilot test comparing the stacked tray Eutek HeadCell® unit and the structured flow Grit King® unit. Both systems were tested for removal efficiency using the VSS sampling method[7].

Data collected on the HRSD AGB has been excluded from this paper. During the above referenced testing, which was performed on dry weather flows, grit was settling in the force main as there was not sufficient energy in the collection system to transport grit to the plant. At peak diurnal flows the velocity in the force main was 0.5 m/s (1.7 fps), when 0.9 to 1.5 m/s (3.5 to 5.0 fps) is needed to re-suspend settled solids and grit.[6] Therefore, data from testing on the AGB was inconclusive. However, the same collection and analysis methodology was used in Columbus, Ga., on an AGB; that data is included in this paper.

This paper provides removal efficiency, using identical and consistent sampling and analysis methodology, of virtually every type of grit removal technology, thus allowing comparison of removal efficiency of these technologies. The processes represented include AGB, vortex grit removal systems, and detritus tanks. The vortex units include mechanically induced vortex (MIV) units, stacked tray units, and structured flow vortex units.

RESULTS

Mechanically induced vortex (MIV) units

HRSD Chesapeake-Elizabeth Treatment Plant—The Chesapeake Elizabeth treatment plant (CETP) is a 91-ML/d (24-mgd) capacity plant operating with an average flow of approximately 72 ML/d (19 mgd). Grit removal equipment consists of two 7.3-meter-diameter (24-foot-diameter) MIV units; one unit was in operation during the study. Design removal parameter for each unit is 95-percent removal of 150-µm particles, 2.65 SG, at 114 ML/d (30 mgd), and 95-percent removal of 270-µm particles, 2.65 SG, at 265 ML/d (70 mgd). Average flow during testing was 71.1 ML/d (18.79 mgd), which is well below the rated capacity of the grit unit. The observed removal efficiency was 48 to 52 percent of all grit 150 µm and larger and 45 to 50 percent of all grit 106 micron and larger. Removal efficiency of particles >297 microns, a slightly larger particle than the performance claim, was 72 to 78 percent or roughly 20 percent less than the claimed removal.

HRSD Virginia initiative Plant—The Virginia Initiative plant (VIP) is a 151-ML/d-capacity (40-mgd-capacity) plant with an average flow of approximately 110 ML/d (29 mgd). The plant employs three 6.1-meter-diameter (20-foot-diameter) MIV units; one unit was in operation during the study. The vortex manufacturer states that each unit will remove 65 percent of 150-µm grit, 2.0 SG, at 101 ML/d (26.7 mgd). Average flow during three days of testing was 99.2 ML/d (26.23 mgd), very near the rated capacity of the grit units. The observed removal efficiency was 43 to 45 percent of all grit 150 µm and larger, 20 percent below the claimed efficiency, and 43 to 44 percent of all grit 106 micron and larger.

Detritus tank

HRSD James River Treatment Plant History—The testing at HRSD included that at the James River treatment plant (JRTP), which operates detritus tanks for grit removal. The JRTP is a 76 ML/d-capacity (20-mgd-capacity) plant with an average flow of approximately 49 ML/d (13 mgd). The JRTP employs four detritors. Each detritor is 8.5 meters (28 feet) in diameter with a design capacity of 24.6 ML/d (6.5 mgd). Each unit removes grit particles of 150 µm and larger, with 2.65 SG. Average flow to the plant during three days of testing was 48.75 ML/d (12.88 mgd) with one of the detritor units out of service; therefore each unit was processing approximately 16.27 ML/d (4.3 mgd) or roughly 33 percent below rated capacity. The observed removal efficiency was 66 to 73 percent of all grit 150 µm and larger and 57 to 68 percent of all grit 106 microns and larger.

Table 1. Removal efficiency	% Removal efficiency				
	#50 Mesh (>297 microns)	#70 Mesh (<297 microns >211 microns)	#100 Mesh (<211 microns >150 microns)	Total % removal 150 µm and up	Total % removal 106 µm and up
MIV					
Chesapeake-Elizabeth treatment plant (HRSD)					
May 17, 2007	72.6	19.1	7.0	48.1	45.8
May 18, 2007	77.8	28.9	14.7	52.1	50.9
Virginia initiative plant (HRSD)					
May 20, 2007	57.7	29.8	22.7	45.3	44.3
May 21, 2007	60.5	26.8	23.2	45.1	43.7
May 22, 2007	59.3	33.2	27.9	43.3	43.3
Detritus tank (James River treatment plant—HRSD)					
Jun 17, 2007	81.8	72.6	41.7	66.2	57.3
Jun 18, 2007	76.9	77.2	66.6	73.2	67.7
Jun 19, 2007	82.6	74.7	55.3	71.2	64.2
Aerated grit basin (Columbus, GA—SWRC)					
Jan 27, 2008	81.8	49.8	42.2	70.5	67.2
Jan 28, 2008	53.0	13.5	21.7	35.6	32.5
Jan 29, 2009	66.3	60.0	44.4	58.7	53.1
Stacked tray system (Army base treatment plant—HRSD)					
Dec 17, 2007	95.8	90.4	81.5	91.9	88.8
Dec 19, 2007	95.7	93.0	85.6	92.5	89.3
Structured flow vortex unit (Army base treatment plant—HRSD)					
Dec 17, 2007	93.6	89.4	78.7	90.3	87.5
Dec 19, 2007 – 112 gpm	97.4	94.3	89.0	95.0	92.7

Aerated grit basin

Columbus, Ga. South Water Reclamation Facility—The city of Columbus, Ga.'s south water reclamation facility (SWRC) operates four AGB units that receive a combined average daily flow of approximately 106 ML/d (28.0 mgd). A rain event occurred on January 28, 2008, increasing the flow to 143.84 ML/d (38 mgd) with a maximum hourly flow of 185.5 ML/d (49 mgd). As seen from the results below, when the flow to the grit chamber increased the removal efficiency decreased, as would be expected.

The plant has two AGBs that are 5.18 by 11.89 meters (17 by 39 feet) and two basins 3.96 by 10.97 meters (13 by 36 feet). While no design removal efficiency data exists, total surface area available for grit settling is 210 sq. meters (2,262 sq. feet). Based on the average flow of 106 ML/d (28.0 mgd), the AGB system has a surface loading rate (SLR) of 0.35 m3/min./m2 (8.6 gpm/ft2) and would be expected to remove a significant percentage of fine particles, 106 microns and below. The plant notices a decrease in removal efficiency at flows in excess of 132.5 ML/d (35 mgd). Once the flow reaches 132.5 ML/d (35 mgd) the SLR increases to 0.435 m3/min./m2 (10.7 gpm/ft2). Based on SLR alone the basin would still be expected to retain a percentage of fine particles at 132.5 ML/d (35 mgd) with particle size retained increasing, and overall capture efficiency decreasing, as flow continues to rise.

Stacked tray system

Structured flow system

The observed removal efficiency was 35 to 70 percent of all grit 150 µm and larger and 32 to 67 percent of all grit 106 microns and larger when the wet weather data is included. Removal efficiency improves to 58 to 70 percent of all grit 150 µm and larger and 53 to 67 percent of all grit 106 microns and larger during average flow of 106 ML/d (28.0 mgd). While excluding the performance during the wet weather event indicates improved performance, removal efficiency is well below what would be expected based solely on SLR.

Stacked tray system

While considering a new grit system for its Army Base treatment plant (ABTP), HRSD tested two grit removal technologies side-by-side in December 2007. The stacked tray Eutek HeadCell® unit was tested side-by-side with a Grit King® structured flow unit using the same sampling and testing methodology. During the pilot test the stacked tray HeadCell unit was fed at 38.6 – 38.8 m^3/hr (170 to 171 gpm). At that flow rate the stacked tray unit was designed to remove 95 percent of all grit 75 microns and larger, with 2.65 SG, however performance was not tested for 75 micron particles. The observed removal efficiency was 92 to 93 percent of all grit 150 µm and larger and 89 to 90 percent of all grit 106 microns and larger.

Structured flow system

During the side-by-side testing the 1.2-meter-diameter (4-foot-diameter) structured flow Grit King® pilot unit was fed at a rate of 38.8 m^3/hr (170 gpm) on December 17 and 25.4 m^3/hr (112 gpm) on December 19. Design removal parameter at the higher flow is 95 percent of all grit 106 micron and larger, 2.65 SG. At the lower flow of 25.4 m^3/hr (112 gpm) the removal would be expected to be 95 percent of all grit 75 microns and larger, 2.65 SG, however removal efficiency for 75 micron particles was not reported. As would be expected, the removal efficiency improves at the lower flow rate as loading rate to the unit is reduced. The observed removal efficiency was 90 to 95 percent of all grit 150 µm and larger and 87 to 93 percent of all grit 106 microns and larger.

DISCUSSION

As seen from the above data, testing results for the mechanically induced vortex technology were considerably below the manufacturers' claimed removal efficiency even when running the unit well below design flows. The results indicate this technology had its highest observed removal efficiencies for large grit particles—more than 60-percent removal of particles larger than 297 microns—and very low performance removing smaller particles, with less than 30-percent removal of particles 210 microns and smaller.

At CETP the MIV was designed to remove 95 percent of grit 150 microns and larger, with 2.65 SG at a flow of 114 ML/d (30 mgd). When operating at 63 percent of the design flow (71.1 ML/d [18.79 mgd]), the observed removal efficiency of grit particles 150 microns and larger was 48 to 52 percent, which is more than 40 percent less than the stated claim. The 7.3-m-diameter (24-foot-diameter) MIV unit has a surface area of 41.83 sq. meters (452 sq. feet), resulting in an estimated SLR of 1.18 m^3/min./m2 (28.97 gpm/ft^2) at 71.1 ML/d (18.79 mgd). Based on the SLR the MIV technology would be expected to retain a large percentage of particles approximately 165 microns and larger. The observed removal efficiency for much larger particles, 297 microns and larger, was only 72 to 78 percent. The low removal efficiency suggests the importance of considering the likely effects of grit settling velocity and other criteria.

Based on operational data from VIP it was found that placing more vortex units into service improved grit removal. During 2007 the plant averaged 99 ML/d (26.2 mgd) and used one vortex unit 83 percent of the year. For 2008, two vortex units were in service for 75 percent of the year and grit production increased 50 percent over 2007 performance. HRSD determined that operating a vortex close to the maximum rated hydraulic efficiency may not be advisable for some treatment plants. Further, they concluded that with this technology placing additional grit removal units in service during high hydraulic events can minimize the impacts of grit slug loads on downstream unit processes.

While test data indicates the Detritus tank achieves higher removal efficiency than the MIV technology, the Detritus tank also fell short of design removal efficiency while operating at 66 percent of design flow. Test data shows relatively high removal efficiencies of large grit particles, 77-percent removal of particles larger than 297 microns and, as would be expected, reduced capability of removing smaller particles, 64-percent removal of particles 210 microns and smaller. Although an older style technology, sampling and analysis for the detritus tank displayed some of the higher removal

Table 7. Relative performance of grit removal devices

Technology	Design flow %	Design removal efficiency at 100% flow	Observed total % removal 150 µm & up	Observed total % removal 106 µm & up
MIV	27 – 90	95% removal of 270 µm, 2.65 SG 65% removal of 150 µm, 2.0 SG	43 – 52	43 – 50
Detritus tank	66	150 µm and larger, 2.65 SG	66 – 71	57 – 68
AGB	66 – 100	Unknown	35 – 70	32 – 67
Stacked tray	100	95% removal of 75 µm, 2.65 SG	91 – 92.5	89 – 90
Structured flow vortex	66 – 100	95% removal of 106 µm, 2.65 SG	90 – 95	87 – 93

efficiencies of the technologies tested. Removal efficiency would be expected to decline at peak design flow.

The AGB results were comparable to those for the Detritus tank during the plant average flow; 58 to 67 percent of all grit 106 microns and larger was removed. During wet weather when the system received the design flow rate, removal efficiency was reduced to 32.5 percent. Even considering the small increase in flow during the rain event, which was around 135 to 175 percent of average, the quantity of grit increased substantially from 3.36 g/m^3 (28.1 lbs./MG) to 8.89 g/m^3 (74.2 lbs./MG). The fraction of grit smaller than 297 microns also increased significantly. The increased grit quantity and elevated fraction of small grit resulted in the observed poor removal efficiencies. A reduction in removal efficiency at higher flows is expected; however, during the elevated flow, influent grit concentration also increased by more than 2.5 times the prior day dry weather influent levels. A removal efficiency of 32 to 35 percent of the heavier grit load will obviously not be adequate to protect the plant from deposition and abrasive wear.

The stacked tray system and structured flow unit test results exhibited very high removal rates. While the performance results for these two technologies were performed as a pilot study, they are consistent with full-scale performance tests, using the identical test method, at other facilities.[8, 9] Measured removal efficiency for both technologies was slightly below manufacturers claimed removal efficiencies, within +/- 8 percent. This small deviation is very near the margin of error in testing. Comparatively, these two technologies provide very high removal efficiencies of large grit particles, 93-percent removal of particles larger than 300 microns. The observed removal efficiency of particles 150 to 210 microns was only slightly less and ranged from 78 to 90 percent. Both of these technologies displayed the highest removal efficiency of those tested; in all cases greater than 87.5 percent of all influent grit 106 microns and larger was captured.

CONCLUSIONS

Grit sampling using the VSS method produces results that are repeatable, accurate and effective. The results corroborate with grit system performance and plant operating history; therefore, this data provides insight into what most operators experience. Using this common testing method allows comparison of performance of various grit removal technologies and can improve grit system design and justify advanced processes.

Based on the reported and referenced testing, the technologies that displayed the lowest removal efficiencies were AGB and MIV. The observed removal efficiency for both technologies was well below claimed removal at peak flows. The AGB displayed a relative removal of only 32 percent of all grit 106 microns and larger when operated at peak design flow. Results for the AGB improve to 53 to 67 percent when influent flow to the unit is reduced to 66 percent of design.

The MIV technology removed 43 to 51 percent of incoming grit 106 microns and larger when operated at 27 to 90 percent of design flows. As is true of all SLR-based technologies, the MIV technology shows higher removal efficiencies at lower flows. When operating near design flow rate, removal efficiency was in the 43- to 45-percent range for all grit 106 microns and larger. As flows decrease, to 63 percent of average flow and 12 percent of peak flow, the efficiency increases, but only marginally, to 45 to 50 percent removal of grit 106 microns and larger.

The detritus tank displayed a higher removal rate, removing 57 to 69 percent of all grit 106 microns and larger when operating at average flows, near 66 percent of peak design flow. The AGB displayed similar results when operated at 66 percent of peak flow. When flows increased to peak, the AGB removal efficiency dropped to 32 percent,

and the detritus tanks would be expected to have similar results as flows increase.

The structured flow vortex and stacked tray vortex units had very high removal rates, none lower than 87.5 percent of incoming grit 106 microns and larger. These results are significantly (20 to 55 percent) higher than any of the other technologies tested. Over the life of the facility, the difference in captured grit is substantial. Also, high removal was achieved with the equipment running at peak design flow. None of the technologies tested met their performance claim exactly, although the technologies that targeted the finest particles displayed the best results and came closest to achieving their performance claim. Systems designed for high removal efficiency of small particles, 106 microns and finer, should remove 85 percent or more of grit entering the plant.

The observed decrease in performance with increased flows strongly suggests that the tested technologies are greatly influenced by loading rate and gravity to capture and retain grit. A better understanding of in-situ grit settling velocity will allow for more efficient design, which would afford the plant increased protection from abrasive wear and deposition.

Wet weather is important in grit system design. The impact of wet weather flows was documented during testing of the ABG in Columbus, Ga. Given the small increase in flow during the rain event, 135 to 160 percent of average, the quantity of grit increased much more dramatically, to more than 2.5 times the volume entering the plant during the prior-day average flow. One would expect the greatest increase would be with coarse grit particles but the overall gradation was finer. Grit quantities increased across all size ranges, but the grit fraction larger than 297 microns decreased, from 61.7 to 39.0 percent, while particles in the 105- to 210-micron range increased from 20.6 to 39.7 percent of the total. Overall, a 60-percent increase in flow resulted in a 48-percent decrease in performance.

Significant increase in grit volumes during wet weather events is common10 and indicates the need to design the grit system for effective removal at peak hydraulic loadings. The AGB and MIV performed poorly at peak design flow and based on the data the detritus tank would be expected to perform similarly to the AGB. Observed removal efficiencies were less than what would be expected based on SLR alone, indicating process inefficiencies or grit settling velocity implications.

Designing the grit removal system for high removal efficiency at peak hydraulic loading will protect the plant from the negative impacts of grit. Advanced, compact, high-efficiency grit removal processes are therefore the more appropriate proven choice to protect plants from deposition, abrasive wear, and associated costs from this nuisance material.

ACKNOWLEDGEMENTS

The authors would like to thank Cliff Arnett, senior vice president, Columbus Water Works, and Mike Taylor, superintendent, Columbus Water Works, South Columbus water resources facility for permission to use data from their testing and for additional information to compile the comparisons.

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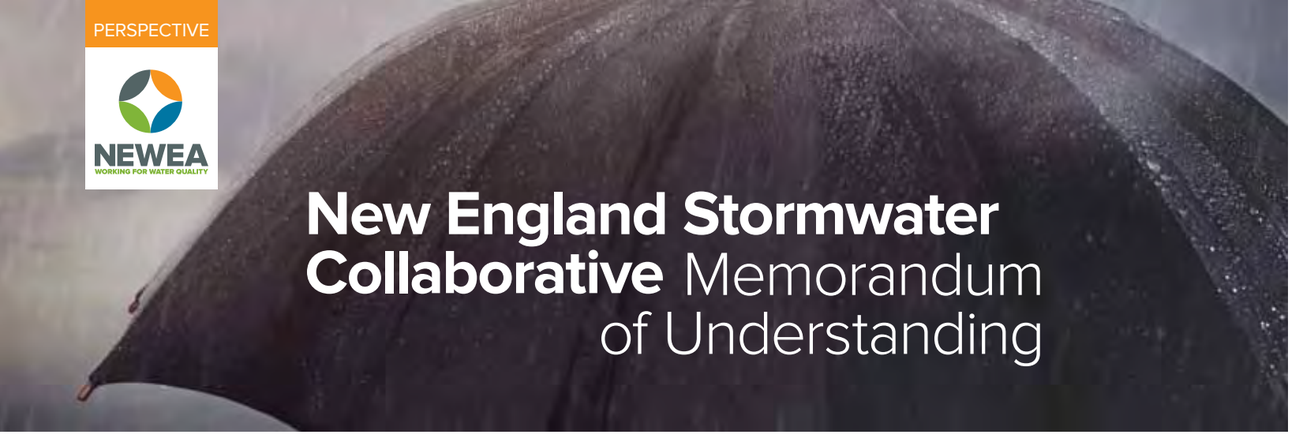


PERSPECTIVE

New England Stormwater Collaborative Memorandum of Understanding

Stormwater Collaborative Formed for all of New England...

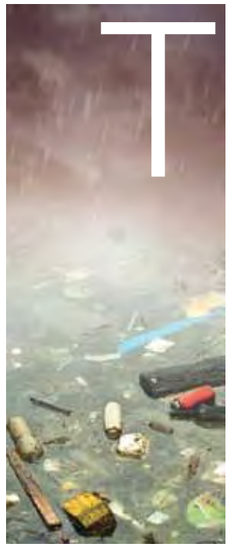
Initiative to Focus on Education, Understanding, and Action...

This fall, the New England Water Environment Association (NEWEA New England Water Works Association (NEWWA), and New England Chapter – American Public Works Association (NEAPWA) formed the New England Stormwater Collaborative. The group will identify and determine New England-wide stormwater educational and informational needs, and ways the collaborative can most effectively educate, advocate, and respond to stormwater issues affecting the region.

"Concerns about stormwater, and its potential to have adverse impacts on the environment and our water quality, affect the members of all three of our organizations as well as the public as a whole," said Brad Moore, president-elect, NEWEA and superintendent, Bangor Wastewater Treatment Facility. "Forming the New England Stormwater Collaborative will allow us to advocate, educate, and act on issues in a team-oriented environment that will enable us to broadcast a consistent message across the drinking water, wastewater, and public works sectors."

The Stormwater Collaborative consists of Steering and Working Committees comprised of members of each association who meet regularly to discuss issues and determine action items. Their first task is to develop an educational product that will address stormwater needs of New England communities using survey results from members of all three associations. Additional initiatives include developing position papers; responding to state, regional, and federal stormwater rulings; creating outreach materials and fact sheets; and providing a clearing house for information and resources on stormwater across the region.

The New England Stormwater Collaborative was formed by the New England Water Environment Association, New England Water Works Association, and New England Chapter – American Public Works Association in 2013 with the conceptual drivers of EDUCATION, UNDERSTANDING, and ACTION. The collaborative works to engage the stormwater community, provide the forum for information and education exchange, and advocate the realm of stormwater.



This Memorandum of Understanding (MOU) establishes a collaborative partnership among the parties:
New England and Water Works Association
New England Chapter—American Public Works Association
New England Water Environment Association

I. MISSION

The conceptual drivers of EDUCATION, UNDERSTANDING and ACTION is the mission of the collaborating New England organizations to:

- Engage the stormwater community
- Provide the forum for information and education exchange
- Advocate the realm of stormwater

II. PURPOSE AND SCOPE

Stormwater refers to rainwater or snowmelt that travels over land surfaces as runoff. Stormwater pollution results when this runoff picks up, carries and transports various pollutants (oil, grease, chemicals, dirt, sediment, nutrients and pathogens) along streets, drains, open channels, and storm sewer systems, and is eventually discharged into nearby water bodies, having an adverse effect on water quality.

Within our shared organizations, stormwater management has been increasingly emphasized. Shaping how our industry identifies and responds to stormwater issues will affect water quality, our communities in New England, and society as a whole.

The stormwater collaborative will identify and discuss stormwater issues in New England, sector needs, and ways the collaborative can most effectively educate, advocate and respond in the realm of stormwater.

III. FORMATION AND TASKS

- Upon the mutual adoption of this MOU the New England stormwater collaborative shall be officially formed.
- The collaborative shall be lead initially by a steering board consisting of three members from each association. For example, the association president, president-elect and executive director or whomever the association decides will represent it on the steering board.
- The collaborative will include a nine-member working committee. The committee shall comprise three appointed representatives from each organization.
- By mutual agreement of the committee and the board, tri-chairs will be identified with one chair representing each organization. One tri-chair will be selected as chair for one year. The other two will serve as vice chairs.
- The collaborating organizations direct that the first task of the committee will be to develop an educational product. A proposal and budget will be presented to the steering board for approval by their respective organizations.
- On behalf of the committee, tri-chairs will provide progress updates at each organization's board meetings.
- Upon completion of the first task—the steering board will evaluate the function and make-up of the committee, and review the contents of the MOU and recommend next steps.

PREVISIONS

Also, the committee will consider the following:

- Explore specific aspects of stormwater collection, operations, maintenance, permitting, funding, capital improvements, and public education, communication and outreach
- Strive to be recognized as leading collaborative for stormwater issues in New England
- Integrate resources to promote coordinated stormwater in New England
- Identify and respond to state, regional and federal stormwater rulings when drafted
- Develop position papers
- Create outreach materials and fact sheets
- Provide a clearing house for information and resources that track the effectiveness of stormwater solutions throughout New England

September 2013

Guest editors needed

Want to contribute to the *Journal*?

Consider becoming a guest editor. The guest editor works with *Journal* editor to identify and review papers for an issue. If interested, please email Helen Gordon at hgordon@woodardcurran.com.

NEBRA Highlights

Fred McNeill (city of Manchester, N.H.) explaining recent upgrades to the wastewater facility fluidized bed reactor at the 2013 Northeast Residuals & Biosolids Conference

Update on anaerobic digestion in Maine

In the spring of "2013 NEBRA Highlights," we discussed the new anaerobic digestion facilities at the Lewiston-Auburn Water Pollution Control Authority (LAWPCA). Here's an update.

LAWPCA started on the path to anaerobic digestion at its Lewiston plant in 2008. What was just an idea is now a reality: In May 2013, seed waste from the Nashua, N.H. anaerobic digester was fed to Digester No. 1, and the LAWPCA plant became the first municipal water resource recovery facility (WRRF) in Maine to run anaerobic digesters.

The seven-year process included ambitious goals:

- Reduce the carbon footprint of the facility
- Eliminate the need for landfilling off-season solids
- Add to the facility's solids capacity
- Add a source of renewable energy to the community
- Keep sewer rates reasonable

On September 10, 2013, during an Open House and Celebration, the new generators started humming, and the flare that had been burning biogas was extinguished. Maine dignitaries were understandably proud and thrilled with LAWPCA's accomplishment. The following day, 49 eager and curious wastewater professionals descended on the plant for a hands-on workshop sponsored by NEBRA, the NEWEA Energy Committee, Maine Joint Environmental Training Coordinating Committee, Maine Wastewater Control Association, and LAWPCA. Travis Peaslee, LAWPCA's assistant superintendent, paced the grounds like an expectant father as Mac Richardson, LAWPCA's superintendent, confidently explained the details. LAWPCA's footprint now includes two new digesters, a gas containment vessel, gas treatment, two new generators, and a heat recovery and pumping building.

Among the projects benefits include:

- 40-percent reduction of solids generated
- Reduction of lime usage
- Increased flexibility and capacity to store waste solids
- Potentially a two-thirds reduction of power usage by using two biogas-powered generators
- Reduction of heating fuel usage through digester heat recovery
- Availability of digester capacity to receive outside wastes for co-digestion

Highlights since start-up include:

- Average volatile solids reduction: 51 percent over 30-days solids-retention time
- 41-percent reduction in overall biosolids volume
- Wetter belt filter press cake than before, but ongoing tweaking of polymer should help
- Operation of the generators has been finicky; still improving
- Making 175-kW most of the time now, expected to increase
- Staff still adjusting to new routines associated with new infrastructure

LAWPCA Superintendent Mac Richardson explains the biogas treatment system

All of this was accomplished with no rate hikes, because LAWPCA had just finished paying off a major bond and also received small grant funding. As Richardson stresses, in LAWPCA's case, the main economic advantage of the project was reduction in solids volumes and solids management costs. The combined heat and power is "icing on the cake," he says.

It took years for the idea to become a reality; but by staying the course LAWPCA is now generating power from biosolids.

1

2

3

Northeast Residuals & Biosolids Conference: 1. Mike Van Ham spreads excitement about biosolids as a solution to myriad environmental challenges 2. Jessica Bunker visits the trade show booths of NHWWA 3. (L to R) Mike Van Ham, Charley Hanson, and Andrew Carpenter (President of NEBRA) enjoying the land application tour

"From 503 to Infinity"—The 2013 Northeast Residuals & Biosolids Conference

The Part 503 Biosolids Rule has stood the test of time and guided biosolids decision-making for 20 years. The architects of the Part 503 were in turn guided by sound science, research, and a need to influence biosolids recycling safely and reasonably. Those architects were the honored guests and featured speakers at this year's NEWEA/NEBRA Residuals & Biosolids Conference held on October 29 and 30 in Concord, N.H. Today's decision-makers reflected with Drs. Jim Smith, Rufus Chaney, and Alan Rubin about the history of the 503 rules and what comes next. Looking toward the future of biosolids recycling, Michael Van Ham of Sylvis Environmental of Vancouver, B.C., reminded us all that biosolids are not a waste but a solution to some challenging environmental problems, such as remediation of superfund sites, reduction of greenhouse gas emissions, renewable energy, and treatment of landfill methane and leachate.

This year's conference included tours of Manchester, N.H. incinerator upgrades and land application of biosolids next to downtown Concord. The second day of the conference overlapped with the New Hampshire Water Works Association (NHWWA) annual trade fair, and one session on use of water treatment residuals was shared by the two events. Feedback was positive; "It was the best one yet," said one attendee.

All conference presentations are available for download at nebiosolids.org.

Vermont biosolids forum

On November 5, the Vermont Department of Environmental Conservation (DEC)—Watershed Management Division—Wastewater Program, held a biosolids forum to explore concerns of local citizens about the recycling of biosolids to soils. St. Leo's Hall in Waterbury, Vt., was packed with representatives from the Vermont DEC, biosolids generators and consultants, farmers, concerned citizens, several interest groups, and NEBRA representatives. The atmosphere was both positive and collaborative regarding the benefits of biosolids. Farmers from Essex and Stowe explained the benefits they receive from using biosolids: slow-release nutrients, reduced chemical fertilizer needs, and significant cost savings. Lorenzo Whitcomb saves $100 per acre on fertilizer costs by using Essex Junction biosolids.

Charley Hanson pointed out that synthetic fertilizer costs have risen 619 percent since 1990, and biosolids, rich in phosphorous and nitrogen, is a long-proven alternative that recycles local nutrients. Josh Tyler of Chittenden Solid Waste District (CSWD) indicated that the city of Burlington could save $51,000 to $68,000 if it changed from landfill disposal and, instead, shipped biosolids to the new Casella Organics lime-stabilization facility in Chateaugay, N.Y., for treatment and land application (CSWD is likely to enter into a contract for such services this winter). Jeff McBurnie (Casella Organics) stressed that, as population increases, our sustainability depends on wise recycling of resources. Land application of well-managed and treated biosolids reduces the burden to limited-capacity landfills. Ned Beecher of NEBRA addressed the most significant concern being raised by local citizens: microconstituents in

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biosolids. He stressed that toxicity is determined by dose, transport, and fate of biosolids constituents, and research does not indicate any likely significant harm to human health or environmental organisms from these biosolids-borne trace contaminants. Abe Noe-Hays (Rich Earth Institute) gave testimony regarding the value of source-separated urine as fertilizer, which they are demonstrating in a pilot project in Brattleboro, Vt.

Standing room only for the joint session held with NHWWA at the Northeast Residuals & Biosolids Conference

During most of 2013, there have been one or two vocal biosolids opponents writing letters to editors, legislators, biosolids managers, and others. Despite being included on the agenda of the forum, neither of the two most prominent objectors showed up. So, only two of the more than 80 forum attendees spoke against biosolids recycling. Naomi Leary, representing Toxics Action and Vermonters Against Toxic Sludge, suggested urine-diverting dehydration private toilets with door-to-door collection as a solution to replace current wastewater infrastructure. Ross Saxton (Lake Champlain International, Burlington, Vt.) urged caution, claiming there is not enough research regarding the safety of biosolids use.

The November forum also introduced a process to revise the state's biosolids rules. Those rules mostly predate the 20-year-old EPA 40 CFR Part 503 regulations and include more restrictive standards for molybdenum, chromium, and arsenic (the latter standard was applied recently). Vermont also has more frequent and stringent monitoring requirements. The state will soon announce the start of the pre-rule-making process, which could lead to new rules late in 2014. Those in attendance at the November forum spoke in favor of revising the rules to current standards and best practices that ensure continued support of land application. As Ned Beecher noted, the state's biosolids recycling rate is at 29 percent; there is much room for improvement, and new rules could help or hinder the state in reaching its goals of keeping more organic residuals out of landfills.

Two weeks after the Vermont DEC biosolids forum, CSWD commissioners held their own biosolids education session, with some of the same speakers presenting. Again, the most vocal opponent to biosolids use was on the agenda but did not appear. CSWD General Manager Tom Moreau and Project Manager Josh Tyler summarized their extensive review of the literature, especially regarding microconstituents in biosolids. Judging from commissioners' questions and statements, it appears likely that, at their December meeting, they will vote to approve a five-year contract with Casella Organics to have Burlington and other area community biosolids treated at the Chateaugay facility for land application in upstate New York.

Mass DEP organics waste ban

As long promised, the Massachusetts Department of Environmental Protection (MassDEP) has proposed a regulatory change that "would add 'commercial organic material' to the list of materials banned from disposal..., effective July 1, 2014." The amended regulation will be part of 310 CMR 19.017 and related provisions in 310 CMR 19.000. "The department is also making the draft waste ban guidance document for solid waste facilities and guidance for waste haulers and generators available for review and comment...." Public hearings were held in early August. Details are available on the MassDEP Web site. The RecyclingWorks Web site also has information and guidance.

Meanwhile, Massachusetts has begun to formally create private-public partnerships for construction and operation of anaerobic digestion facilities on state lands, including at the Amherst wastewater treatment plant next to the University of Massachusetts. The facilities are intended to help provide capacity for managing the hundreds of thousands of tons of source-separated organics—food waste—that will be diverted from landfills when the proposed organics ban goes into effect.

At the same time, the Massachusetts Water Resources Authority continues its evaluation of the potential for co-digestion at the Deer Island treatment plant, where there is enough digester capacity to possibly take up to half the food waste targeted for diversion over the next several years.

NEBRA and other stakeholders continue to work with MassDEP to clarify solid waste and sludge management rules, to ensure that the dramatic increase in organic residuals products that will be entering the market next year are adequately, but not overly, regulated. NEBRA has repeatedly raised the concern that the state sludge rules are woefully outdated and deter safe and beneficial uses of biosolids in the state.

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NEBRA comments on federal rules

Late this fall, public comment ended regarding two major proposed new federal regulations affecting biosolids: the U. S. Food & Drug Administration (FDA) "Produce Safety Rule" and the EPA NPDES program "Electronic Reporting Rule." NEBRA submitted comments to both, focusing on the proposed rule's treatment of biosolids.

The proposed FDA rule includes biosolids as one of many "biological soil amendments" available to farmers, just like animal manures, NEBRA stated:

"We commend FDA and the authors of the Food Safety Modernization Act (FSMA) for the explicit focus on scientific analysis and risk assessment in the creation of the proposed regulations. This careful science was already evident in FDA's discussion of biosolids in the 1998 'Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables.' In that document, FDA formally recognized the significance and effectiveness of the pathogen controls required for biosolids by 40 CFR Part 503, the EPA regulations for the use and disposal of sewage sludge (biosolids).... This scientific rigor has also been evident in FDA's (and partner agencies') approach, over recent years, in analyzing outbreaks of food-borne illness, using environmental assessment modeling.... We appreciate that FDA clearly recognizes the efficacy of the 40 CFR Part 503 biosolids regulations and is 'not proposing to implement further restrictions (Fed. Reg., 2013, p. 3578).' This is important in avoiding duplicate or conflicting regulations that unnecessarily hamper producers and stymy the recycling of biosolids and other beneficial soil amendments.... It is clear from this and past FDA actions that the agency properly recognizes that biosolids are, in reality, just one of several biological soil amendments commonly in use, that biosolids are currently adequately regulated for safety, and that all such amendments should be managed in similar ways to reduce the risk of human or environmental impacts."

Regarding the proposed EPA NPDES program Electronic Reporting Rule, at press time NEBRA was developing comments for the mid-December deadline, with a focus on the implications of the rule for biosolids management. NEBRA's concerns are:

- It is imperative that EPA ensures only quality data are published publicly; thorough validation and data review systems should be included in the system, and corrections of errant data should be easily and quickly instigated by facilities to which the data pertain.
- EPA's electronic reporting system should be compatible with the variety of state electronic reporting systems and those used by private companies to the extent that data uploaded to one of those more local systems can be easily transferred into the national database system.
- EPA should carefully phase in any new computer system, piloting it with a few facilities in each of several states, to ensure it works well, before going live to the thousands of facilities nationwide.
- EPA needs structures and personnel trained to support the new system and to address the questions and concerns that will inevitably arise. EPA has been disinvesting from the biosolids program, and continues to see dramatic budget cuts across the board. If those continue, rolling out a new program like that proposed may be a mistake, unless funding is secured for adequate implementation and support.
- For now, EPA should require reporting of only those biosolids data required by current federal Part 503 regulations. It should not add additional data reporting requirements or increase the scope of the data collection to include facilities with design flow less than 1 mgd (now exempt from reporting), which the proposed rule raises as a possibility. Once the electronic reporting system is working well, expansion of the scope of data collected and the facilities involved can be considered.

Contact the NEBRA office for a copy of the final comments.

Welcome new NEBRA members!

Biosolids Generators .....Town of Newmarket, NH WWTF; Ithaca Area Wastewater Treatment, NY
Consultant .....BDP Industries, Greenwich, NY
Individuals .....Scott Woods, Chelmsford, MA; Jim Konatsotis, Wilton, CT

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nebra
North East Biosolids & Residuals Association

NEWEA
WORKING FOR WATER QUALITY

Maine State Director Report

by Peter Goodwin
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Clean water week

In recognition of Maine Clean Water Week (June 3-7, 2013) Maine Wastewater Control Association (MWWCA) again sponsored a poster competition for students in grades 3 through 8. The theme of the competition was "what clean water means to me."

This year nearly 300 posters were received from throughout the state, and at the MWWCA spring conference, winning posters were selected by the association's membership, including the top three posters. The winners were honored at NWWCA's 2013 fall convention or a school assembly. The top three poster winners received cash prizes and the top 12 posters will once again be featured in the 2014 MWWCA calendar.

During the judging at the spring conference, water colors and posters that had a "true Maine theme" were a big hit with the members. This year the top three posters all came from Ms. Haven's 6th grade class in East Waterboro. The talented students in Ms. Haven's class all used colorful designs and shared a great message about what clean water means to each of them.

Clean Water Week—Poster contest winners pose with their winning entries, backed by MWWCA officers and ME Governor Paul Lepage

MWWCA Vice President Aubrey Strause, Second Vice President Tom Connolly, and Public Relations Chair Matt Timberlake spent a few hours with the three winning students at a ceremony on June 3 at the Maine State House with Governor Paul LePage. The winning students —Sofia Irons, Nick Rocray and Faith Ledger— should be proud of the work they have done.

Steve Sloan (left) & Phil Ryan at PWD EEWWTF

Operator exchange

This year MWWCA hosted Phil Ryan from the wastewater division in Haverhill, Mass. Phil is a veteran of the program, having participated in previous years in Vermont and New Hampshire. Phil insists that the knowledge and relationships he has developed by participating in the exchange are invaluable. Many thanks are due to the hard working and professional staff from the Kittery Sewer Department, the Saco water resource recovery facility, the Portland Water District-East End WWTF, and the Lewiston-Auburn water pollution control facility (LAWPCA), which provided comprehensive technical tours of their facilities.

Anaerobic digestion and energy workshop

On September 9, the LAWPCA, MWWCA, NEWEA Energy Committee, North East Biosolids and Residuals Association, and Joint Environmental Training Coordinating Committee offered a one-day workshop and open house on anaerobic digestion and energy generation at the LAWPCA wastewater treatment facility, in Lewiston. Forty-nine attendees and presenters celebrated Maine's first municipal anaerobic digesters with a full day of training and tours. Many thanks to Mac Richardson and Travis Peaslee from LAWPCA for hosting the event.

Spring conference

MWWCA's spring conference was held on April 26 in South Portland, and was very well-attended—quite an accomplishment for the first sunny, warm Friday of the year. For the first time, the personnel advancement committee (PAC) included a session track dedicated to stormwater, and attendee evaluations indicate this decision was a hit. In addition to the stormwater track, other sessions included I-pad and tablet applications, CSO LTCP, and nutrient removal. Nearly 100 professionals from across the MWWCA membership attended and participated in the voting for the Clean Water Week Poster Competition. The NEWEA awards announced in January at the NEWEA Annual Conference were re-presented locally at a luncheon ceremony.

Non-dispersibles

Our own Aubrey Strause (Verdant Water) and Scott Firmin (Portland Water District) have been local, regional, and national leaders to address non-dispersibles. Aubrey presented on behalf of MWWCA at the WEFMAX conference in Providence, R.I., on May 3, informing attendees from across the country about what MWWCA, NEWEA, and the WEF house of delegates are doing to advance legislation and public knowledge on this important issue. Scott Firmin is working with the WEF Collection Systems Committee's flushables technical group leader Rob Villee (Plainfield Area Regional Sewerage Authority, New Jersey) and HOD Non-Dispersible Workgroup Chair Hiram Tanner (DC Water) to develop a national strategy for non-dispersibles. Aubrey and Scott both represented MWWCA and NEWEA in a "Wipe Out" presentation and panel discussion at WEFTEC 2013 in Chicago, Ill., in October. WEF blocked out four hours in the WEFTEC schedule for this session because of the rapidly growing interest on the issue. The National Association of Clean Water Agencies (NACWA), pump equipment vendors, and representatives from the wipes manufacturers also participated.

Proud members of the 2013 MWWCA management training class

The MWWCA non-dispersibles working group participated in the kickoff meeting for the MWWCA/ INDA "Don't Flush Baby Wipes" 2013 Pilot Education Campaign on September 5, 2013. Michelle Clements (Portland Water District), Tom Connolly (Yarmouth), Jen McDonnell (Casella), and Aubrey Strause (Verdant Water) represented the group. INDA's director of marketing and representatives from manufacturers Kimberly-Clark, Procter & Gamble, Suominen, Rockline, Nice-Pak, and Nehemiah also attended. The estimated cost of a public education campaign pilot is $113,000. A formal proposal from Burgess Advertising and Marketing revised the original proposal and estimate to include purchase of television spots in the target market, as was discussed by the group at its kickoff meeting. INDA and several of its member companies have agreed to fund most of the cost of the pilot.

Fall conference

Magnificent weather greeted the membership for the annual fall conference held at Sugarloaf Resort in Carrabassett Valley on September 19 and 20. The conference committee—chaired by Andre Brousseau from the Sanford Sewerage District and assisted by our exceptional support team of Joan Kiszely, Nancy Sargent, and Melissa Carver from the Maine Municipal Association—were well prepared for the conference. The conference kicked off on September 18 by a golf scramble on the challenging Number 1-rated golf course in Maine. The weather and views were exceptional and the golf memorable. It was rumored some non-golfer attendees enjoyed another afternoon of skeet shooting hosted by Carrabassett Valley District's David Keith.

More than 30 hours of training, seminars, and case studies were developed by the professional advancement committee chaired by Mike Stein of Woodard & Curran. Of particular note was a roundtable discussion on the proposed intra-state operator exchange program being developed. Nearly 60 vendors, contractors, and consultants filled the exposition areas at the base lodge.

The annual business meeting and MWWCA awards presentation were held on Thursday. NEWEA President Mike Bonomo provided the keynote address and urged the entire membership to engage in public education by visiting a school or other public venue to talk about the value of water. Mike also spoke about the Water's Worth It campaign.

At the business meeting, the 2014 MWWCA Officers were announced and MWWCA Awards were presented. Also, the latest class of the highly successful management candidate school was acknowledged. The meeting included the culmination of a one-and-a-half-year program led by the executive committee to change the association name to the Maine Water Environment Association, an effort that included several surveys and a 75-percent approval vote of the membership.

NEWEA
WORKING FOR WATER QUALITY

New Hampshire State Director Report

by Fred McNeill
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The New Hampshire Water Pollution Control Association (NHWPCA) continues to be an active and vibrant organization promoting the water industry. NHWPCA participated in several legislative, educational, and association activities in 2013 that we share below.

Permitting symposium

In June NHWPCA hosted its second NPDES permitting symposium at Derryfield Country Club in Manchester. The theme of this year's symposium was Compliance in a Challenging Regulatory Environment. A variety of stakeholders spoke at the symposium, including environmental attorneys, consultants, wastewater treatment plant (WWTP) operators, and municipal officials. NPDES permits with nutrient limits and the draft MS4 stormwater permit dominated the symposium's discussions. New Hampshire has five seacoast WWTPs that are all being issued nitrogen limits in their NPDES permits. The state's internal WWTPs that discharge into the Merrimack River are being issued phosphorus limits. The cost of compliance with the proposed nutrient limits amounts to hundreds of millions of dollars. The draft MS4 permit will regulate stormwater in 49 southern New Hampshire communities that are home to 75 percent of the state's pollution. As with the NPDES permits, the MS4 permits will cost additional hundreds of millions to achieve compliance. The conclusion of the symposium was that the NHWPCA must continue to promote rational, reasonable, and cost-effective environmental regulations based on sound science.

Summer meeting

Later in June, NHWPCA held its annual summer meeting at beautiful Ellacoya State Park on the shores of Lake Winnipesaukee in Gilford. Since nutrient limits are dominating the New Hampshire wastewater industry, a technical session was provided in the morning that focused on testing for various forms of nitrogen and phosphorus.

Ray Vermette of Dover receives recognition for his Operator Ingenuity presentations at WEFTEC from WEF President Cordell Samuels

The afternoon was filled with a delicious cookout and ice cream bar for dessert. Participants enjoyed several outdoor sports, including volleyball, horseshoes, and swimming.

Golf tournament

In August NHWPCA hosted its 23rd annual golf tournament at the historical Beaver Meadow Golf Course in Concord. The association is proud to support the city of Concord's 117-year-old municipal course, one of the three municipal courses in New Hampshire. In return, guests were treated to a well-manicured course, exceptional services from the hardworking staff, and a delicious meal both before and after our tournament. Twenty-five teams battled out for low gross and several skill prizes, including closest to the pin, long drive, and straightest drive. A putting contest supported the Sewer Snakes, our national champion Operations Challenge team, and the association's scholarship fund. After golf the players enjoyed a steak cook-out, awards ceremony, and fellowship with professional colleagues and friends from throughout the state.

Events

The NHWPCA winter meeting is scheduled to be at the Nashua WWTP. Nashua recently completed dewatering, aeration, and clarifier upgrades. Engineers, equipment vendors, and Nashua staff will be on site to answer questions during morning tours. After the tours, the meeting will continue at the Crowne Plaza for technical presentations, our annual business meeting, and a visit from Santa. Other upcoming NHWPCA events include:

- March 2014 – Legislative Breakfast in Concord
- March 2014 – NEWEA/WEF Congressional Breakfast in Washington, D.C.
- April – NHWPCA 34th Annual Trade fair in Manchester
- June 2014 – NHWPCA Summer Meeting at Ellacoya State Park in Gilford
- August 2014 – 24th Annual NHWPCA Golf Tournament at Beaver Brook in Concord

The association has monthly board of directors' meetings at the Concord WWTP. If you wish to attend or have an item for the agenda, please contact me at FMcNeill@ManchesterNH.gov.

The New Hampshire Seacoast Sewer Snakes Operations Challenge team poses across the water from the Portsmouth shipyard (l-r Mike Carle, Paula Anania {coach extraordinaire}, Tim Vadney, Mike Baker, and John Sykora)

WEFTEC

In early October I attended WEFTEC in Chicago to witness the largest water industry trade show in the country. WEFTEC broke its attendance record as more than 22,000 water professionals attended the four-day conference. There were several New Hampshire highlights at this national event. New Hampshire's Ops Challenge team, the Seacoast Sewer Snakes, took second place in the Process Control Event in Division I. Congratulations to Coach Paula Anania and team members Mike Baker, Mike Carle, John Sykora, and Tim Vadney. Former NHWPCA President/NEWEA State Director Ray Vermette won not one but two awards in WEF's national operator ingenuity contest. Ray's "Waste Not, Want Not—Polymer Tote Rack" and his "Mess Prevention in Process Control—Aerated Sludge Tank Sampler" were both winners. Last, the pilot testing at the Portsmouth WWTP was presented by Jon Pearson of AECOM at one of WEFTEC's technical sessions to a standing-room-only audience.

Fall meeting

The famous literary community of Peterborough hosted NHWPCA's fall meeting in September. More than 100 water professionals gathered to tour the town's recently upgraded 0.62-mgd facility that went on line in March 2012. This plant features sequencing batch reactors to address—you guessed it—nutrient removal. Other upgrades included screening, grit removal, sludge thickening, odor control, and disinfection. After the morning tours of the WWTP, the meeting moved to the Monadnock Country Club for lunch, presentations, and, for a lucky few, golf afterwards.

A highlight of the fall meeting was hosting our operator exchange with Vermont. Nathan Lavallee, chief operator of the Milton, Vt. WWTP, joined us for two days of tours, camaraderie, and festivities. On Thursday he visited plants in Lebanon, Hanover, and Concord. That night Nate shared dinner with the NHWPCA board of directors. On Friday Nate started his day touring the Manchester WWTP and then attended our fall meeting in Peterborough.

Vermont State Director Report

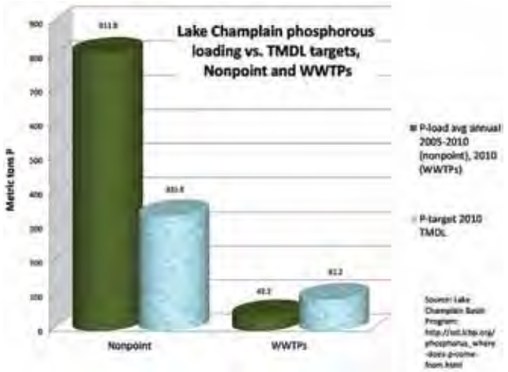
by Bob Fischer
bfischer@montpelier-vt.org

I have to start with the sad news of the passing of my predecessor, friend and mentor, current Past GMWEA President Bob Wood. Bob dedicated himself to our industry and although 81 years young, he was doing groundbreaking work with Purpose Energy. The revolutionary anaerobic digester he was testing and operating is more efficient than your traditional design. For years, Bob was chairperson of the GMWEA continuing education committee and has served on many NEWEA Committees through the years.

Clean water week

Vermont Department of Environmental Conservation (DEC) Commissioner David Mears appointed DEC Environmental Engineer Jeff Fehrs as the new GMWEA representative and DEC Wastewater Program Manager Ernie Kelly as the alternate. This fills a position that has been vacant for over a year, and the change has enhanced the exchange of information.

On August 13, 2013, municipalities in Vermont received notification from DEC requesting that discharges from authorized CSOs during storm events now have to be reported to DEC as unauthorized CSOs have always been. Communication between DEC and GMWEA clarified that at this time it is a request (voluntary) requirement; however, it will likely become mandatory in the future. On August 20, 2013, members of the GMWEA government affairs committee met with Commissioner Mears, in a private meeting, to discuss the upcoming Lake Champlain phosphorus TMDL and the current Long Island Sound Nitrogen TMDL. GMWEA realizes the extremely difficult responsibilities DEC has been tasked with and appreciates the free exchange of information. On the Connecticut River basin side of Vermont the nitrogen allowance has been determined, and it is now up to DEC to allocate the nitrogen allowances. GMWEA disagrees with the current EPA allocation, as the Long Island Sound TMDL computer model shows no advantage when assuming zero nitrogen discharge from Vermont facilities. We do fully understand that the mandate is by EPA and that there is only a limited nitrogen



allowance for DEC to allocate. The concern, as always, is that by once again pressuring communities that have already made improvements to discharge less nitrogen than comparably sized communities that have not invested in upgrades, the wrong message is being sent. It is always troubling when good behavior is penalized. One positive aspect is that DEC has started to write some NPDES permits on the Connecticut side of the state.

On the Lake Champlain basin side of Vermont, public comment meetings took place in November 2013 on the upcoming phosphorus TMDL. DEC has been unable to write NPDES permits since 2007 because of a Conservation Law Foundation (CLF) appeal of the 2007 city of Montpelier NPDES permit and the subsequent court case. The appeal

(continued on page 68)

GMWEA Spring Meeting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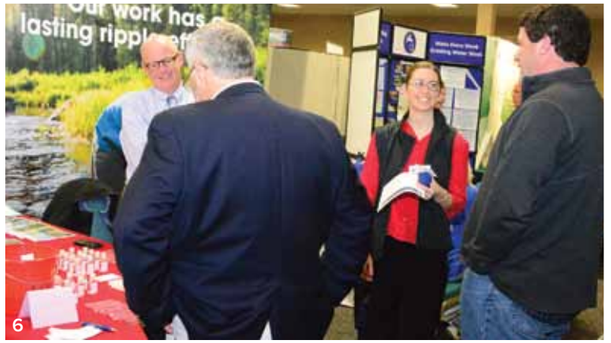
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1. A packed technical session 2. Erik Bailey 3. Steve Crosby 4. Michele Eisenstein 5. NEWEA President Mike Bonomo and NEWWA President Dave Harris 6. Traffic was brisk on the vendor floor 7. GMWEA President Bob Fischer with New Hampshire Exchange Operator Ken LeBlanc

The spring meeting was held at the Killington Grand Resort on May 23, 2013. It was attended by NEWEA President Mike Bonomo and New England Water Works Association (NEWWA) President Dave Harris. GMWEA awards were given out; two directors (Steve Crosby and Erik Bailey) were re-elected, and one new director (Michele Eisenstein) was elected. The featured speaker was Jeff Wennberg, current commissioner for the city of Rutland Department of Public Works and former Vermont DEC commissioner. During his presentation he said that the CWA is the most successful piece of environmental legislation ever enacted, but although regulation, education, and technical advances are clearly part of the story, the biggest reason for its success was the funding. Federal and state grants enabled communities to afford the billions of dollars of capital investment needed for success. He further said that we need to recognize that the cost of incremental progress is growing exponentially as financial resources dwindle and that we need to get our clean water priorities all "on the same page" rather than allowing competing requirements for stormwater, CSOs and phosphorous removal to waste resources and stifle opportunities to maximize environmental benefits. Regulatory policy would begin with realistic standards, address each jurisdiction individually, establish jurisdiction-specific priorities for improvements, consider local resource capabilities, and set requirements and timetables that maximize achievable environmental benefits. He said EPA's integrated planning and permitting policy approach provides a rational framework for integration but offers compliance schedules without real regulatory relief. He concluded that when local, state and federal resources are in short supply we must address the highest local public health and environmental priorities first, or we run the risk that despite the expenditure we fail to protect both.

(*continued from page 66*)
was decided in CLF's favor at the environmental and Supreme Court levels as it was ruled that DEC cannot issue a new five-year NPDES permit at the existing phosphorus limit (0.8 mg/L) if the facility has achieved a lower level during the previous NPDES permit (0.37 mg/L for the 2002 to 2007 period), because the higher limit violates the Clean Water Act (CWA). The CLF also appealed the Lake Champlain TMDL, resulting in the new limit, by law, being written by EPA instead of DEC. Since the last TMDL had target limits that only wastewater facilities had met (wastewater target 91.2 metric tons/actual 42.2 metric tons vs. nonpoint target 335.8 metric tons/actual 811.8 metric tons), EPA is requiring a TMDL that lays out real actions with quantifiable results. The new TMDL is going to impact everybody, but it appears that wastewater targets will once again be reduced significantly, in spite of the excellent showing against targets—good behavior to be punished again. DEC is discussing options, but since they are only modeling 0.2 mg/L and 0.1 mg/L, discharge limits will probably be very low, and this is likely to cost rate payers a lot for little real environmental benefit. It is easy to see why some groups feel the CWA doesn't care about "bang for the buck." Current Vermont statutes mandate that any requirements on wastewater facilities for phosphorus reductions below 0.8 mg/L will be funded by the state, but in deference to a CLF agreement on delegation, DEC plans on asking the Vermont legislature to rescind that statute (which is in violation of the CWA) when the legislature reconvenes in January. Instead, as the legislature previously directed DEC to find funding for phosphorus reductions, DEC will be requesting a state-wide assessment or another method to help people (farmers and others) do their part in the reduction so that the new TMDL limits can actually be met. The commissioner stressed, however, that if that measure passes, no money will be included for wastewater because "there is no bang for the buck there."

Finally, DEC produced a new MS4 permit last year and it was promptly appealed by CLF. In September 2013, there was a settlement that responds to the CLF's first concern and allows public review and appeal rights of the flow restoration plans (something not in the original MS4 permit) and defers resolution of the CLF's second concern regarding how long a schedule of compliance can be until all stakeholders have evaluated the flow restoration plans. CLF was gracious to send us the settlement before it was released; kudos again to the GMWEA government affairs committee for getting us a "seat at the table" and helping to facilitate dialog among all the groups.

My concern is always about unintended consequences. As costs increase (potentially significantly) for rate payers, there is a real possibility that to pay for new mandates commensurate savings may be sought that decrease the actual quality of plant performance. Continual negative responses from well intentioned, but practically flawed, legislation may cause more harm to the environment than good.

NEWEA spring meeting

June 2 to 5, 2013: I participated in the NEWEA spring meeting in Brewster, Mass., attending numerous meetings and technical sessions. GMWEA representation was strong, as usual.

GMWEA golf tournament

Almost 100 players and sponsors took part in the George Dow Memorial Golf Tournament on August 23, 2013. The proceeds help fund a GMWEA scholarship.

World water monitoring day

GMWEA again gave out 100 WWM kits to Vermont educators. GMWEA also lent out our HACH 890 meter and reagents to several schools for additional testing.

GMWEA activities

On July 18, 2013, more than 50 members attended GMWEA Night at the Ball Game, in Burlington, including a barbeque and seats to watch the Vermont Lake Monsters. On September 14, 2013, GMWEA members attended GMWEA Goes to the Races at Devil's Bowl Speedway, in Fair Haven, where dinner was served and several members raced during intermission with cars provided by the track.

Vermont state science and math fair/Stockholm Junior Water Prize

GMWEA board members judged the students work and selected the Vermont winners and the Stockholm Junior Prize winner on April 13, 2013, at Norwich University.

Trade show

The GMWEA fall trade show was held in Burlington on November 7, 2013. Nearly 100 vendors participated and 360 water professionals attended from across the state. Vermont hosted the New Hampshire exchange operator during this time. New Hampshire hosted the Vermont operator September 19 and 20, 2013, where he toured four facilities and attended the New Hampshire fall meeting.

With GMWEA having a new executive director (Mary Ellen Parkman, formerly of Stantec Engineering), a new Web site, and a new logo, these are exciting times as we move ever forward. For further information regarding GMWEA/NEWEA activities and events, contact Vermont Director Bob Fischer at bfischer@montpelier-vt.org or go to gmwea.org.

Connecticut State Director Report

by Kevin Cini
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It is hard to believe my Connecticut state director's term is coming to an end. I have enjoyed working within NEWEA over the past three years, and I've developed an even greater appreciation for the dedication and effort put into everything the association does. In January 2014, Jay Sheehan will be taking over as state director. As many of you know, Jay is very accomplished and poised to do a great job in this role.

CWPAA and LabACT

The Connecticut Water Pollution Abatement Association (CWPAA) has seen many accomplishments in 2013, from our successful annual trade show to our co-hosting events with the Connecticut Lab Analysts association (LabACT). LabACT has had a busy year. On May 10, it hosted an educational seminar, "What's it all about.... Algae?" Some of the informative topics were:

- Nutrient bio extraction from urban estuaries, a discussion of the value of seaweed as a resource and as a means of increasing water quality by Professor Charles Yarish
- Innovative clarifier cleaning system for algae control by Dave Drobiak, a description of Jewett City's solution for clearing algae from clarifiers as a means to control a snail problem
- Algae may fuel your car someday by Carmela Cuomo, regarding the extraction of biodiesel fuel from Long Island Sound Algae
- Future sushi by chef Bun Lai, demonstrating the making of delicious sushi from vegetarian and sustainable seafood resources, which resulted in one of the luncheon choices—a sushi and vegetarian buffet.

Lab ACT 's annual meeting, "Permit This Not That," on December 6, included topics on NPDES permit renewal and new permit requirements for Connecticut as well as UV disinfection and its relation to bacterial testing. The meeting was at the Department of Energy & Environmental Protection (DEEP) Marine Headquarters in Old Lyme.

CAWPCA

The Connecticut Association of Water Pollution Control Authorities held its fall conference on November 1 in Cromwell. The conference included a networking breakfast, a presentation about sewer acceptance in Old Lyme, several "flashpoint" (20-minute) presentations, including updates on Metropolitan District Commission activities, renewable energy opportunities, and "non-flushables." Members from DEEP spoke about funding for projects, NPDES permits, and Connecticut operator licensing. The morning was capped off with a presentation about effective wastewater legislation.

Ops exchange

Connecticut's participation in this year's NEWEA Operator exchange led to Richard Hartenstein from the town of Stafford being hosted by the Narragansett Water Pollution Control Association (NWPCA) in Rhode Island. Over three days in the Ocean State, he toured seven plants and finished the week at the annual NWPCA trade show and clam bake. Richard offers his thanks to all who were involved, with special recognition to Scott Goodinson, Joe LaPlante, Douglas Nettleton, Bob Mack, Brent Herring, Bernie Bishop and of course NEWEA's Rhode Island state director, Janine Burke.

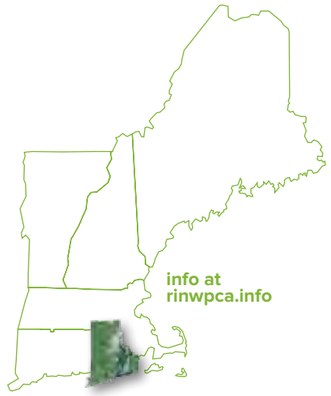
It has been a rewarding three years as the Connecticut state director. I'll remember these days fondly, and I also look forward to still being a part of NEWEA and continuing to work with all the fine people I have met over the years.

Dave Drobiak, a presenter at the 2013 LabACT spring conference, is shown here with Carmen Krzesik of Meriden WWTP in the midst of a tour group

Professor Charles Yarish shows off his seaweed research and aquaculture laboratory

Rhode Island State Director Report

by Janine Burke
janine.l.burke@warwickri.com



Vendor exhibition and clambake

The Narragansett Water Pollution Control Association's (NWPCA) annual vendor exhibition and clambake took place on September 6 at Twelve Acres Banquet Facility in Smithfield. Forty-one vendors signed up to exhibit their products and services to more than 200 attendees. NWPCA gave out tee shirts to everyone in attendance displaying the NWPCA logo on the front and Water's Worth It! across the back.

After the morning exhibition, which also included an Operations Challenge-style pipe cutting competition, attendees enjoyed a traditional New England clambake, including clam cakes and chowder, mussels and little necks, lobsters, steaks, potatoes and corn on-the-cob. There were raffles (with prizes donated by all the vendors) as well as a horseshoe tournament. In addition, NWPCA presented college scholarships of $500 each to the following students:

- Suzanne Bates, University of Rhode Island
- Rose Weeden Kenyon, George Mason University
- Jacob Maggs, University of New Hampshire
- Nicole Starkey, University of Massachusetts-Dartmouth
- Stephanie Tamburrino, Rhode Island College

Randy Sposato, Dave Robbins, Gary MacDonald, Russell Demeulenaere, and Dave Salvador

Golf tournament

On June 20, NWPCA held its annual golf tournament at the Cranston Country Club. Tournament event committee co-chairs Lisa Feitelberg (Feitelberg Industries), Carmine Goneconte and Joe LaPlante (Narragansett Bay Commission), and all their dedicated volunteers worked hard to make this a very successful day. Proceeds from the event contribute to NWPCA's training and scholarship programs and the Operations Challenge team. In addition to more than 20 tee sponsors, major corporate sponsors included Baker Corporation, CDM Smith, CH2MHill, Elmwood Sports, Feitelberg Industries, F.R. Mahoney & Associates, Inland Waters Synagro Technologies, United Water, Veolia Water-NA, and Whole Foods Market.


Tom Therrian, Steve Wold, Douglas Nettleton and Bernard Bishop

Awards event

Rhode Island's wastewater treatment facility operators gathered on May 16 at the Cranston Country Club to recognize outstanding facilities and clean water professionals for their performance and contributions in 2012.

NWPCA presented the following awards at its annual event:

- **Town of Jamestown—***United Water Award*—most efficient small secondary wastewater treatment plant
- **Town of Warren** (Operated by United Water)—*Wright-Pierce Award*—most efficient medium secondary wastewater treatment plant
- **Narragansett Bay Commission, Fields Point treatment facility** *Veolia Water North America Award*—most efficient large secondary wastewater treatment plant to the
- **Town of East Greenwich**—*CDM Smith Award*—most efficient medium advanced wastewater treatment plant
- **City of Woonsocket** (operated by CH2MHill)—*Baker Corporation Award*—most efficient large advanced wastewater treatment
- **Town of West Warwick**—*Joseph Mattera Award*—for demonstrated outstanding commitment to safety (sponsored by Tutela Engineering)
- **Scott Goodinson**, Warwick Sewer Authority—*James Marvelle Award*—for demonstrated leadership excellence as an active and contributing member of NWPCA (sponsored by Synagro Technologies) to
- **Alan Linsky**, Veolia Water, Cranston—*Inland Waters Award*—for outstanding contributions in advancing collections systems knowledge to
- **Walter Timpson**, South Kingstown regional wastewater Treatment facility—*Robert J. Markelewicz Award* -- For outstanding contributions to wastewater treatment system maintenance (sponsored by Thompson Pump)

Guest speakers included Rhode Island Secretary of State Ralph Mollis and NEWEA President Mike Bonomo.

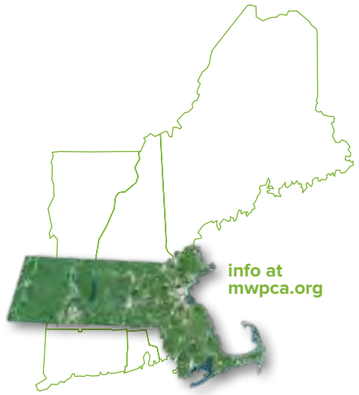

Walter Timpson accepts the Robert J. Markelewicz Award and a citation from RI Secretary of State A. Ralph Mollis (left) and NWPCA President Douglas Nettleton (right)

The following NEWEA award winners were also recognized:

- **Peter Trombetti**, Narragansett Bay Commission—*Alfred E. Peloquin Award*
- **Thomas Ciolfi**, United Water, Bucklin Point —*Operator of the Year Award*
- **Paul Nordstrom**, P.E., Narragansett Bay Commission—*E. Sherman Chase Award*
- **BettyAnne Rossi**, Warwick Sewer Authority—*Crystal Crucible Award*

Massachusetts State Director Report

by Ray Willis
rwillis@onsite-eng.com



Since my last report in the Spring 2013 *Journal*, there have been several events hosted by the Massachusetts Water Pollution Control Association (MWPCA) to provide educational opportunities to our members and promote the water quality industry. This report will review those activities and describe other developments.

Public outreach and jobs

Recently, MWPCA participated in two events to support public outreach. First, MWPCA attended the "Jobs in Drinking Water and Wastewater Sector" workshop in September 2013 initiated by the Lowell Center for Sustainable Productions and the Massachusetts Workforce Alliance. This workshop was aimed at connecting water quality professionals with workforce alliance and placement groups to fill the projected 2,400 operations-related jobs expected to be required in the next 5 to 10 years. In October 2013, MWPCA was invited to furnish a featured speaker at the Massachusetts Green Career Conference. The conference session, "Water Quality Professionals: Enforcing the Right to Clean Water," was geared toward promoting the water quality profession and informing attendees about opportunities created by the retirement of a large number of operators. The presentation also included Kirsten King, New England Water Works Association, who provided background and projected opportunities on the drinking water side of the industry.

Action initiatives

As reported during the Spring *Journal* report, State Representative Carolyn Dykema filed "An Act Relative to Municipal Assistance for Clean Water and Economic Development Infrastructure." The act is aimed at the creation of a 10-year water infrastructure bond to fund local drinking water, wastewater and stormwater improvements. The bond would provide $200 million in annual funding that would be allocated as direct funding to cities and towns for water infrastructure improvements (20 percent) with the rest in grants (40 percent) and low-interest loans (40 percent). This proposed bill recently went before the Joint Committee on the Environment, Natural Resources and Agriculture on September 26, 2013, in which many regional agencies/association testified in support of the bill, including a letter of support by MWPCA.

In addition to the above-mentioned bill, a separate bill sponsored by Senator Jamie Eldridge, "An Act Improving Drinking Water and Wastewater Infrastructure" (Senate Bill 1880), will be going before the Joint Committee on the Environment, Natural Resources and Agriculture. This senate bill focuses on "combining reform with increased commitments from the commonwealth of Massachusetts to improve partnerships with cities and towns, increase municipal options while incentivizing best management practices and deal sensibly and realistically with the challenges in water and wastewater infrastructure." The bill is broken into three categories: financing, reform and system performance, with focus on innovation and green infrastructure funding, sustainable water resource funds, new eligibility criteria for grants, promotion of public-private partnerships, and water conservation. The MWPCA government affairs committee will continue to track the progress of both proposed bills.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1. Tom Azevedo presents an MWPCA Life Membership Award to Frank Arnold

2. Joe Shepherd, MWPCA Life Membership Award recipient

3. Aram Varjabedian, MWPCA operator award recipient

Operations challenge

Following a second-place finish at the NEWEA Spring Conference Operations Challenge Event, the MASSerators, consisting of team members (L to R) Sean Kehoe (Captain), Patty Passariello, Tim Deguglielmo, Kris Smith, and their coach, Brian Farmer (not shown), competed at the WEFTEC Operations Challenge Event in Chicago. The team had a strong competition, improving again in all event categories. On behalf of MWPCA, we thank the MASSerators for representing the association and water quality professionals throughout Massachusetts.

Trade show and awards

The MWPCA annual trade show took place on September 18, 2013, at the Mount Wachusett resort in Princeton. The event featured over 50 vendors with more than 180 people in attendance. Held during the event was the MWPCA annual awards ceremony. MWPCA presented Outstanding Small, Medium and Large Facility Performance awards, as well as the MWPCA Operator of the Year Award. The recipients of the awards are as follows:

- **Town of Cohasset**
  Outstanding Performance Award
  Small Facility
- **City of Attleboro**
  Outstanding Performance Award
  Medium Facility
- **City of Brockton**
  Outstanding Performance Award
  Large Facility
- **Aram Varjabedian**, City of Brockton
  Operator of the Year

Also, the awards ceremony included the re-presenting the 2013 NEWEA Operator of the Year and Peloquin awards, by NEWEA President-elect Brad Moore, to Joseph Dugan, city of Newburyport, and Mike Moreau, Wastewater Treatment Services, Inc., respectively.

On behalf of MWPCA, we again congratulate each of this year's award recipients. We recognize that often many citizens overlook or just are unaware of the work what goes on behind the scenes and underground to provide clean and safe water to them. Wastewater treatment is the "forgotten infrastructure" Our water reclamation facilities quietly do their job, for the most part unnoticed. The performance by these groups of operators is a great example of the high level of commitment and professionalism that is a goal of all water quality professionals throughout Massachusetts and the region.

Upcoming events

The Annual MWPCA Legislative Event is scheduled for March 6, 2014, at the Omni Parker House in Boston. State Representative Carolyn Dykema is planning to be a featured speaker, and selected mayors from cities in the commonwealth will participate.

For future events check the MWPCA Web site, mwpca.org, or facebook/mwpca, or Twitter@MWPCA.

Into the future

To reiterate a theme in my reports, MWPCA, in concert with NEWEA, has set a goal over the next year to enhance our focus on public outreach and promoting the water quality industry. The MWPCA recognizes that public outreach and education regarding the importance of water and what we do as water quality professionals is the foundation to sustain the profession holistically and increase the awareness for funding for water quality infrastructure.

Both national and local studies have identified that there will be a shortfall of people to fill the roles of water quality professionals who are now employed at wastewater treatment facilities and will be retiring in 5 to 10 years. Two groups we have identified to fill these positions are U.S. armed services veterans and students enrolled at vocational high schools throughout Massachusetts. The MWPCA board of directors will be volunteering to speak with these groups and soliciting our members to provide internships to promote the water quality profession. Along those lines, MWPCA seeks additional volunteers to speak with these groups and/or offer internships. If you are interested in volunteering or could offer an internship/externship, please contact MWPCA or me.

In closing, as my term ends as the NEWEA Massachusetts director, I thank both MWPCA and NEWEA for affording me the opportunity to serve in this role. The experiences and the knowledge I have gained over the past three years, while working with some of brightest people in this industry, have truly been priceless. I encourage anyone thinking of getting involved to step up and do so. The time commitment is less than you probably think, and the work associated with this or any NEWEA position is most rewarding; the payback outweighs any perceived misconceptions we sometimes have about volunteering.

If you have questions regarding MWPCA/NEWEA and/or any issues or ideas you wish to share, please contact me. I can be reached at 508-440-5470 or at rwillis@onsite-eng.com. Thank you for taking the time to read the Massachusetts report.

MWPCA business

During the Annual Business Meeting, MWPCA membership approved changes to the association's bylaws, including a change with regard to how the board of directors is elected, and another change creating an executive director position.

Historically, the board of directors was elected through a mailed ballot process, with candidates nominated during the year. Changes to the bylaws include a new Nominating Committee, which will review and recommend candidates to be nominated for the board, with a formal membership vote on the nominees occurring at the Annual Election Meeting in June.

With the creation of the executive director position, MWPCA wants to be more effective with its involvement in issues that affect our industry, while also increasing advocacy with legislative matters and implementing public outreach. To fill the executive director position, the MWPCA board nominated and approved Secretary/Treasurer Lynn Foisy, who will be the first person to serve in this role.

EVENT

2013 Spring Meeting & Exhibit

1. The mansion house of the Ocean Edge Resort in Brewster, MA was the headquarters for the NEWEA 2013 Spring Meeting
2. President's reception 3. President Mike Bonomo poses with his wife (Annette) and two children Allissa and Michael

1. The NEWEA Awards Committee meeting 2. President-Elect Brad Moore addresses the Executive Committee
3. Program Committee Chair Susan Guswa and Operations Challenge Chair Andre Brousseau 4. Mansion staircase

The New England Water Environment Association (NEWEA) held its Annual Spring Meeting on June 2-5, 2013, at the Ocean Edge Resort in Brewster, Mass. Meeting registrants totaled 219. Registrants included 169 members, 2 non-members, 15 Operations Challenge participants, and 16 guests. The meeting also featured 17 exhibit booths.

A full NEWEA Executive Committee meeting with Committee Chairs was held on Sunday, June 2, 2013, with NEWEA President Michael Bonomo presiding. In addition to the Opening Session, there were nine technical sessions and one tour.

- Breakfast and General Opening Session
  Moderator: Susan Guswa, Tighe & Bond, Inc.
- Welcome: Michael Bonomo, NEWEA President
- Meeting the Challenge: Finding Solutions to Cape Cod's Water Quality Issues—Paul Niedzwiecki, Executive Director, Cape Cod Commission

SESSION 1
Operator Focus
Moderator:
George Vercelli, Veolia Water NA
Co-moderator:
Jerry Potamis, Town of Falmouth, MA

NFPA 820 Standard For Fire Protection in Wastewater Treatment and Collection Facilities; Upcoming Revision
- Nancy Pearce, National Fire Protection Association

Writing an Effective SOP
- Marcel Tremblay, MCI Concord

Making the Grade? Lessons Learned from Graduates of New England's Wastewater Management Programs
- Thomas Groves, NEIWPCC; William Patenaude, RI DEM

Roundtable Discussion—The Next Generation: Attracting & Developing Great Operators
- NEWEA State Directors: Janine Burke, Rhode Island; Kevin Cini, Connecticut; Robert Fischer, Vermont; Peter Goodwin, Maine; Fred McNeill, New Hampshire; Ray Willis, Massachusetts

SESSION 2
Stormwater—From Promulgation to Implementation
Moderator:
Virginia Roach, CDM Smith
Co-moderator:
Patty Passariello, Weston & Sampson

Legal and Regulatory Update: Stormwater Management
- William Taylor, Pierce Atwood LLP

Who Wants a Rain Tax? Warming to the Stormwater Utility Concept in Danvers
- Emily Scerbo, Woodard & Curran;
- Richard Rodgers, Town of Danvers, MA

Evaluation of Structural Stormwater BMP Maintenance in a Water Supply Watershed
- Allan Rantala, MA Department of Conservation & Recreation;
- Pat Austin, MA Department of Conservation & Recreation

Reconstructing a Commercial Street in Provincetown with Porous Pavement to Mitigate Stormwater Discharges and Repair the Roads after Sewer Installation
- Nathan Weeks, GHD Inc.
- Jessica Janney, GHD Inc.

SESSION 3
Collection Systems—Current Issues and Case Studies
Moderator:
Jim Barsanti, Town of Framingham, MA
Co-moderator:
Karla King, Tighe & Bond

Town-Wide Sewer Pump Station Evaluation and Phase 1 Upgrade Project
- Timothy DeGuglielmo, Weston & Sampson

Extending Sewers to Rural Lake Communities—Story of the Bolton Lakes Sewer Project
- Joyce Cheung, Fuss & O'Neill
- Marshall Gaston, Fuss & O'Neill

Constructing a New Large Diameter Force Main While Maintaining Full Operation of the GLSD's 140 MGD Wastewater Pumping Station
- Mark Thompson, Kleinfelder
- Richard Weare, Greater Lawrence Sanitary District

Design and Optimization of CSO Storage Conduit in Portland, Maine Using Advanced Hydraulic Modeling
- Eric Lemont, AECOM
- Larry Soucie, AECOM
- Owens McCullough, Sebago Technics, Inc.
- Bradley Roland, City of Portland, ME

SESSION 4
Let's Talk Money
Moderator:
Matthew Yonkin, ARCADIS
Co-moderator:
Kate Goyette, Kleinfelder

MassWorks Funding Supports Sewer Construction and Economic Growth in Oxford, MA
- Meredith Zona, Fay, Spofford & Thorndike; Sean Divoll, Town of Oxford, MA

A Public-Private Partnership Creates a Win-Win for Ware's WWTF and Kanzaki Specialty Papers
- Thom Martens, Town of Ware, MA
- Tracy Adamski, Tighe & Bond

Financial Incentives and Regulatory Drives for Anaerobic Digestion
- Briony Angus, Tighe & Bond


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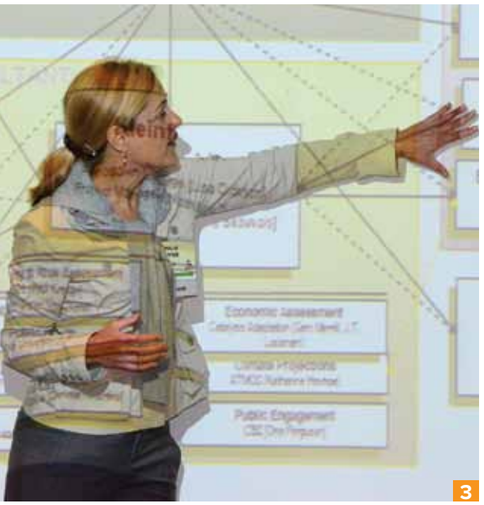

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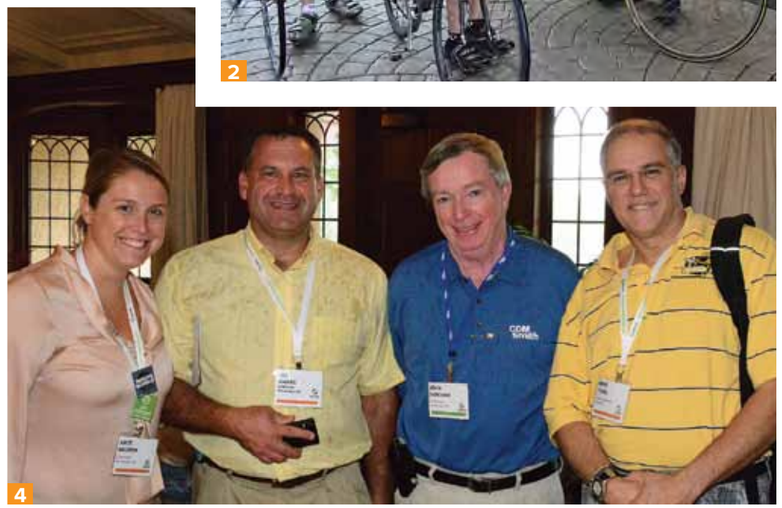
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1. The registration area was busy on Monday morning **2.** Three hardy bicyclists participated in the morning bike ride
3. Nathalie Beauvais spoke about climate change management **4.** Kate Biedron, Jim Drake, John Donovan, and Mark Young

Generating New Revenue from Solar Power at the Lowell Regional Water Utility (LRWU)
• Robert Little, Woodard & Curran

SESSION 5
Climate Change
Moderator:
Stephen Geribo, Kleinfelder
Co-moderator:
Clary Coutu, CDW Consultants

Modeling Storm Surge Risk and Coastal Engineering Adaptations in a Changing Climate
• Kirk F. Bosma, Woods Hole Group

Planning for Extreme Weather Events
• Kathleen McAllister
• Horsley Witten Group, Inc.

Adapting to Climate Change: Three New England Projects
• Nathalie Beauvais, Kleinfelder

Addressing Climate Change in Multi-Hazard Mitigation Planning
• Darrin Punchard, AECOM

SESSION 6
Nutrient Removal at Wastewater Treatment Plants
Moderator:
David Polcari, CDM Smith
Co-moderator:
Kenneth Carlson, Woodard & Curran

Using a Dual Operating Mode Approach to Maximizing Total Nitrogen Removal
• Paul Dombrowski, Woodard & Curran

Operation-Focused Design of Counter—Current Activated Sludge Process for Enhanced Nutrient Removal
• Ayman Shawwa, Schreiber LLC;
• Patrick Brooks, Parsons
• Natalie Richards, Parsons

SBRs—A Flexible Nitrogen-Removal Process for Small WWTFs
• William McConnell, CDM Smith

Chatham Water Pollution Control Facility Managing the First Permit in Massachusetts for Nutrient Removal to the Limit of Technology through Extreme Flow and Load Fluctuations
• Marc Drainville, GHD Inc.
• Karen Wong, GHD Inc.

SESSION 7
Raising Public Awareness
Moderator:
Deborah Mahoney, Hazen and Sawyer
Co-moderators:
Georgine Grissop, CDM Smith;
Howard Carter, City of Saco, ME;
Jennifer Lachmayr, ARCADIS

Celebrate Water

Elena Proakis Ellis, CDM Smith
• Meg Tabacsko, MWRA
• Clary Coutu, CDW Consultants

The Flow Family
• Joseph LaPlante, Narragansett Bay Commission

How to Use Media Training to Teach Folks to Utilize Other Media Outlets for Outreach—Other Media Outlets Include Twitter, Facebook, LinkedIn, etc.
• Matt St. Pierre, Tata and Howard


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1. Monday evening reception featured a scrumptious hors d'ouevre buffet **2.** Walkers on the return trip through the culvert as they finish the Tuesday morning Richard family benefit walk/run/ride **3.** A full house marked the opening session

SESSION 8
Making Integrated Water Resources Management Work for You
Moderator:
Nelson Thibault, Hoyle Tanner & Associates
Co-moderator:
Jessica Cajigas, Comprehensive Environmental, Inc.

Meeting Cape Cod's Wastewater Challenge through the 208 Water Quality Management Plan and Tools for Consensus Building
• Thomas Cambareri, Cape Cod Commission
• Scott Michaud, Cape Cod Commission

One Watershed, One Goal, Seven Approaches to Low Impact Development
• Tiffany Schwarzenberg. Hadlyme Environmental Engineers
• Kathleen Scott, Hadlyme Environmental Engineers

A Roadmap for Integrated Water Resource Management Planning—How Marshfield is Managing the Challenge
• Ryan Trahan, Environmental Partners Group, Inc.

Massachusetts Sustainable Water Management Initiative (SWMI)—An Integrated Approach to Stream Protection
• Duane LeVangie, MassDEP; Rebecca Balke, Comprehensive Environmental, Inc.

SESSION 9
Wastewater Treatment and Disposal
Moderator:
Kenneth Maltese, Maltese & Associates
Co-moderator:
Charles Tyler, MWRA

Algae, Natures Response to Nutrient Pollution—A Problem and a Solution
• Brian Braginton-Smith, AquaGen

Expanding Applications for Permeable Reactor Barriers in Sustainable Groundwater Treatment
• David Young, CDM Smith
• Michaela Bogosh, CDM Smith
• Cannon Silver, CDM Smith

Approved Methods and Case Studies to Develop Design Infiltration Rates for Treated Water Recharge through Sand Infiltration Beds
• Darlene Zelinski, GHD Inc.
• Nathan Weeks, GHD Inc.

Constanta, Romania—North WWTP: Sludge Handling and Odor Control Improvements
• Ashley Dunn, CHA
• Mark Devine, CHA
• James Colantonio, CHA;
• Mike Giggey, Wright-Pierce
• Melissa Hamkins, Wright-Pierce;
• David Kiely, Jennings O'Donovan
• Pierre Mayol, Jennings O'Donovan

Overcoming Hydraulic Obstacles—The Mattabassett Story
• William Hankins, Wright-Pierce
• John Braccio, Wright-Pierce
• Brian Armet, The Mattabassett District

Advantages of 3D Technologies for Existing Retofit Documentation
• Christopher Lorrain, LandTech Consultants, Inc.

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1. William Taylor spoke about the legal and regulatory aspects of storm water managementt **2.** Mike Harris, Paul Dombrowski, and John Trofatter discuss the Operations Challenge **3.** Registration Chair Kate Biedron and NEWEA Staff essential Linda Austin **4.** Susan Guswa and Ian Catlow **5.** The Richard family benefit walk/run/ride **6.** Paul Niedzwiecki, delivers the keynote address

1. Mass. DEP Commissioner Kenneth Kimmel with the DEP's Gary Moran **2.** President Mike Bonomo delivers an opening speech **3.** Team Force Maine **4.** New Hampshire Seacoast Sewer Snakes—first place over-all **5.** MASSerators—safety event second place **6.** Team Force Maine—process event first place

TOURS

City of Newport—Easton's Beach Stormwater UV Disinfection System

Coordinators:
- Julia Forgue, City of Newport RI,
- Dean Audet, Fuss & O'Neill

Chatham Water Pollution Control Facility and Pump Station

Coordinators:
- Robert Duncanson, PhD, Town of Chatham, Director of Health and Environment;
- Val Peter, Weston and Sampson
- Michael Keller, Weston and Sampson Services
- Marc Drainville, GHD Inc.
- Jeff Gregg, GHD Inc.

OPERATIONS CHALLENGE

Operations Challenge Committee Chair:
- André Brousseau

Operations Challenge was held on Tuesday, June 4, 2013. Three teams participated in the competition.

Maine – Force Maine:
Alex Buechner (Captain), Tony Ellsworth, Dan Laflamme (Coach), Scott Lausier Stacy Thompson

Massachusetts – MASSerators:
Tim Deguglielmo, Brian Farmer (Coach) Sean Kehoe (Captain), Patty Passariello, Kris Smith

New Hampshire – Seacoast Sewer Snakes:
Paula Anania (Coach), Mike Baker Mike Carle, John Sykora, Tim Vadney (Captain)

The Operations Challenge Awards Reception was on Tuesday, June 4, Committee Chair André Brousseau and each event coordinator, assisted by NEWEA President Michael Bonomo, presented trophies to the winning teams of each event and to the overall first-, second-, and third- place winning teams. :

First Place Individual Events:
- Process Control—Maine
- Safety—New Hampshire
- Collection Systems—New Hampshire
- Laboratory—New Hampshire
- Pump Maintenance—New Hampshire

Overall Competition:
- Third Place—Maine
- Second Place—Massachusetts
- First Place—New Hampshire

During the reception it was announced that NEWEA would support the first-, second-, and third-place teams in the 2013 WEF National Operations Challenge competition to be held in Chicago, Ill., in October.

Event and Equipment Coordinators:
- Process Control—Paul Dombrowski, Michael Harris
- Safety—James Laliberte, Michael Burke
- Collection Systems—EJP, Lenox Tools, Michael Smith
- Laboratory—YSI, Marylee Santoro, Dennis Palumbo
- Pump Maintenance—Wilo-USA, Brian Farmer
- Scorekeeping (Overall):—Jane Brooks

Judges—Process Control Operations Challenge Committee:
- Safety—Michael Burke, Wayne Barton, Richard Perez
- Collection Systems—Tim Vivian, Laurie Perkins, Michael Armes
- Laboratory—Andy Fish
- Pump Maintenance—Harold Adams, John Lord, Gary MacDonald

Miscellaneous
- Trophies—Joseph Kruzel, Michael Burke
- Shirts—Norton True

Meeting Planners:
- Conference Arrangements—Ron Tiberi
- Program—Susan Guswa
- Registration—Kate Biedron
- Operations Challenge—André Brousseau
- Guest Program—Joy Lord
- Golf Tournament —Peter Kibble

Meeting Management
- Director—Meg Tabacsko
- Sponsors—Paul P. Casey

Select Society of Sanitary Sludge Shovelers—Influent Integrator Charles Tyler inducted two new members:
- Scott Haynes,
- Ray Vermette

EXHIBITORS

ADS Environmental
Advanced Drainage Systems
AquaGen
Aqua Solutions, Inc.
BAU Hopkins, Inc.
Carlsen Systems, LLC
Duke's Root Control
EST Associates, Inc.
F.R. Mahony & Associates
Flow Assessment Services
Hamilton Kent
Hobas Pipe USA
INUSA, Inc.
Mechanical Solutions
Orenco Systems, Inc.
Tech Environmental, Inc.
The MAHER Corporation

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EST Associates, Inc.
Fay, Spofford & Thorndike
Flow Assessment Services, LLC
Fuss & O'Neill, Inc.
Haley and Ward, Inc.
Hayes Pump, Inc.
Hazen and Sawyer, PC
Hoyle, Tanner & Associates
Kleinfelder
R.H. White Construction
Synagro NE
The MAHER Corporation
Tighe & Bond, Inc.
Underwood Engineers
United Water
URS Corporation AES
Woodard & Curran
Wright-Pierce

EVENT

Get Connected

Annual Conference & Exhibit Preview

January 26–29, 2014 • Boston Marriott Copley Place, Boston, MA

We have some exciting additions to the Annual Conference—the biggest and best wastewater forum in New England. NEWEA President Mike Bonomo will preside over this year's conference featuring expanded technical sessions, two days of poster sessions, exhibitors, and the Awards Ceremony.

The technical program will include 33 sessions that span all areas of expertise in the water quality and resources profession. Topics are wide-ranging and will include emerging issues, practical applications, specific project experience, and lessons learned. New this year are sessions focused on selected "Hot Topics."

Conference Events

SUNDAY, JANUARY 26

Registration – 4th Floor.....Noon–4:00 PM

MONDAY, JANUARY 27

Registration – 4th Floor.....7:00 AM–6:00 PM
Technical Sessions 1–6 .....8:30–10:30 AM
Exhibits .....10:30 AM–6:30 PM
Opening Session.....11:00 AM
Exhibit Hall Reception .....4:30–6:30 PM

TUESDAY, JANUARY 28

Registration – 4th Floor.....7:00 AM–6:00 PM
Exhibits .....8:00 AM–6:30 PM
Technical Sessions 13–18.....9:00 –11:30 AM
Technical Sessions 19–24 .....1:30–4:00 PM
Exhibit Hall Reception .....4:00–6:00 PM

WEDNESDAY, JANUARY 29

Registration – 4th Floor.....7:30 AM–2:00 PM
Exhibits .....8:00 AM–1:00 PM
Awards Presentation & Gavel Passing ...11:00 AM
Technical Sessions 25–29.....8:30–11:00 AM
Technical Sessions 30–33 .....1:00–3:00 PM

Event Hotel

Boston Marriott Copley Place Hotel
110 Huntington Avenue
Boston, MA 02116
617-236-5800

SINGLE—$195.00
DOUBLE—$207.00

Conference Registration

Register online/download a complete conference program at newea.org
Phone: 781-939-0908

Early registration before January 10

Technical Sessions

1. Regulatory Challenges
2. Asset Management, Programs in Action
3. Establishing the WW Baseline—Monitoring and Modeling
4. Residuals—The Whole Kitchen Sink Except for Food Waste
5. Water Reuse & Reclamation— What Goes Around Comes Around!
6. Sustainability Planning and Tracking—Tools of the Trade
7. Looking To the Future: Digestion and Source-Separated Organics
8. Knowledge is Power—Assessing Your System
9. Phosphorus—Limits, Testing and Technology
10. Rip Up the Pavement—Stormwater Management & CSO Control in 2014
11. Utility Management Issues
12. Water for People
13. Flushables/Non Dispersibles
14. Wet Weather Constructed Case Studies
15. Better Operations Through Improved Communication and Information Technology
16. Plant Operations Process Performance
17. Raising Public Awareness
18. Utility Hazards Assessment Is Your Safety Program Keeping Up?
19. Funding
20. If It's Broke, Fix It—Construction Repairs
21. Planning and Researching for Sustainability and Energy Neutrality
22. Operator Ingenuity
23. Small Community Smorgasbord Compliance, Cooperation, & Costs
24. Planning for Climate Change
25. Green Infrastructure
26. Selecting Project Delivery to Maximize Value
27. Industrial Wastewater—The Cycle of Compliance
28. Energy Efficiency Improvements Through Planning and Continuing Improvements
29. Sustainability A to Z
30. Integrated Water Resources Planning
31. Academic My Dear Watson—Learn Something New Each Day
32. Nitrogen Removal Case Studies
33. The Rising Sea of Wet-Weather Mandates and Challenges

Conference Exhibitors

ADS Environmental Services
Advanced Drainage Systems, Inc.
Advanced Enterprise Systems
AP/M Permaform
Aqua Solutions, Inc.
Asahi/America, Inc.
Associated Electro-Mechanics, Inc.
Atlantic Fluid Technology, Inc.
Ayer Sales, Inc.
BakerCorp
BAU/Hopkins
BDP
Bilfinger Water Technologies
Biosec Enviro, Inc.
BISCO Pump Systems
Blake Equipment Co
Boyson and Associates, Inc.
Brentwood Industries, Inc.
Burt Process Equipment
Cabot Norit Americas Inc.
Carl Lueders & Co.
Carlsen Systems, LLC
Carus Corporation
Casella Organics
Coyne Environmental Services
Cretex Specialty Products/Quadex
CSI Controls (PRIMEX)
CST
CUES
David F. Sullivan & Associates
DN Tanks
Duke's Root Control, Inc.
Duperon Corp.
Eastern Pipe Service LLC
Electroswitch Corp
Environmental Operating Solutions
eRPortal Software Group, LLC
EST Associates, Inc.
F.R. Mahony & Associates, Inc.
Flomatic Corporation
Flottweg Separation Technology
Flow Assessment Services
FlowWorks, Inc.
Flygt - Xylem
Ford Hall Company
G.L.LYONS ASSOCIATES
Gabriel Novac & Assoc.
Geomembrane Technologies Inc.
Green Mountain Pipeline Services
Grundfos
Hach Company
Hamilton Kent LLC
Hanna Instruments
Hayes Pump, Inc.
Hazen and Sawyer, PC
HOBAS Pipe USA
HOLLAND COMPANY
Infrastructure Technologies
Innovyze, Inc.
J & R Sales and Service
J. F. McDermott Corp
Kemira
LMK Technologies
M.A. Selmon Company
The MAHER Corporation
Maryland Biochemical Co., Inc.
MaxWest Environmental Systems, Inc.
Mechanical Solutions, Inc.
Methuen Construction Co., Inc.
National Filter Media
National Water Main Cleaning Co.
New England Environmental Equipment
New England Pipe Cleaning Company Division Heitkamp, Inc.
Oakson, Inc.
Pavers by Ideal
PAXXO (USA) Inc.
Pollardwater.com
Polydyne Inc.
POND Technical Sales
Pump Systems Inc.
R.H. White Construction
Rain For Rent
Rockwell Automation
Russell Resources, Inc.
Scherbon Consolidated Inc.
Seacoast Supply
Sealing Systems, Inc.
Sentrol, Inc.
Shea Concrete Products
Siemens Industry, Inc.
Sprauroq, Inc.
Stacey DePasquale Engineering, Inc.
Statewide Aquastore, Inc.
Synagro Northeast LLC
Technology Sales Associates Inc.
ThermaStor, LLC/Quest
Trumbull Ind.
United Concrete Products
USABlueBook
Victaulic Company
Walker Wellington, LLC
Water & Waste Equipment Inc
WEBB Kentrol SEVCO
WeCare Organics, LLC
Wescor Associates, Inc.
WESTECH
WhiteWater, Inc.
Winters Instruments
Woodard & Curran
Yeomans Chicago Corporation

as of 11/25/13

2013 Award Recipients

NEWEA

Alfred E. Peloquin, CT ..... Everett Weaver
Alfred E. Peloquin, MA ..... Janice Moran
Alfred E. Peloquin, ME ..... Scott Firmin
Alfred E. Peloquin, NH ..... Shelagh Connelly
Alfred E. Peloquin, RI ..... Mike Bedard
Alfred E. Peloquin, VT ..... Chris Robinson
Asset Management ..... Narragansett Bay Commission
Claire N. Sawyer ..... John Hart
E. Sherman Chase ..... Dennis Dievert, Sr.
Energy Management ..... Narragansett Bay Commission Achievement
Founders ..... Roger Janson
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Operator, MA ..... Joseph Fijal
Operator, ME ..... Gregory Thulen
Operator, NH ..... Thomas Moran
Operator, RI ..... Barry O'Brien
Operator, VT ..... Erik Bailey
Operator Safety ..... Kyle Arnold
Paul Keough ..... Susan Spencer
Past President ..... Daniel Bisson
Public Educator ..... Maine Water Utilities Association and Maine WasteWater Control Association
SJWP - MA ..... Amy Kopec
SJWP - ME ..... Nathan Dee
SJWP - VT ..... Basundhara Mukherjee
SJWP - RI ..... N/A
SJWP - CT ..... Gabrielle Liflander
SJWP - NH ..... Deepika Kurup
Wastewater Utility ..... Warwick Sewer Authority
Young Professionals ..... Paula Drouin

WEF (presented at WEFTEC)

Operations Challenge ..... Seacoast Sewer Snakes (NH)
Operations Challenge ..... Force Maine (ME)
Gascoigne Medal ..... Gary Johnson
Operator Ingenuity ..... Ray Vermette
Operator Ingenuity ..... Alfred Waitt
WEF Fellows ..... Robert Marini

WEF—MA Awards

Arthur Sidney Bedell ..... Meg Tabacsko
George W. Burke, Jr. ..... Town of Provincetown, MA
Lab Analyst Excellence ..... Peter Sherwood
William D. Hatfield ..... Erwin "Art" Enderle
Quarter Century Operator ..... Bob Wood*
Quarter Century Operator ..... Gary Kuczarski
Quarter Century Operator ..... Rich Persson
Quarter Century Operator ..... Tom Sciarrino
WEF Life Membership ..... Alvin Firmin
WEF Life Membership ..... Bruce King
WEF Life Membership ..... Thomas Schultz
WEF Life Membership ..... Paul Sutton
WEF Service ..... Greg Cataldo
WEF Service ..... John Hart

*Awarded Posthumously

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NEWEA appreciates these industry leaders who have helped make a positive impact on the water environment this year. **Is your company ready to join us in 2014?**

Sponsorship benefits at all levels include:

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- Recognition as an environmental leader among peers and customers
- Exposure at NEWEA's most popular events including the Annual Conference and golf tournaments

For more information or to join NEWEA's 2014 Annual Sponsor Program, contact Elizabeth Cutone:

EMAIL: ecutone@newea.org
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Advertiser index

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❒ Check here if renewing | Member I.D. (please provide)

**By joining NEWEA you also become a member of the Water Environmental Federation (NEWEA is a member Association of WEF)

Employment Information (see back page for codes)

1. ORG Code: | Other (please specify): | 2. JOB Code: | Other (please specify):

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Signature Required for all new Memberships | Date

Sponsorship Information

WEF Sponsor name (optional) | Sponsor I.D. Number | ACQ. Code for WEF use only | WEF 13

Membership Information

Membership Categories (select one only)	Member Benefit Subscription	Dues
Professional Pkg: Individuals involved in or interested in water quality	✔ WE&T (including Operations Forum) ✔ WEF Highlights Online	$126.00
Young Professionals Pkg: New WEF members or formerly WEF Student members with 5 or less years of experience in the industry and less than 35 years of age. This package is available for 3 years.	✔ WE&T (including Operations Forum) ✔ WEF Highlights Online	$ 66.00
Professional Wastewater Operations (PWO) Pkg: Individuals in the day-to-day operation of wastewater collection, treatment or laboratory facility, or for facilities with a daily flow of < 1 mgd or 40 L/sec.	✔ WE&T (including Operations Forum) ✔ WEF highlights Online	$79.00
Academic Pkg: Instructors/Professors interested in subjects related to water quality.	✔ WE&T (including Operations Forum) ✔ WEF Highlights Online ✔ Water Environment Research Online	$126.00
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Executive Pkg: Upper level managers interested in an expanded suite of WEF products/services .	✔ WE&T (including Operations Forum) ✔ World Water & Environmental Engineering ✔ Water Environment Research Online ✔ Water Environment Regulation Watch	$338.00
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Consider including additional WEF resources in your membership package! Check the appropriate subscription and include the subscription cost in your payment.

NOTE: prices listed reflect a substantial member discount!

❒ Water Environment Research Print	$100.00	$
❒ Water Environment Research Online	$75.00	$
❒ World Water	$75.00	$
❒ World Water - Water Reuse and Desalination	$55.00	$

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Water Environment Federation
the water quality people

NEWEA

To help us serve you better, please complete the following:

(choose the one that most closely describes your organization and job function)

1. What is the nature of your ORGANIZATION? (circle one only) (ORG)

1. Municipal/district Water and Wastewater Systems and/or Plants
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)
5. Consulting or Contracting Firm (e.g., Engineering, Contracting and Environmental)
6. Government Agency (e.g., U.S. EPA, State Agency, etc.)
7. Research or Analytical Laboratories
8. Educational Institution (Colleges and Universities, libraries, and other related organizations)
9. Manufacturer of Water/Wastewater Equipment or Products
10. Water/Wastewater Product Distributor or Manufacturer's Rep.
11. Other (please specify) _____

2. What is your Primary JOB FUNCTION? (JOB)

1. Upper or Senior Management (e.g., President, Vice President, Owner, Director, Executive Director, General Manager, Mayor, etc.)
2. Engineering, Laboratory and Operations Management (e.g., Superintendent, Manager, Section Head, Department Head, Chief Engineer, Division Head, etc.,)
3. Engineering and Design Staff (e.g., Consulting Engineer, Civil Engineer, Mechanical Engineer, Chemical Engineer, Planning Engineer, etc.)
4. Scientific And Research Staff (e.g., Chemist, Biologist, Analyst, Lab Technician, etc.)
5. Operations (e.g., Shift Supervisor, Foreman, Plant Operator, Service Representative, Collection Systems Operator, 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. Other (please specify)_____

3. What areas do you consider to be your KEY FOCUS AREAS (circle all that apply)? (FOC)

1. Collection Systems
2. Drinking Water
3. Industrial Water/Wastewater/ Process Water
4. Groundwater
5. Odor/Air Emissions
6. Land and Soil Systems
7. Legislation (Policy, Legislation, Regulation)
8. Public Education/Information
9. Residuals/Sludge/Biosolids/ Solid Waste
10. Stormwater
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

4. Optional Items (OPT)

How many years have you worked in the industry?

1. 1-5
2. 6-10
3. 11-20
4. 21-30
5. >30 years

Year of Birth:

_____

Gender

1. Female
2. Male

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)

1 Physical Sciences (Chemistry, Physics, etc.)
2. Biological Sciences
3. Engineering Sciences
4. Liberal Arts
5. Law
6. Business

Water quality professionals, with fewer than 5 years working experience and are under the age of 35, are eligible to join WEF as an Active Member, while participating in the NEWEA/WEF Young Professionals Program. This program allows up to 50% off of the Active Member dues, valid for the first three years of membership. This program is available for new member applicants and Student Members.

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