The Next 30 Years of Wastewater

By Mike Bonomo - President, New England Water Environment Association

The 80/20 Rule, sometimes referred to as Pareto’s principle, can easily be applied to wastewater treatment. Since the authorization of the Clean Water Act in 1972 it is likely that we have developed, installed and are operating wastewater treatment systems to deal with 80% of the problems. Handling the next 20% of the challenge will of course be more difficult, as the first 80% could be considered the low hanging fruit. Taken another way, we have solved 80% of the problems for 20% of the cost and the next 20% to be solved will demand 80% of the cost. If we accept that this is true, or even close to the truth, it is a costly paradigm.

So what does the next 30 years hold for wastewater in New Hampshire and the U.S? We have all heard stories or seen photos and some personally remember the Merrimack River in the 1960’s- 70’s. There were some river sections that were heavily polluted and it was not a pretty sight. I grew up in New York City and the state of the western Long Island Sound was a similarly polluted sight. Since that time, the water quality of the Merrimack River, Long Island Sound and most water bodies in New England is in far better shape than it was 40 years ago. The evolution and implementation of treatment technology during this period has done a remarkable job in producing cleaner facility effluent. This in turn has allowed the natural ecological systems to restore the health of these receiving waters. We have done much to improve our waters, but there is still much work to do to sustain these improvements and to continue moving towards safely fishable and swimmable waters throughout the region.

No doubt there will be more regulations, challenging the limits of technology and increasing capital costs for facility upgrades. This qualitative pressure is what Washington does and our state regulations are obliged to follow suit. As restrictions tighten, the challenge will be to determine the most cost effective investments in our water infrastructure so that the dollars will be well spent. The result needs to be measurably cleaner water and not wasteful spending for minimal results. Efficiencies are going to have to be found in the way we deliver on facility upgrades. Use of streamlined alternative delivery methods, including design-build (DB) and design-build-operate (DBO), will likely increase in the coming years. Financing alternatives will also take center stage. Performance-based contracts with minimized municipal funding and higher risk-reward for the vendor or contractor should increase. We will see more creative financing approaches including methodical tapping into the private debt and equity markets. This can be an emotional ownership and trust issue, as the public may be reluctant to turn over historically municipal assets to a “for profit” private enterprise. The shortage of public funding options and the need for infrastructure improvements will make public/private financing options more attractive.

The past 10 years have seen an increase in energy efficiency projects and undoubtedly this will continue for many years to come. Research and technology advancements will accelerate as we learn better ways to harness energy from biosolids and other wastewater by-products. Turbine development will continue as we improve and miniaturize water turbines to take advantage of the energy in gravity flows.

Green Infrastructure as a wet weather remediation strategy, only a concept a short time ago, has emerged with vigor. Following already-successful projects in Syracuse, Philadelphia and other cities, we will see burgeoning growth in this technology as we continue to look at nature’s way of healing the problems caused by our impervious surfaces. We will see advances in collection system operation and optimization; better, faster and cheaper ways to monitor flow and prudent use of SCADA will improve control and

(Continued on page 1)
WORDS FROM THE EDITOR

All this talk about what wastewater treatment was like thirty years ago and what will be happening in the next thirty years is making me feel OLD! Of course, thirty years ago I wasn’t really making the connection about why I wasn’t allowed to pet the dog after she’d gone swimming in the river. I didn’t give a second thought that everybody in the neighborhood had a backyard swimming pool even though we were within walking distance to a natural place to swim. And I never could have imagined all the cool stuff I’d see as I walked around the NHWPCA’s trade fair thanking all the businesses that support this newsletter with sponsorships and advertisements. I tried my hardest to personally thank every business that I could, but I’m sure I missed some so please know that I do appreciate all of our supporters for helping to make this newsletter so awesome as we go into the next thirty years!
efficiency. Optimized strategies for use of existing capacity within the infrastructure will save millions in sewer separation and tunneling projects. SCADA advancements will also improve treatment facility monitoring and operations, reducing cost and increasing capacity.

Nutrients have certainly been the buzz word of this decade as we continually upgrade facilities to achieve greater nitrogen and phosphorous removal. With a backlog of projects, this will continue for the next several years. There will be other compounds that will continue to be studied and that may require removal from the waste stream. Endocrine disruptors are just one such class of compounds that we know are not good for the environment. Pending further research, we have not yet been required to remove them because safe limits are difficult to establish, and there is not yet an efficient, cost effective technology to remove them from the waste stream. As we continue to learn and understand the effects of these and other pharmaceutical wastes and by-products we will likewise need to develop technologies and procedures for keeping them out of the waste stream, or processes for treating them when and if they enter the flow.

Stormwater is now as much a political issue as an engineering problem. Municipalities will have to come to terms with an unenthusiastic public in forging an organizational structure to finance stormwater management programs. It is a ‘hot potato” now, but in the future runoff control will have to be a part of a more integrated water management strategy. The perception of separate silos for water, wastewater and stormwater is partially a result of the evolution of regulatory programs. As these programs continue to mature, a larger water resource management discipline will grow to encompass all aspects of the water cycle. A better managed, comprehensive water program, including the merging of professional associations and municipal entities, will be more efficient and effective in helping to restore and maintain our nation’s water resources. Water will be recognized for what it is, our most precious and essential resource, and the public will increasingly realize this as water demands rise and availability becomes scarce. The growing awareness of the public as to the true value of water will drive our industry toward improvements in efficiency and effectiveness, enabling us to maintain cleaner water, a healthy economy and a better place to live.

(Continued from front cover)

Discover Wild New Hampshire Day

By Ray Gordon - NHDES

Discover Wild New Hampshire Day was April 20th, 2013 and it was a huge success with over 7,000 attendees. The 2013 event was the largest Wild NH Day ever, and NHWPCA was there!

Hosted by NH Department of Environmental Services and NH Fish and Game, this annual event is the largest free event in the state of NH. Visitors enjoyed exhibits presented by dozens of New Hampshire environmental, conservation and outdoor organizations. Live animals, big fish and trained falcons were all there. Kids participated in archery, casting and crafts projects. Parents and kids alike explored new trends in recycling, environmental protection and energy-efficient hybrid vehicles.

Our NHWPCA booth was staffed by Andrea Martel, our 2nd Director who works at the Allenstown WWTF, Peter Goodwin, our 1st Director who works for Woodard & Curran, and Ray Gordon from NHDES. The NHWPCA booth conducted a free fishing pole raffle for children 12 and under. This year we had over 800 children participate in the raffle and we awarded 22 fishing poles.

Next year consider volunteering for Discover WILD New Hampshire Day and help us by promoting clean water and connecting this important issue to life outdoors!
Opinion/Editorial

New Hampshire Lives on Water
By Thomas Burack, DES Commissioner

There may be no better way to see how our environment supports a vibrant state economy than to consider our reliance on water. First, tourism is a mainstay of our economy, and much of our tourism is water-based or is supported by clean rivers, lakes, and ocean waters. Second, high-quality water bodies and recreational opportunities are critical to the excellent quality of life that helps to attract employers and an educated work force to New Hampshire and support the “New Hampshire advantage.” Third, reliable water services such as clean drinking water, reliable wastewater disposal and properly maintained dams provide essential support to New Hampshire’s economy.

We would like to think that our high-quality water resources and water services will always be here, that our quality of life will only improve, and that our infrastructure will always support a strong economy. But according to the Water Sustainability Commission, appointed by Governor John Lynch in 2011, New Hampshire faces new water-related challenges now and in the coming years, and new approaches are needed to ensure that our state will have enough clean water for future generations.

New Hampshire Lives on Water is the Water Sustainability Commission’s highly readable 28-page report, urging government and the private sector to work together on long-term approaches to addressing water issues. The report identifies four key areas that need to be addressed: water-related education, infrastructure investment, forward-looking management approaches, and environmental monitoring.

The Commission’s 14 members represented a broad range of perspectives on water needs, use, and management. Only two members – the Director of the N.H. Fish and Game Department and I – represented state government agencies; the rest represented municipalities and the private and non-profit sectors. The Commission reviewed previous work, consulted with experts, and conducted an extensive public participation process which included public forums in six locations throughout the state.

An overview of the Commission’s findings makes it clear that there is no room for complacency:
♦ New Hampshire residents recognize the importance of water to their quality of life, but many are asking for more information about their role in ensuring a sustainable water future for New Hampshire.
♦ Residents are increasingly concerned about access to and control of water and water supplies.
♦ New Hampshire is experiencing declining water quality in some of our lakes, rivers and estuaries.
♦ Extreme weather events are increasingly frequent, causing problems with water quality, stormwater systems, flooding, and the ability of water systems to meet customers’ needs.
♦ The state’s water infrastructure, last extensively upgraded in the 1970s and 1980s, is aging and increasingly inadequate to meet present needs.
♦ Water issues vary from one part of the state to another. There is no one-size-fits-all solution that solves problems from the North Country to the Seacoast. At the same time, although the quality of groundwater varies from place to place, private wells throughout the state should be tested for naturally occurring contaminants such as arsenic and radon and for manmade contaminants such as MTBE so that homeowners can take appropriate action to protect their families’ health.
♦ Investment is needed to protect our water resources and maintain our water infrastructure if the state wants to maintain its water-derived economic advantage.

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Step Right Up…..No Waiting…..To Guess the Weight….of your MLSS

By Steve Clifton - Underwood Engineers, Inc.

That’s right. Let me guess the weight of your mixed liquor! For only 5 cents I will guess the weight of your mixed liquor, regardless of your aeration tank size! Sound too good to be true? Well, let’s start and see where we end up. Have a seat and let me ask you a few questions.

First of all, I do need some data from your facility, concerning your influent and wasting habits. Sure, we all have numbers, be they daily, weekly, monthly, etc. You get the idea. I need the annual average daily numbers. This is the sum of all the daily numbers divided by the number of days in a year. So if you do BOD$_5$ twice weekly, you would have 104 BOD$_5$ tests in a year. So total up all the BOD$_5$ results and then divide by 104.

So, here is what I need to know:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Your Value</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Average Daily Flow, MGD</td>
<td>1 MGD</td>
<td></td>
</tr>
<tr>
<td>Annual Average Daily Influent BOD$_5$, mg/L</td>
<td>120 mg/L</td>
<td></td>
</tr>
<tr>
<td>Annual Average Daily Influent TSS, mg/L</td>
<td>80 mg/L</td>
<td></td>
</tr>
<tr>
<td>Average Sludge Retention Time, days</td>
<td>8 days</td>
<td></td>
</tr>
</tbody>
</table>

Once you have written down those values, I can now attempt to guess your weight (MLSS weight)!

Your weight is: ______ Flow x _____ BOD$_5$ x ____ SRT x 2.46 = _______ MLSS in pounds

For the example values shown above, we are using the flow and concentrations of the wastewater going into the reactor (primary effluent example in this case), we get the following weight of MLSS:

Example weight is: 1 MGD Flow x 120 mg/L BOD$_5$ x 8 day SRT x 2.46 = 2,362 pounds

Now if you want to know your MLSS concentration, take the pounds of MLSS estimated and divide it by your aeration tank volume in million gallons (MG) and 8.34. If our example WWTF has 200,000 gallons of aeration tank volume on line, then the MLSS concentration would be:

Concentration of MLSS - 2,362 pounds MLSS/ (0.2 MG x 8.34) = 1,416 mg/L

This estimate assumes a typical residential wastewater from a WWTF with primary clarifiers.

For raw sewage going right into aeration (no primary clarifiers), multiply your answer by 2.13! So this would be 2.13 x 2,362 pounds MLSS = 5,031 pounds of MLSS.

The more technically correct explanation is that the wastewater contains substrate (food) and inert solids. The food and inert solids, along with the sludge retention time you operate at, controls the weight of MLSS that can be achieved. The weight from the organics can be divided into the solids created by the substrate that allow bacteria growth, solids from bacteria decay and solids enmeshed in the mixed liquor from inert organic particulate from the influent. These make up your volatile content of your MLSS (your MLVSS). You also have inert non-organic solids accumulating in the aeration tank based on the inert TSS (this is typically 15 to 25% of your influent TSS) coming into the tank from your influent times your SRT.

Let me know by email if I guessed your weight correctly. If you are interested, email me and I will provide you with the spreadsheet to more accurately estimate your MLSS weight at wsclifton@underwoodengineers.com.
Your Wastewater Operator Certification Committee

By Mary Jane Meier, NHDES

The purpose of our Certification Committee (Cert Comm.) is to serve our most valued resource...YOU.... the wastewater operators of NH. The Cert Comm. is unique in the sense this committee’s very existence and membership is mandated by legal statute in the New Hampshire Code of Administrative Rules Chapter Env-Ws 900 OPERATION OF SEWAGE AND WASTE TREATMENT SYSTEMS, specifically, PART Env-Ws 901 CERTIFICATION OF WASTEWATER TREATMENT PLANT OPERATORS. We shorten the reference to ‘Env-Ws 901’. As per the requirement found in Section 901.22 Certification Committee, (a) The department shall implement its responsibilities relative to certifying wastewater treatment plant operators through a certification committee comprised of 3 (NH DES) department personnel and 2 individuals who are not employed by the department.

(b) The 3 department personnel shall be designated by the director of the department’s division of water.

(c) The remaining 2 members of the committee shall be nominated by and elected from the membership of the New Hampshire Water Pollution Control Association. All nominees shall hold current New Hampshire wastewater treatment plant operator certifications as per these rules.

SO what does all this mean to you? For starters, the Rules define the responsibilities of WWTF owners and operators. It’s a really good idea for each of you to become familiar with and understand the requirements defined by this Rule. The Cert Comm. functions to uphold the Rule and works on your behalf and to protect the environment.

It is likely the first time you will meet the Cert Comm. is at the stage in your career when you earn your Grade 2 or 2-oit certification. You are required to attend an interview with the Cert Comm. members once in your career. This offers the opportunity to learn that your Cert Comm. is your friend in this business. But our function does not end there.

There is a serious side in the Cert Comm.’s role for those operators who fail to protect the environment and for owners who do not provide for proper maintenance and staffing of their facilities. Fortunately this is not a regularly occurring event, but assigning this task serves a necessary function.

The Rules are a living set of conditions and a document that must be updated to remain relevant. Through the re-adoption process, the Cert Comm. manages the updates and revisions to the Rules. The Env-Ws 901 Rule expiration date was April 23, 2013. Over several months leading up to April, the Cert Comm. and the DES Legal Unit prepared an updated version of the Rule Env-Ws 901 and prepared the document for re-adoption.

As you may recall, a public hearing was held on April 18, 2013 at the Franklin Training Center. Every active certified operator was notified to ensure each has the opportunity to voice concerns or offer written comment on the proposed amendments to the Rule.

Hopefully, the final step in the process will be completed before the Joint Legislative Committee by late summer 2013.

The most prominent features of the newly re-adopted Rule are summarized below:

1) Env-Ws 901 is now known as Env-Wq 304.
2) The certification renewal process for Grade 1 and 1-oit operators now requires you to earn 10 training contact hours (1.0 Continuing Education Unit -CEU) within the 2 year renewal period.
3) All operators can carry over excess training credit from one renewal period to the next one. For Grade 1 and 1-oit – the credit carry over maximum is 5 hours (0.5 CEUs). For Grades 2, 3, and 4, the maximum carry over credit value is 10 training contact hours or 1.0 CEU.
4) Applicants and certified operators will be allowed less credit for work history time spent outside wastewater treatment plant operations. The amount of actual on-site operating experience required at a wastewater plant was increased to better align the substitution for operating experience.

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A NEAR MISS
Submitted by Patricia Passariello, PE – NHWPCA Safety Committee
(author wished to remain anonymous)

Lockout/Tagout – It’s Not Just for Electricity

The Situation:
I arrived at the plant on a Monday morning and learned from the log book that the clarifier rake arm had tripped out and wouldn’t run. There were reports of trouble with the unit on the previous day and it apparently stopped working entirely during the night shift. I went out to the clarifier and found the rake arm stopped at the scum ramp, so I proceeded to the Motor Control Center (MCC), reset the rake and tried, in vain, to get it moving. When I checked the torque indicator, I found it pegged out at over 100%. Something was obviously wrong and it appeared to be with the rake arms at the bottom of the clarifier.

With only one clarifier and the possibility of serious damage below the water line, I informed the plant manager and we agreed that we had to shut down production throughout the plant. No pressure there!

We properly locked out and tagged the rake arm drive MCC and then started to pump down the clarifier. As I watched the water level drop ever so slowly, I noticed something about the scum arm. It appeared that the scum wiper, which is hinged, was cocked to one side and was jammed up against the side wall of the scum ramp.

“AHA!” I thought, and without further consideration, I grabbed a nearby shovel and I used it to give the scum arm a good whack in hopes that I would free it and solve all our problems.

Well, free it I did, and as is so often the case when you dislodge something that has jammed, the scum arm immediately flung forward. It was a small clarifier; only 40 foot diameter, but this means that the scum arm was some 20 feet long. Fortunately for me, I was outside the range of the scum arm as it retracted (ouch!) and possibly even knocked off my feet into the clarifier, which was not yet fully drained. It was a near miss.

The Lesson Learned:
We had properly followed our standard procedures for Lockout/Tagout of the electrical energy, but we had completely failed to consider any OTHER types of energy that could be present in our malfunctioning clarifier (e.g., spring, hydraulic, pneumatic, etc.). We should have taken our time to ensure that ALL energy sources had been addressed before performing any work. This is particularly important in breakdowns or other emergency situations, where there is much greater potential for abnormal and unanticipated conditions. Serious diligence is needed by operators to identify and control all types of hazardous energy before starting work, and especially during already stressful times when equipment fails unexpectedly.

THINK SAFETY TODAY.....BE ALIVE TOMORROW
One of the great things about my job is the hours. Well, maybe not the start time. I am a morning person, but that doesn’t mean that I like getting out of bed and then being hard at work at the plant less than an hour later. I’m not one of those morning people that enjoy waking up earlier than necessary. I’m one of those morning people that like to sleep as late as possible. Anyway, what is really great about my job is being done at 3 p.m. each day.

Now that it’s spring-time in New England I take time when I get home each afternoon to walk around my yard and see what’s growing. Lately, it’s the daffodils. I have bright yellow daffodils, pale yellow daffodils, white daffodils, two-tone daffodils and mini-daffodils. The variety of the color yellow gets me thinking about my IDEXX quanti-tray® results.

As required, I always use my comparator tray to read the IDEXX results and I keep a close watch on the expiration date of the comparator so that it is always up-to-date. Well, sometimes my sample trays have really deep yellow wells. Sometimes the wells are lighter yellow, but still easy to compare. Sometimes the wells are just barely as yellow as the comparator and I nab any poor operator who walks into the lab to double-check them for me.

I’ve been asked if the shade of yellow has any meaning. My stock answer has always been that it doesn’t matter, a positive well has to be at least as yellow as the comparator and glow at least as much as the comparator. I’ve been asked what is happening in our effluent to make the wells pale yellow instead of deep yellow. My stock answer has always been that it doesn’t matter, a positive well has to be at least as yellow as the comparator and glow at least as much as the comparator. I’ve been asked if there’s a different kind of e-coli growing that is a deeper yellow or if we are over-dosing hypo because the wells are a paler yellow. My stock answer has always been that it doesn’t matter, a positive well has to be at least as yellow as the comparator and glow at least as much as the comparator. So, it’s pretty obvious from my stock answer what my opinion is about reading IDEXX results, but maybe I should look into these questions further and have some better answers. You think?

I called the IDEXX technical support line and asked if the shades of yellow meant anything – especially anything that I could use to optimize chlorination. The answer was “not really”. Coliform bacteria have an enzyme called \( \beta \)-galactosidase that is used to metabolize the nutrient indicator ONPG and as ONPG is metabolized, it turns yellow. It really doesn’t matter if there’s one really active coliform in each well or if there’s a bunch of some-what active coliform in the well. As long as there’s one coliform in there and it’s metabolizing the ONPG, then that’s enough to make that a positive well.

I figured that while I was on the phone I’d ask about the degree of fluorescence under my black light. The e-coli bacteria use an enzyme called \( \beta \)-glucuronidase to metabolize the nutrient indicator MUG and as MUG is metabolized, it creates the fluorescence. Yet again, it doesn’t matter how many e-coli bacteria are in each well and how much metabolizing is going on, if it’s enough to cause the fluorescence, then it’s a positive well.

The idea of rogue bacteria that also may test positive came to mind, so I asked about that. I was told that most non-coliform bacteria do not have these two enzymes. “Ahâ€œ, I thought, “so there could be rogue bacteria that do have these enzymes!” Well, before I even had time to complete this thought, I was told that the Colilert reagent has some proprietary ingredients in its matrix to suppress these bacteria. Just another reason to love IDEXX, I guess!
2013 NHWPCA Trade Fair Photos
Photos By Charlie Tyler - Deer Island

You can view more photos from the 2013 Trade Fair on the Association’s website at:
www.nhw pca.org
2013 NHWPCA Poster Contest Winners

**Water: The Origin of Life**
Photos By Charlie Tyler - Deer Island

4th thru 6th Grade Winners

**First Place**
Irina Stan  
Crossroads Academy  
Lyme, NH

**Second Place**
Anjali Kurup  
Bicentennial Elementary  
Nashua, NH

**Third Place**
Haider Khan  
Bicentennial Elementary  
Nashua, NH

1st thru 3rd Grade Winners

**First Place**
Liana Lansigan  
Crossroads Academy  
Lyme, NH

**Second Place**
Saia Patel  
Crossroads Academy  
Lyme, NH

**Third Place**
Abigail Thomas  
Crossroads Academy  
Lyme, NH

You can view the winning posters on the Associations website at [www.nhw pca.org](http://www.nhw pca.org).
These Rule revisions and additions reflect the need to ensure our operators receive the training and experience required to keep pace with the treatment processes as they become more complicated and specialized at our facilities. The next scheduled Rule revision will be in the year 2023.

Each year at the NHWPCA’s Winter Meeting, one new member to the Cert Comm. can be selected from the NHWPCA’s membership. The term is two years. The Cert Comm. meets approximately four times per year. If you are interested in becoming a member please contact the current president or any past president to become a nominee. Final selection is by vote at the meeting.

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**Top Ten Text Messages Your Teenager Wouldn’t Understand. . .**

1. Do we have a WWTP, WWTF, WPCF or WRF?
2. H2O ADF @ WWTF is 2 high 4 HGL. IOMH!
3. What proc do we have?? CAS, BNR, FF/SG, IFAS, MLE, MBR, SBR or TF/RBC? IDK.
4. GR8. I lost my BioP PAOs!
5. Did you change RAS, WAS or IMLR r8s? BOD, C:N, DO, F:M, MCRT, MLSS, N2, TKN, TP, TSS all messed up.
6. SRT/HRT in UASB AD up. CH4 and BTU in CHP down.
7. Pump 1 off. Check H/O/A, SCADA OIT, LAN and AC from VFD to MCC.
8. SSO BMPs in CMOM say CIP for I/I.
9. USEPA/NHDES want TMDL for CWA NPDES. Need some CWSRF!
10. RFP allows for DB, DBO, DBOO, DBOOF.
The Challenges and Pleasures of Collecting Biogas Data

An inside story about the creation of www.biogasdata.org by NEBRA Project Assistant Maggie Finn

As published in NEBRAmail 02/2013

In April 2012, after starting work at NEBRA, I was asked to start right in on the WEF Biogas Data Collection Project. My new responsibilities entailed contacting wastewater treatment plant operators state by state, across the country, to determine if they had anaerobic digestion and what if anything they were doing with the biogas produced. It really seemed like it would be easy enough, and, in reality, in the process I got an excellent introduction to wastewater treatment plants and operations across the country, a perfect orientation to my new job.

Contacting hundreds of treatment plants across the country and asking operators, superintendents, plant managers, project managers and public works directors about their digesters with all their challenges and successes gave me insight into who we are. Human waste is a fact of life, but call some town halls across the country and they have no idea who works at the “plant”, where it is, or how to get in touch with them. There is a sort of collective amnesia regarding our waste products. Most of my life was spent cleaning up hazardous waste, and absolutely everyone was involved in that, from the neighbors to the town officials. Those working at wastewater treatment plants understand that they are doing an important job, but that no one knows they are there. As a group, they – you – are very unassuming.

The results of the WEF Biogas Data Collection Project are presented at http://www.biogasdata.org. There are over 1200 wastewater treatment plants in the U.S. that are using anaerobic digestion. On this new website, they are points on a map. But, in reality, each facility is a unique place with quite a story, run by an elusive bunch of MacGyvers who can make something amazing out of nothing. I’ve talked to a lot of them. For the most part, these men and women do their work day to day without anyone noticing. Often, with small staff and limited funding, they have found their way to the front line of recycling in the United States. They embrace human waste as an amazing resource, when most of the public can’t even think about it. Like science fiction, they are converting cast-offs to power and heat.

Here’s another observation from my calls: Here in New England and around the continent, it is fair to say that operators’ “wicked” sense of humor serves them well, since they are in jobs that few kids think about when they think about what to be when they grow up. As I called operators across the country from here in New Hampshire, I got to hear some great stories, and a few great jokes. In Tolleson, Arizona, they are so proud of “the plant” they deck it out for Christmas (see photo). While looking at a photo of that truly beautiful plant, my 11-year-old said, “I want to work there, look at the pools they’ve got!” Tolleson may have the right idea there. Public perception counts when working with public funds.

As you visit www.biogasdata.org for the wealth of information that can be found, remember each point on the map is a facility with a story. For each facility, you will find data on plant size and location and how biogas is produced and used. You’ll see an aerial view of the plant. You can search by state or city or part of facility name, or you can locate facilities on a map of the U.S.

I have to say here, that pinpointing the location of each plant was not always easy, when the treatment plant address given is sometimes the town hall. But, as plants came into focus, they appeared like crop circles on the outskirts of towns. At one location in the southwest, there was even a Paleolithic stone structure visible adjacent to the wastewater treatment plant. I urge you to take a look at this new website. Check out a few of the plants in detail, and then zoom out on the map and think of how amazing it is to have all this infrastructure treating wastewater and making renewable energy across the U.S.

Then send us your comments and suggestions for the site: info@biogasdata.org. I will answer your emails personally.

-Maggie
It bears repeating that the Commission felt that the water challenges we face now and will face in the future are different than those of the past; therefore, it is time for a departure from the solutions of the past. Today’s water problems are more complex and require smarter approaches and more resources to address them. The solutions require the involvement of not just state and local governments, but businesses, institutions, individuals, and the Legislature. Clean water, where and when we need it, is a renewable resource only if we manage it effectively. We owe its care to our children and their children. The work must begin now.

You can view the report on the Water Sustainability Commission’s website http://www.nh.gov/water-sustainability

(Continued from page 2)

In Remembrance:  Arthur T. Seabury, Kent CT

Arthur Seabury passed away on April 8, 2013 at the age of 100 years. Our deepest sympathy goes out to those who worked with him and knew him. He was born and died in Kent, CT. He was a veteran of World War II, serving in the U.S. Army. He owned and operated Seabury Plumbing and Heating Company in Kent for 25 years. Following that retirement, he became superintendent of Kent’s Water Pollution Control Facility for 40 years. Art was instrumental in the plant’s design. He worked full time at the plant until the time of his passing.

Art dedicated his life to civil service and was a member of the Kent Volunteer Fire Department for more than 50 years and served as chief for 16 years. He was also instrumental in bringing ambulance service to the Town of Kent for which he served as a driver for many years.

Last November the local newspaper ran a story on Art, in recognition of reaching his 100th birthday. In the article published by the Republican- American newspaper, his close friends and associates gave the following honors:

“Art held in high esteem the basic principles of public service and shared his knowledge of his many years of experience with anyone that was willing to listen to him, I can’t say enough on how much I personally appreciated Art with his everlasting humor, wit and kindness...”, shared by Sal Palaia, long time friend and engineer assigned to planning, design and construction of the Kent plant.

Rowland Denny of the CT Department of Environmental Protection and Dave Chin of USEPA honored Art in the article as well. Art was honored with a citation from EPA that acknowledged his more than 45 years of service to help protect the water quality of the Housatonic River and public health of the citizens of Connecticut.

They just don’t make ‘em like that any more, a proud member of the Greatest Generation.

He will be missed.
The NHWPCA in conjunction with NEWEA and NEBRA held their annual Water’s Worth It! Legislative Breakfast on Wednesday March 6, 2013 at the Holiday Inn on Main Street in Concord. This 7:00 a.m. event was very well attended and had the best turnout for legislators since we began hosting this event seven years ago. The high attendance rate is attributed to members of NHWPCA who were diligent in reaching out to their elected officials and inviting them to this important annual event. The free breakfast didn’t hurt!

The Breakfast was moderated by Fred McNeill, Chief Engineer for the City of Manchester’s Environmental Protection Division, who noted that “New Hampshire’s water industry is faced with aging and failing infrastructure, increased regulatory requirements, and no source of sustainable funding, so we are reaching out to our legislators through this breakfast to educate them about the needs of the water industry, which is so closely tied to New Hampshire’s high quality of life.”

The event was sponsored by two legislators who are very active on water infrastructure funding, Representative Tom Buco from Conway and Senator Forrester from Meredith. David Paris, Director, Manchester Water Works and NH Water Works Association Board Member, gave a compelling overview of drinking water and its costs for municipalities. Dr. Thomas P. Ballester, P.E. (Associate Professor and Director of UNH Stormwater Center) shared insight on the many developing alternative options for managing stormwater cost-effectively. Unfortunately Donna Hanscom from Keene could not attend to give her presentation, but Ned Beecher, Executive Director for NEBRA, filled in and did a great job.

The event closed with remarks from Vicki V. Quiram, the new Assistant Commissioner of NH Department of Environmental Services (NHDES). She acknowledged that NHDES has identified close to $3 billion to fund water infrastructure needs over the next decade. Dams over 100 years old, drinking water upgrades, wastewater facility improvements to comply with increasingly stringent permit limits and stormwater management systems are all in need of funds. Coming from the southwest, Ms. Quiram fully appreciates the value of clean and plentiful water and that this natural resource is vital to modern society.

A question and answer discussion with professionals, legislators and other attendees followed the presentations. This annual event is a good opportunity for NHWPCA Members to reach out to their elected officials and help them to understand why Water’s Worth It!
The New England Water Environment Association (NEWEA) held its annual *Water’s Worth It! Congressional Breakfast* in Washington, D.C. on March 20th this year. The breakfast was well attended and members from all of the New England states traveled down to participate and to reach out to our elected officials to discuss the important issues facing the water, stormwater and wastewater infrastructure of our communities throughout New England.

Congressman Mike Capuano from Massachusetts really set the stage by bringing in a section of pipe in terrible disrepair to illustrate the need for investing in the aged and dilapidated water infrastructure. He rightly pointed out the need to fund states so that the SRF program can continue to enable municipalities to carry out the upgrades and improvements needed to comply with increasingly stringent limits from EPA. Dave Cedarholm from Durham, NH Public Works gave a compelling presentation about their efforts to mitigate nutrient loading in the Great Bay watershed. Senator Angus King from Maine shared his experience as a past-governor stating that if you are not spending money on infrastructure, then you are creating debt for the future. The message from the speakers was that there are many organizations competing for limited federal dollars, and that the water industry needs to keep telling its story and remain in front of policy makers.

After the *Water’s Worth It!* breakfast, members from each state went out to meet with each of their elected officials. The crew from New Hampshire was comprised of Kristin Noel (NHWPCA President and Concord WWTF) Peter Goodwin (NHWPCA Board and Woodard & Curran), Dave Cedarholm (Durham Public Works), Harry Stewart (NH-DES) and Shelagh Connelly (Resource Management, Inc.).

Our team met with staffers from each of the four delegates and had the opportunity to share information and provide feedback about the issues surrounding drinking water, stormwater and wastewater. The major issues remain: 1) the need for repairs and replacements for aging and failing infrastructure; 2) investing in this infrastructure creates jobs; 3) the need to meet more stringent regulations and environmental protection standards increases costs; and 4) must have sustainable funding mechanisms to manage drinking, storm and waste water.

We were especially pleased to meet with Senator Shaheen in her office and she took the time to listen to our concerns about the need for sustainable funding. Clearly Senator Shaheen is knowledgeable about drinking water and wastewater issues and understands the impact for NH communities when the infrastructure for these fails. And Congresswoman Carol Shea Porter caught up with us in the hallway between voting and was very interested in our issues. As a follow-up it was encouraging to read her recent editorial in the Union Leader about Great Bay and the need to fund wastewater improvements (http://www.unionleader.com/article/20130513/OPINION02/130519812)

(Continued on back cover)
CLOACINA: Goddess of the Sewers
By Jon C. Schladweiler, Historian, Arizona Water & Pollution Control Association

Mankind has routinely sought, through the ages, strength and guidance from the spirit world. The Romans, during the course of their Empire (650 BCE – 400 AD), worshipped many deities … one of them being the Goddess Cloacina – in whom they placed their faith/trust for the wellbeing of Rome’s sewers (and workers); a facet of Rome’s public works infrastructure that was considered vital to their desired way of life - good health through sanitation.

Cloacina was the patron goddess of the Cloaca Maxima (the main drain of the City) and the city’s overall sewer system. Over time, the Romans came to also think of her in a multitude of other ways including; as the goddess of purity, the goddess of filth and the protector of sexual intercourse in marriage. As such, over the ages, she came to be affiliated with Venus; and, gradually became known to many as the Venus Cloacina.

The first “sewer” segments (as opposed to Rome’s initial surfaced and open topped drainage ditches) of the Cloaca Maxima were started in the late 500’s BCE; the craftsmen were Etruscan – Rome’s neighbors to the North. Soon thereafter, it is told that a statue of a woman was found in the sewer. She became known as the Goddess Cloacina; a deity that likely had its origin in the mythology of the Etruscans. Cloacina’s name is possibly derived from either the Latin verb “cloare or cluere” (to wash, to purify or to clean) or, from the Latin word cloaca, meaning “sewer”. The need for the Goddess of the Sewers soon became recognized as an important aspect of the Romans’ lifestyle/beliefs during the next 600 or more years - as Rome grew and its sewer system was completed.

Recognition was paid to Cloacina in many ways:
- A shrine (aka: Sacrum Cloacina) was built in her honor in the Forum, in front of the Basilica Aemilia; directly above the Cloaca Maxima Sewer. [In fact, it is believed that an entranceway (i.e., a “manhole”) to the sewer was once present within the physical confines of the shrine.] Only the foundations of the original shrine remain evident today.

Sculpture of Cloacina
(Source: Sewerhistory.com )

Ruin of Sacrum Cloacina showing its circular foundation. (Source: University of California LA)

Sketch of the Sacrum Cloacina in Rome

Model of the Basilica Aemilia showing the Sacrum Cloacina in the foreground. (Source: Robert W. Garbisch)
-Certain of the Roman coins minted in the times following the death of Julius Caesar (44 BCE) had an image of the Shrine of Cloacina embossed on one side of them.

42 BCE Roman coin showing the Sacrum Cloacina.
(Source: www.wildwinds.com)

- Rhymes, Poems and Prayers:

“Then Cloacina, goddess of the tide,
Whose sable streams beneath the city glide
Indulged the modish flame, the town she roved,
A mortal scavenger she saw she loved.”

A prayer that might have been offered by a Roman to Cloacina:

“O Cloacina, Goddess of this place,
Look on thy suppliants with a smiling face.
Soft, yet cohesive let their offerings flow,
Not rashly swift nor insolently slow.

One can only hope that the spirit of Cloacina has remained with us through the ages; and, is still available to help with the well being of our sewers and of the people who work so hard to plan, design, construct, administer, operate and maintain them today. Faith may indeed work wonders!

Visit 
www.sewerhistory.com
to see this article and much more information about the history of our profession.
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Our economic and social expectations are that clean water will come from our taps and sewage will flow through pipes to wastewater facilities for treatment. Society cannot function without these two critical features. We go to Washington, DC each spring to engage our Senators and Congressional representatives to ensure that they prioritize these issues and will work to secure adequate funding for water infrastructure for our communities throughout New Hampshire and the whole country.

Meeting Senator Jeanne Shaheen
Molly Riehs (student), Shelagh Connelly, Senator Jeanne Shaheen, Kristin Noel, Dave Cedarholm and Harry Stewart.