NYWEA'S MAGAZINE

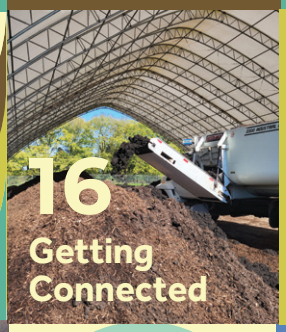
ClearWaters

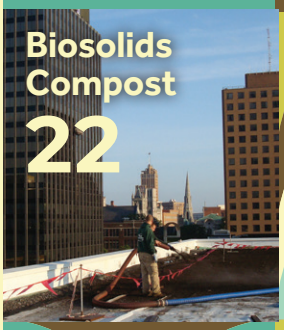
Spring 2024

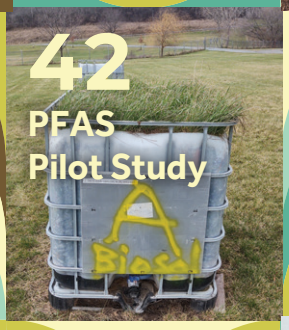
NYWEA

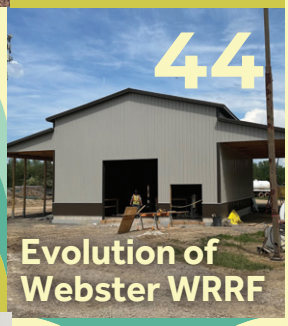
nywea.org

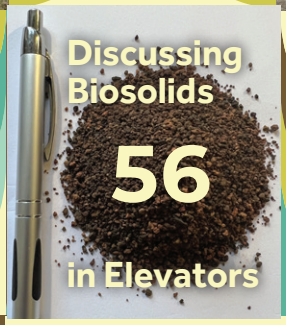
The BIOSOLIDS Issue











OPEN FOR MORE OF OUR NEW LOOK

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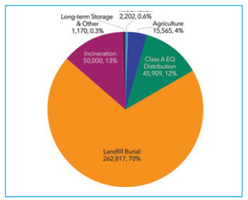

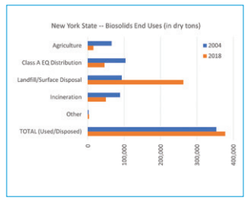

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Editor's Note:** ***Winter 2023 Issue Correction: Page 34, Figure 1 should be credited to Joel Paradise, not NFWB.*

NYWEA™
LEADING THE WAY IN WATER QUALITY MANAGEMENT
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ClearWaters NYWEA'S MAGAZINE

Editor
Kerry A. Thurston

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NYWEA believes in sustainability as a core value. *Clear Waters* magazine is produced using responsible RecycleOne certification procedures. This is done in an eco-friendly process, that recycles virtually all chemical, paper and metal waste.

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NYWEA'S MAGAZINE
ClearWaters

DEPARTMENTS

PRESIDENT'S MESSAGE

It was an honor and a privilege to accept the gavel from Immediate Past President, now Water Ambassador Donna Grudier at the 96th Annual Meeting Awards Luncheon this past February. I would like to thank Donna for her tremendous efforts to elevate the essential worker and the work they do that often goes unacknowledged. Her passion and dedication to this organization are admirable.

Donna initiated the Operation SOS: Support Operator Scholarships campaign, and I am honored to co-chair this effort with her. The mission for Operation SOS is to elevate operators by creating sustainable and inclusive opportunities for operators, which is why this fundraising campaign supports the Lucy Grassano and Brian Romeiser operator scholarships that NYWEA offers, as well as the new Michelle Koester operator scholarship.

Lisa Derrigan
NYWEA President

A Match Made in Water—

A Match Made in Water:
Pumping up Our Professionals
Connecting mentors and mentees

Mentor Sign Up

Mentee Sign Up

Connecting Mentors and Mentees

In my remarks at the Awards Luncheon, I told my NYWEA story, the journey that led me to eventually serve as NYWEA president. I first joined NYWEA (or the New York Water Pollution Control Association, as it was called back then) in college and was a founding member of the University at Buffalo Student Chapter. Throughout my NYWEA journey, I have always been surrounded with people who encouraged and supported me—and even nudged me outside of my comfort zone—which is why the focus for my year as president is to promote mentoring. For those that planted the NYWEA seeds of encouragement over the years—Dave Smith, Kirk Rowland, Tony DellaValle, Patricia Cerro-Reehill, and so many more—I sincerely thank you. Your guidance and inspiration have been invaluable.

Mentorship is more important than ever due to workforce challenges such as the silver tsunami, shortage of workers and decline in students going to college in water-related fields. Mentoring needs to happen at all levels to help retain staff, elevate young operators, and entice students to join and remain in our industry. I believe there are elements of previous NYWEA presidents' themes that touched on mentorship, from Bill Nylic's personal connection theme in 2020 to Lauren Livermore's Reflect, Protect, Connect theme, and from Khris Dodson's Year of JEDI to Donna Grudier's Elevating Essential Workers. Mentoring provides a pathway for connecting with others, fostering diversity/inclusion, and elevating essential workers, as well as helping our future water heroes grow and remain committed to the wastewater industry. Mentoring also aligns with some of NYWEA's strategic plan drivers such as supporting and diversifying a sustainable workforce and long-term organization health.

There are opportunities all around you to mentor a future water hero, whether from within your own workplace, or through connections at NYWEA or other professional organizations, the InFLOW program, NYWEA student chapters and so on. Please consider mentoring a future water hero this year. It doesn't have to be anything formal; sometimes mentoring is most impactful when it happens organically. If you are interested in becoming a mentor or mentee, please consider participating in our new program **A Match Made in Water: Pumping Up Our Professionals, Connecting Mentors and Mentees**, and follow the appropriate QR code above.

2024 Spring Meeting

I'm thrilled that the Spring Meeting was in Buffalo this year, June 4 through 6, 2024. Participants enjoyed a robust technical program and the highly competitive Operations Challenge where seven teams vyed for a chance to compete at WEFTEC 2024, including the newly formed Buffalo team, the Buffaflows. Congratulations to the top four teams, the Brown Tide, Coyotes, Notorious BOD and Water Recyclers, who will be representing NYWEA in New Orleans this October. We also had some exciting fundraising events for Operation SOS. There was a golf tournament on Monday, June 3 (the day before the conference officially started), with over 40 golfers participating! The pipe cutting event was a rockin' good time with a smoke machine, great music and quite a few attendees getting some real-world Ops Challenge experience. And let's not forget the dunk tank, it was so much fun! Several NYWEA volunteers, including Water Ambassador Grudier, Executive Director Khris Dodson, and your current NYWEA president (hey wait, that's me!) among others made a big splash for the Operator SOS campaign. Many thanks go out to all the throwers and dunkees! Be sure to keep an eye on our social media and email newsletter for a highlight reel!

In This Issue

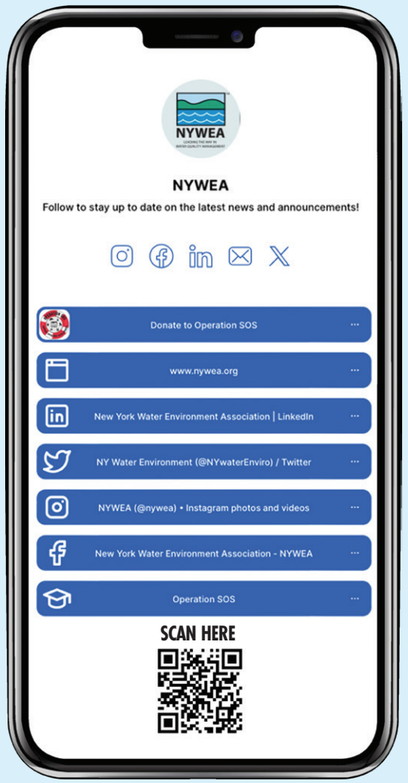
This issue of Clear Waters highlights all things Biosolids—from treatment and addressing emerging contaminants to management and disposal. Effective biosolids management is essential for protecting the environment, promoting sustainable development, and ensuring the efficient use of resources in wastewater treatment. The articles cover topics such as PFAS in biosolids, regulation trends New York, the NYCDEP's biosolids management journey and driving sustainability in biosolids disposal at the Webster WRRF. The Focus on Safety column made my skin crawl as Nellie Brown informs us about bedbugs in the workplace. This issue also marks the last Water Views column by Jim Tierney, as he recently retired from the NYSDEC. **Thank you, Jim, for your dedication to NYWEA and contributions to Clear Waters. We wish you all the best in your retirement.**

There is much work to be done in the year ahead and we are fortunate to have a rock-star team of dedicated and talented professionals on the Executive Committee, including President-Elect Dan Rourke, Vice President Vijesh Karatt-Vellatt, and Vice President-Elect Dan O'Sullivan. It is a privilege to work with this team and I am honored to represent NYWEA and our wonderful members.

Lisa J. Derrigan

Lisa J. Derrigan, PE
NYWEA President

Khris Dodson
Executive Director



CHECK US OUT ONLINE!

FROM THE DESK OF THE EXECUTIVE DIRECTOR

Annual and Spring Meetings a Success!

We've got another Annual Meeting in New York City in the books, and it was a great event! For the first time, we had an Operator's Lounge, which was appreciated and well-used. We had 36 sessions, which is an expansion of the number of presentations over previous years. We hope to continue to offer quality technical sessions for all of our events and to offer more of them.

The exhibit hall was as active as it's ever been, and those aren't just my words. Next year, we hope to re-configure the exhibit hall to not only allow for more exhibitors but to also provide areas for attendees to meet, congregate and actually have a place to sit down and eat their lunch.

Our Women's Networking event was so well-attended we had to expand the room to make space for everybody! Thanks to Donna Grudier and Jean Malafronte for hosting that event. Our new member luncheon was at capacity and our Past Presidents' breakfast became a brunch, which was a lovely change thanks to now Immediate Past President Donna Grudier. I bet we'll carry that through to next year, too. Want to join that? Nominate yourself for a NYWEA state board officer position before August.

InFLOW was again a success, and this program continues to grow and thrive. More importantly, I am seeing InFLOW scholars return year after year. This is how we build the pipeline of future water workers! Thanks to Walt Walker, Stephanie Castro and the rest of the committee for pulling that together. And we saw even more InFLOW scholars at the Spring Meeting in June in Buffalo, which was exciting.

Speaking of the Spring Meeting, it's also in the books, and we received tremendous feedback. It's been more than a decade since we hosted the Spring Meeting in Buffalo, but we felt right at home, and everyone seemed to enjoy themselves. I mean, after all, there was a dunk tank, how could you not?! And the Operations Challenge events were outstanding as always. From the expertise, to the camaraderie and sportsmanship, the operators never disappoint, and it seems that everybody at the Spring Meeting won from the operators, to the judges and spectators. It was an inspiring event. We'll be putting together a highlight reel for those of you who could not attend, so keep an eye out for that, in addition to the dunk tank video President Derrigan mentioned.

You really should consider joining us at a future event, as one attendee said, he was impressed by the energy at the Spring Meeting.

Upcoming Meetings in 2024

Our NYC Watershed and Technical conference will be at Bear Mountain Inn again this year on September 10. And, we will have another Women in Water event in Albany on October 24. Hopefully, we'll see some of you at our upcoming events. And, if you have an idea for a training or event, let us know!

NYWEA is as strong as it is because of the depth of commitment of our volunteers. As always, let me know how we can plug you in to chapter, committee or state association board service.

Khristopher Dodson
khris@nywea.org

Student Spotlight: Jack Murtagh

I was first introduced to NYWEA during my junior year at the State University of New York College of Environmental Science and Forestry (SUNY ESF). I was eager to set myself up for strong job opportunities and heard from faculty that NYWEA was a great way to do this. I was still unsure of my post-graduation career plans so decided to attend the ESF NYWEA Student Chapter meetings out of curiosity.

The first significant event of the year was the chapter's annual Women in Science Engineering (WISE) Panel. Each year, ESF NYWEA invites successful women in the water industry to share their experiences and answer questions on the panel. This was when I really started to consider a career in water. I pictured myself in the shoes of someone further into their career and was excited about the possibilities of working in this space.

After my experience with the WISE Panel, I became more involved in the organization and registered for NYWEA's 95th Annual Conference. My experience at this conference ultimately solidified my decision to pursue a career in water engineering. I was fascinated by the innovative technologies on the exhibition floor and wanted to learn more about them. I wanted to become a wastewater expert and make real changes in water quality. The presentations and technical sessions I attended left me inspired and excited to grow my knowledge of the different components of wastewater treatment.

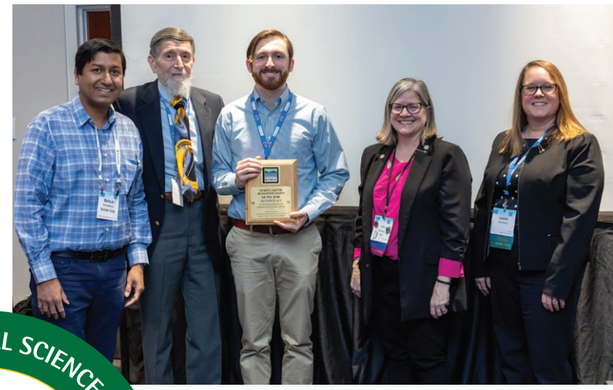
What struck me most at the conference was the feeling of a shared mission between the hundreds of attendees. It was clear that people in this field are passionate about their work and believe they are genuinely improving the environment and public health. This realization was encouraging and compelled me to make connections with these inspirational people.

Of all the things NYWEA has done for me, the most rewarding were the connections I made along the way. During my second annual conference in February 2024, people started to recognize me, and I felt like I was actually a part of the organization instead of an outsider looking in. I realized that by staying in New York, I will be seeing these people for years to come.

Many of these connections were with people in the Syracuse area. Outside of the conference, I got to see them at Central Chapter events where I further developed the relationships. Most recently, I attended a Central Chapter bowling event and reconnected with people from summer internship and with ESF alumni who graduated this past year. These events are a great way to stay connected with friends and an opportunity to make new ones. I definitely plan on attending more events like this after I graduate this spring.

My involvement in the WEF Student Design Competition (SDC) at WEFTEC 2023 was an incredible opportunity to improve my leadership and collaboration skills. Before my involvement with NYWEA, I lacked confidence in my leadership and public speaking abilities, but knew that it was something I could improve with some work. I decided to break out of my comfort zone and requested the role of captain for the ESF design team traveling to Chicago for WEFTEC. There were certainly growing pains, but this competition was one of the most valuable learning experiences during my time as an undergraduate student.

In reflecting on my time as president of the ESF NYWEA Student Chapter, I recall the stressful moments when I felt overwhelmed by the responsibilities. It certainly wasn't an easy role, but perhaps that is why I found it so rewarding. NYWEA has helped me grow so much as a person and as a leader. I'm excited to see how my experience with the organization will transform as I enter this exciting career in water quality engineering.



L-to-R: Mahbub Choudhury, Walter Saukin, Jack Murtagh, Lisa Derrigan and Lauren Livermore posing with SUNY ESF's Grant Award at the 2024 Annual Meeting.
Photo: Trent Wellott

Jack Murtagh
SUNY ESF

Photo: Trent Wellott

2024 Annual Meeting

NYC Marriott Marquis, February 5-7

NEW: Scanning in and out of sessions using QR codes.

Mark Koester and Steven Fangmann.

Koester, busy as always.

All Photos: Trent Wellott

STATS: **1500+** Attendees **130+** Speakers **183** Exhibitors **36** Sessions

L-to-R: Donna Grudier, Lisa Derrigan, Khris Dodson, Lauren Livermore and Patricia Cerro-Reehil.

Grassano scholars at the ribbon cutting.

Walt Walker.

Rit Aggarwala.

The women's networking event was so popular it needed more room.

Angel French.

The GP Jager aisle.

The Bowery Bay Coyotes stopped in for a demo.

Students posing with awards and NYWEA representatives during the student session.

Steve Sanders.

Jean Malafronte.

It's not a meeting without GA Fleet.

Student Lunch.

SCAN FOR THE 2024 ANNUAL MEETING PHOTO ARCHIVE

Managing Today's Environment for a Better Tomorrow

Wyandanch Spring Lake
Geiger Park, Deer Park, NY

WATER VIEWS

Toward a Flood Resilient New York

James Tierney
Deputy Commissioner for Water Resources
NYSDEC

The "Resilient NY Stream Study" program is one way that NYSDEC seeks to reduce flood impacts. This state-of-the-art initiative involves scientific and engineering investigations to identify numerous specific project proposals in the subject watershed that will, together, substantially reduce flooding and ice jams. The studies involve extensive community consultations and employ advanced hydrologic modeling techniques and field assessments. These studies generally take only six to eight months to complete. NYSDEC pays all study costs. To date, NYSDEC has completed 40 flood studies, with another 60 planned to assist additional flood-prone watersheds.

Identified project proposals are good candidates for funds available annually via NYSDEC's Non-agricultural Nonpoint Planning Grant, which pays 90% of the costs. Some project proposals have qualified directly for implementation grants from EFC's Green Innovation Grant Program. These technically recommended flood mitigation projects are good candidates for Clean Water, Clean Air and Green Jobs Bond Act grants.

The flood reduction projects identified in Resilient NY studies (such as culvert right-sizing, floodplain and wetland restoration/creation, berm removals, etc.) are eligible for grants from NYSDEC's annual Water Quality Improvement Project program, although you will need an engineering report to apply. The next grant round will likely open in May.

Many wastewater treatment facilities and pump stations, located at hydrologic low points, are vulnerable to flood risks that are worsening due to climate change. Engineering reports to support resilient upgrades (EFC's Engineering Planning Grant helps pay for 80% of these reports) should propose solutions to reduce risks to flood-vulnerable facilities or certain of their components. Once projects are identified, competitive grants and other state financing options are available to help mitigate flood risks.

An example of flood-resilient facility improvements is the Nassau County South Shore Water Reclamation Facility (WRF). This facility has been rebuilt with improved pollutant removal treatment systems. Moreover, following Superstorm Sandy, the upgraded facility was designed to withstand a 500-year coastal storm. Thanks to our partners at the Federal Emergency Management Agency, this project has been undertaken at no cost to local ratepayers or Nassau County.

Similarly, a partnership between NYSDEC and the Nassau County Department of Public Works led to the development of the Bay Park Conveyance Project. This project will shift the highly treated effluent discharge of the South Shore WRF from the Western Bays of Long Island to the Cedar Creek Water Pollution Control Plant ocean outfall pipe. Removing the nitrogen discharge from the warm and shallow Western Bays will allow the marshlands and the badly degraded ecosystem to recover with surprising speed, bolstering the natural protection that the coastal marshland provides against storm surge and sea level rise to southern Nassau County.

NYSDEC will continue to support initiatives to safeguard New York's critical infrastructure. Learn more about the Resilient NY Stream Study program and the various flood studies at: https://dec.ny.gov/environmental-protection/water/water-quantity/resilient-ny.

Postscript: After 17 years, this will be my final Water Views column, as I am retiring from DEC. I've enjoyed working with NYWEA and am personally and professionally grateful for all of your good work.

FOCUS ON SAFETY

Nellie J. Brown
MS, CIH

Bedbugs in the Workplace

Bedbugs are making headlines today, but have lived with humans worldwide for millennia. Before World War II, about 30% of American homes probably had bedbugs. Then long-lasting pesticides made them rare for about 50 years. In the late 1990s, a worldwide resurgence began, attributed to less-toxic pesticides, pesticide resistance and increased international travel.

Bedbugs are human parasites that bite to feed on blood. Their eggs hatch into nymphs with several eating-then-molting cycles until becoming adults. Fortunately, they do not appear to be disease vectors. Adults live six to 12 months and may survive for long periods without feeding.

Could they be a problem in a water or wastewater treatment plant? Bedbugs typically hide during the day, emerging to bite people at night, so an infestation is unlikely as this requires some type of residential or sleeping arrangement. Bedbugs crawl but don't fly; to reach a treatment plant, they would hitch a ride on clothing, bags, backpacks, etc. Unless the bedbugs are biting you at work, they are unlikely to be able to reproduce enough to produce an infestation. But they could be shared at work and then carried home or anywhere.

So, get everyone's cooperation. Encourage reporting signs of bedbugs and keep records of the dates and locations. Inspect communal areas and shared items such as seating, lunchrooms, locker rooms, workstations, offices or coat racks for eggs, nymphs, adults, shed skins and fecal pellets. Check books, files and records for damage; pull out drawers and inspect casements. Turn over furniture and fill any cracks or screw holes with silicone. Avoid upholstered furniture, use hard surfaced materials instead. Remove clutter to make cleaning easier.

If you find any bedbugs, make sure that the critter has been correctly identified as a bedbug, not some other pest. Quarantine infested items in zippered plastic bags or plastic containers until you can clean them or starve the bedbugs. Launder washable items; clean items/areas with a HEPA vacuum; wipe down surfaces using essential oil soaps (pine, orange, lemon), enzyme soaps or sudsy detergents (not bleach or ammonia). These procedures will kill or remove all life stages, as well as sticky fecal pellets that contain allergens. Inspect clothing and personal items; change clothes at work and bag work clothes until placed in the washer.

Consult an exterminator for assistance, as there are less-toxic products such as natural oils or silica gel to discourage bedbugs. While there are no insect repellents that are labeled for bedbugs, they may dislike some scents of essential oils (cinnamon, lavender, peppermint or tea tree).

Some years ago, I was asked to speak about bedbugs, lice and scabies at a conference. When I agreed, the requester was so very relieved—other speakers had been turning him down! "What do you want to call your workshop?" he asked. I said, "Critters."

LOCAL HEALTH DEPARTMENTS APPRECIATE WASTEWATER SURVEILLANCE

By David A. Larsen

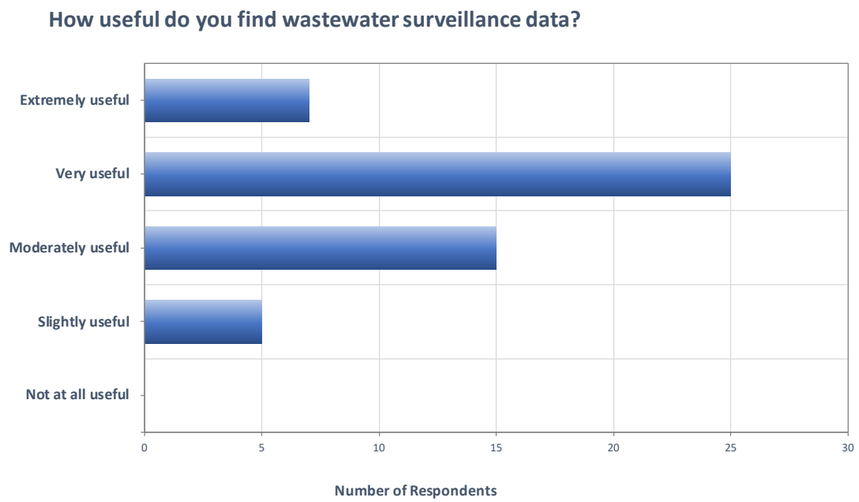


Figure 1. In a survey of local health departments across New York state, most respondents reported that they find wastewater surveillance to be very useful. Some even rated it more important than hospitalizations or case data to understand the current threat of COVID-19 to the community. *Credit: NYS Wastewater Surveillance Network*

One of our routine activities with wastewater surveillance data is to provide local health departments with a memo report every week outlining the results from wastewater samples in their counties. These memo reports include:

- The level of SARS-CoV-2 RNA in the wastewater of the county and how it relates to earlier in the pandemic.
- The trends of SARS-CoV-2 RNA in the wastewater.
- Forecasts of COVID-19 hospitalizations (what to expect in the next week).
- Update on genetic variants that may be circulating in their county.

We consider these memo reports to be a key process in translating wastewater samples into public health understanding.

In January 2024, we surveyed local health departments across New York state regarding their knowledge, attitudes and practices related to wastewater surveillance data. Our preliminary analyses of the survey data show that the majority of local health departments in the state hold the wastewater surveillance in high regard (***Figure 1***), with many of the counties reporting that wastewater is more important than case or hospitalization data to understand COVID-19 risk in the community.

The local health departments throughout New York state appreciate the wastewater surveillance network, including all the efforts made by wastewater treatment plants to participate. Wastewater treatment plant operators are the foundation of the state's network, a network that is improving our local health departments' capacity to improve the health.

David A. Larsen, Ph.D., MPH, is a professor and chair of the Department of Public Health with Syracuse University who may be reached at dalarsen@syr.edu.

GETTING CONNECTED
with Water, Wastewater and Biosolids Associations

Photo: Curtis Huey, Mechanicsburg Wastewater Treatment

By Mary E. (Firestone) Baker

There is a famous quotation from Helen Keller that serves as a great catalyst for this article, and for the water, wastewater and biosolids organizations that serve you, the region and the country: "Alone we can do so little; together we can do so much."

Let's talk about the togetherness that brought you to read this article—your membership in NYWEA! You probably joined NYWEA based largely on their purpose and the services they provide through your membership. And that purpose is directly seen in the NYWEA Mission Statement: "NYWEA will serve the best interest of the public by promoting sustainable clean water quality management through science, education and training."

There are many other organizations like NYWEA out there that have your best interests in mind and that can help you navigate your clean water career and provide better service to your communities.

Strength in unity goes even further with the specialized purpose of the biosolids associations of the region—the North East Biosolids and Residuals Association (NEBRA) and the Mid-Atlantic Biosolids Association (MABA).

NEBRA serves six U.S. states and five Canadian provinces in the Northeastern region of the continent. The NEBRA mission is "to cooperatively promote sustainable diversion, recycling and beneficial use of biosolids and residuals from the municipal and industrial sectors."

MABA serves seven states in the Mid-Atlantic region, and their mission statement is to "communicate the benefits of biosolids resources within the biosolids community and the communities we serve."

Both organizations were formed in 1997 and both have recently celebrated their 25th anniversaries.

But why are biosolids-specific organizations key to the holistic water and wastewater community? There are many answers to this question, and I'll review a few of those here.

Biosolids Is Our "Thing"

It's good to be focused just on the solids—not to mention sustainability, soil health, greenhouse gas reductions and all those resources to recover. Additionally, there are many challenges with sludges and biosolids because it's where all the pollutants removed by water resource recovery facilities (WRRFs) end up. Although many water environment associations have committees focused on residuals and biosolids, the solids are the only focus for MABA and NEBRA. This focal point of solids allows for concentrated efforts to communicate the distinctly solids-related information to their members and communities.

Regional biosolids associations offer help with communications, sharing of accurate information, building trust with communities, and assistance with talking to the press—services that everyone involved with managing biosolids needs. Moreover, regional biosolids associations provide their members with access to best management practices and research, and provide advocacy for well-informed laws, regulations and policies. They are the true one-stop-shop for all your biosolids-related needs.

Let's delve a little deeper into some of these aforementioned areas, including advocacy, education and communications.

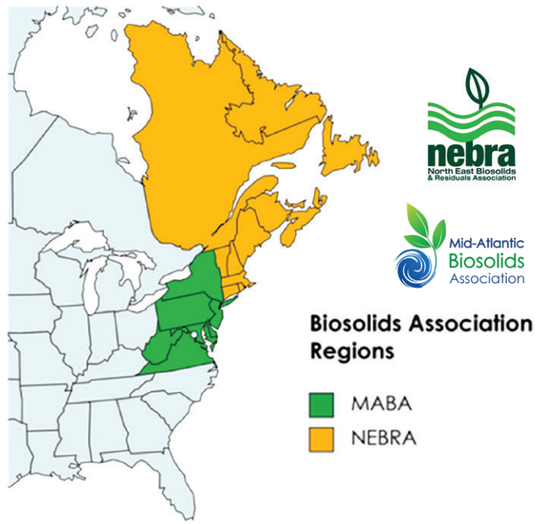
Advocacy

MABA and NEBRA work to identify, advocate and respond to legislation and regulations that affect the wastewater treatment and biosolids sector in the region. With a refined focus on solids-specific legislation and regulatory developments, this affords the regional biosolids organizations the ability to share and provide direct call-to-action announcements to their members. They also meet regularly with other regional and national organizations to share information, experiences and opportunities to work together to review and respond to regulatory and legislative developments. Once more, the unification of many groups in solidarity in these responses can greatly affect the weight they carry and the results they achieve.

Education

Education is a cornerstone for the biosolids associations in the region. MABA and NEBRA host regular webinars on wastewater treatment and biosolids-related topics. NEBRA's Lunch & Learn series, as well as the

Credit: MABA/NEBRA



Northeast Digestion Roundtable, and MABA's regular webinar series provide information and training on a broad scope of topics for residuals and biosolids. MABA hosts an annual Summer Symposium and NEBRA, in collaboration with the New England Water Environment Association (NEWEA), hosts an annual Residuals and Biosolids Conference. Both events cover a wide range of technical topics and provide in-person networking opportunities.

Communication

MABA and NEBRA stay abreast of the latest information within their respective regions and across the country. They regularly share this information and related resources with their members via email, social media and their respective websites.

MABA researches and compiles news articles related to wastewater treatment and biosolids in the region and across the country in monthly Biosolids NewsClips email to members. NEBRA similarly compiles relevant news from across the Northeast region and shares with its members via their monthly newsletter, NEBRAMail.

Both organizations email monthly research libraries from biosolids researcher Sally Brown at the University of Washington. They also provide their members with access to the members-only section of their websites that includes a wealth of information and files.

Time to Engage

Where do the roads of water and wastewater associations and their members, and the regional biosolids association intersect? With YOU! These organizations are all working, often together, to best serve you, their members. And one common thread NYWEA, NEWEA, MABA and NEBRA share is their desire to know more about you and your stories, your concerns and your needs now and in the future.

Consider reaching out to MABA and NEBRA's directors to discuss the residuals and biosolids issues that you are confronting, and the topics that interest you and your community. MABA and NEBRA are always looking for new participants for focus groups, committees and their boards as well. The water, wastewater and biosolids communities are all a part of a greater whole, and we are stronger together.

Mary E. (Firestone) Baker is the executive director of the Mid-Atlantic Biosolids Association and may be reached at mfirestone@mabiosolids.org

Photo: Thomas Hauser, Chalfont-New Britain Township Joint Sewage Authority

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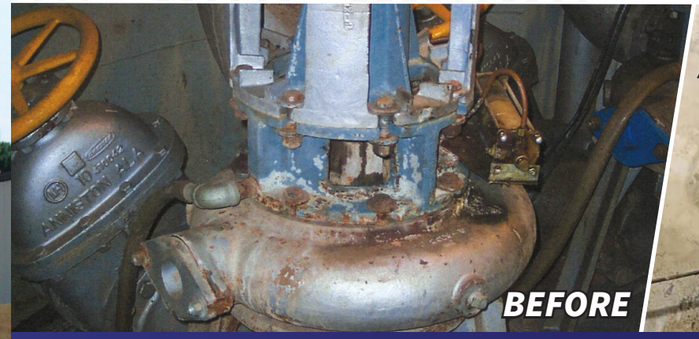

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Biosolids Management in New York State—How Far Has It Really Come?

By Janine Burke-Wells

When I was in college—not that long ago—New York wastewater sludges were still being disposed of at sea. Dumping wastewater sludges into the ocean was legal until the Ocean Dumping Ban Act of 1988. The previous year, in 1987, the Clean Water Act (CWA) was amended to include Section 405(d)(2)(D), which established the "three-legged stool" of biosolids management that we know today: landfilling, incinerating and beneficial uses.

The U.S. Environmental Protection Agency (USEPA) had been working on sludge management policy since the 1977 CWA Amendments, when Congress charged USEPA with developing regulations and guidance for use and disposal of sewage sludge, identifying alternative uses/disposal options and establishing concentrations of pollutants that would interfere with each use. Subsequent science and policy work by the USEPA was codified as 40 CFR Part 503, the Standards for the Use or Disposal of Sewage Sludge, effective March 22, 1993.

The history of the Part 503 rules was fraught with controversy. All of the regulated end-use options faced challenges from the public. But none as much as beneficial reuse or land application. Looking back, a lot has changed with biosolids management since the CWA Amendments, but a lot remains the same.

Flashback to 1997—The Case for Caution

Back in 1997, the Part 503 regulations were still fairly new and there were a lot of detractors out there. In particular, the Cornell Waste Management Institute (WMI) in New York came out with a "working paper" titled, "The Case for Caution: Recommendations for Land Application of Sewage Sludges and an Appraisal of the USEPA Part 503 Sludge Rules" in August 1997. The working paper raised many questions about USEPA's risk assessment process, causing consternation among the public and New York state regulators.

"Dear Mr. Sterman"

The Cornell WMI report generated a lot of letter writing. Of particular interest was a letter from USEPA Assistant Administrator Robert Perciasepe to David Sterman, deputy commissioner of the New York State Department of Environmental Conservation (NYSDEC), dated Oct. 31, 1997. That letter pulled together all the comments and concerns about The Case for Caution.

In the letter, Perciasepe refers to an assessment done by the U.S. Department of Agriculture (USDA)'s Agricultural Research Service with a point-by-point rebuttal of The Case for Caution. Perciasepe's letter also included a one-page fact sheet about USEPA's enhanced program for oversight and management of the biosolids program, which indicates increases in funding and full-time equivalents were being considered for fiscal year 1998.

Citing the Agricultural Research Service's evaluation, Perciasepe writes, "the potential risk from biosolids utilization are small in comparison with the risks from other natural processes and everyday agricultural practices." Perciasepe wrote something similar in a letter to NYSDEC's Sterman back in July 1997: "I believe that both the risks and the benefits of various recycling activities need to be put in perspective."

Perciasepe cites numerous benefits of biosolids including their use to help remediate problems with New York state soils such as high lead and arsenic in apple orchards and potato fields from past pesticide applications. He goes on to argue that the "undue focus" on biosolids can divert attention from other more serious environmental and public health issues due to the use of manures and commercial fertilizers.

The Oct. 31, 1997, letter to the NYSDEC includes a copy of another letter written by USEPA's Perciasepe to Ellen Harrison, the Director of Cornell WMI at the time. In that letter, Perciasepe encloses a copy of USEPA's "A Guide to the Biosolids Risk Assessment for the EPA Part 503 Rule." Perciasepe also comments, "biosolids' qualities have continued to increase."

NYSDEC Chimes In

Also reviewing and commenting on The Case for Caution was NYSDEC's Director of Solids and Hazardous Materials, Norman H. Nosenchuck, P.E., with a report by his team in November 1997. That report provides an extensive discussion of the exhaustive peer review study the USEPA went through in developing the risk assessment for biosolids land application resulting in the Part 503 standards (*NYSDEC 1997*).

The 1997 NYSDEC report details the 14 exposure pathways studied by USEPA, pointing out that the Part 503 standards came from the lowest value resulting from the risk assessment of the 14 pathways, which was biosolids for direct human consumption (a child ingesting 200 milligrams of biosolids per day or 11.3 pounds per year) over a lifetime, considered a "highly exposed individual."

If you are interested in diving deep into USEPA's data analysis, you can check out the Part 503 Technical Support Documents from 1992-93 available on the USEPA's Biosolids Program website library — it's in two volumes and nearly 1,000 pages.

CPF Associates Peer Review, 2002

Another review report came from CPF Associates, Inc. as presented at the New York Water Environment Association (NYWEA)'s 74th annual meeting in February 2002. CPF was hired by Synagro to review the science behind The Case for Caution. This paper is a very detailed analysis, a scientific peer review of sorts. The CPF paper calls The Case for Caution a "polemic advocating alternative views of biosolids rather than a scientific document." The CPF analysis found deficiencies in two major areas:

- Failure to adhere to generally accepted standards for publication of scientific research.
- Drawing conclusions that were erroneous and misleading.

The CPF authors admit there were too many problems with Cornell WMI's working paper to be discussed in a single peer review.

Impact of The Case for Caution on Beneficial Reuse in New York

This flashback shows just how much time and effort went into rebuffing The Case for Caution, which was in essence a policy paper with no scientific basis for its recommendations. The working paper caught the attention of the public, especially farmers and home gardeners, causing consternation and extra effort all-around. USEPA and the USDA made special effort to work with Cornell University faculty members, even organizing a series of 10 "Biosolids Roundtables" meetings over a one-year period across New York state.

It's possible, however, that The Case for Caution put a damper on beneficial reuse in New York with water resource recovery facilities (WRRFs) choosing the easier and less controversial landfill or incineration method back then. According to the National Biosolids Data Project (*Beecher et al 2022*), the beneficial reuse of New York biosolids approached 20% in 2004 and has continued to decline since.

It is interesting to note how involved the federal USEPA was in New York at that time. NYSDEC has never accepted delegation of the Part 503 regulations, so USEPA was and remains the primary enforcer of those regulations in New York. The Part 503 rules were designed to be "self-implementing" and, after a decade or so, the USEPA as well as many of the state regulators began to disinvest in their biosolids programs, including compliance, enforcement, research and risk assessment.

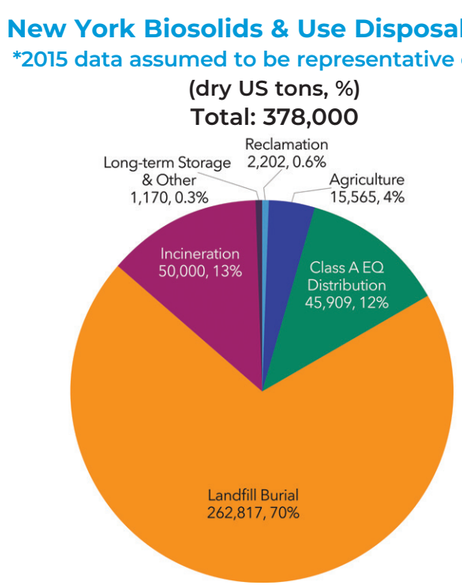

Figure 1. Most wastewater solids generated in New York go to landfill disposal in- and out-of-state, a trend that has been steadily growing for decades. Landfilling is relatively hassle-free and not much more expensive than land application. Data presented here are from 2015, from a NYSDEC report, but are adjusted and assumed to be representative of 2018. *Credit: National Biosolids Data Project*

Flashforward to 2018—Contaminants of Emerging Concern

In November 2018, USEPA's Office of Inspector General (OIG) issued a report titled "EPA Unable to Assess the impact of Hundreds of Unregulated Pollutants in the Land-Applied Biosolids on Human Health and the Environment." This report caused an uproar, especially at USEPA. Assistant Administrator for Water, David P. Ross, wrote in response to OIG: "We are particularly concerned about how the science is presented in the OIG report. It is biased and raises alarm due to the use of narrowly selected studies and examples, and information that is taken out of context or that is not relevant to the Clean Water Act (CWA) statutory requirements…. There is no attempt to make it clear to the reader that the occurrence of pollutants in biosolids does not necessarily mean that those pollutants pose a risk to public health and the environment…. We disagree with the OIG characterizing uncertainties in science as known risks or 'threats' to human health and the environment." (*Ross 2019*)

The OIG report got lots of press. Environmental groups cited it in their advocacy efforts. Although there was great push back from the scientific community, the OIG report did spur USEPA to once again beef up its biosolids program and complete a risk assessment program for contaminants of emerging concern.

The USEPA agreed with the need to address the uncertainties. USEPA also agreed that other aspects of the biosolids program could be improved upon. USEPA has since increased staffing for its Biosolids Program and initiated (and is pretty far along in) a risk assessment for contaminants of emerging concern in biosolids, with several PFAS compounds being fast-tracked. USEPA has been much more actively engaging with states, tribes, practitioners, researchers and others to improve biosolids management.

Back to New York

Instead of dumping wastewater solids into the ocean, nowadays the majority of WRRFs dump it into a landfill. According to the National Biosolids Data Project, 70% of New York biosolids went to landfill in 2018 (***Figure 1***).

New York is still throwing away valuable resources in its biosolids that could be recovered. But now, landfill capacity in the Northeast is limited and declining. Numerous sewage sludge incinerators in New York state have closed in the last decade. These pressures are creating opportunities for innovations in biosolids management and new technologies. So perhaps the future will look different.

Closing Thoughts

The Case for Caution and the OIG report are based on the "precautionary principle" arguments (*ScienceDirect 2024*). During these times of uncertainty, I like to turn that around and ask, "What are the risks of not recycling biosolids?" The long-term climate impacts could be significant. I hope that when we look back 25 years in the future, we will see the Case for Caution and the OIG report as sparks that reignited the vigilance over biosolids management, reducing risks and maximizing the benefits of resource recovery.

Janine Burke-Wells is the executive director of the North East Biosolids & Residuals Association, who may be reached at info@nebiosolids.org.

PRECAUTIONARY PRINCIPLE:
An approach in policymaking that legitimizes the adoption of preventative measures to address potential risks to the public or environment associated with certain activities or policies.
Source:https://www.britannica.com/topic/precautionary-principle

Resources

Beecher, N., J. Beecher, J. Burke-Wells, M. Lono-Batura, N. Goldstein, G. Kester and B. Toffey. 2022. National Biosolids Data Project: Biosolids management in the U. S. (https://www.biosolidsdata.org/)

NYSDEC. 1997. A Technical Review of "The Case for Caution" Recommendations for Land Application of Sewage Sludges and an Appraisal of the USEPA's Part 503 Regulations. New York State Department of Environmental Conservation, Division of Solid & Hazardous Materials. November.

Perciasepe, Robert. Correspondence to David Sterman (NYSDEC) regarding concerns about the Cornell Waste Management Institute papers, Oct. 31, 1997. USEPA, Washington, D.C. (https://www.nebiosolids.org/s/1997-EPA-HQ-Letter-to-NYDEC-on-Biosolids.tif)

Ross, D.P. 2019. Memorandum: Response to November 15, 2018, Office of Inspector General's Final Report, "EPA Unable to Assess the impact of Hundreds of Unregulated Pollutants in the Land-Applied Biosolids on Human Health and the Environment." U.S. Environmental Protection Agency, David P. Ross, Assistant Administrator, Office of Water. May 30, 2019. (https://www.epa.gov/sites/default/files/2019-07/documents/_epaoig_19-p-0002_agency_response.pdf)

ScienceDirect. 2024. "Precautionary Principle." ScienceDirect. (https://www.sciencedirect.com/topics/earth-and-planetary-sciences/precautionary-principle)

USEPA Biosolids Program Library (https://www.epa.gov/biosolids/biosolids-library)

USEPA OIG. 2018. EPA Unable to Assess the Impact of Hundreds of Unregulated Pollutants in Land-Applied Biosolids on Human Health and the Environment. U.S. Environmental Protection Agency Office of Inspector General, Report #19-P-0002, Nov. 15. (https://www.epaoig.gov/reports/audit/epa-unable-assess-impact-hundreds-unregulated-pollutants-land-applied-biosolids-human)

How New York State Makes the Most of Abundant, Nutrient-Rich Biosolids Compost

By Ryan Cerrato

Across the United States, municipalities and industries generate biosolids. Where this resource ends up and whether it is used beneficially depends greatly on state leadership, both through regulations and legislation.

Fortunately for residents of the Empire State and the entire Northeast region, the state of New York has long been a leader in supporting biosolids recycling, including composting. Thanks to the state and the composting industry, the quality and quantity of compost derived from biosolids continues to improve.

Regulation of Biosolids Compost

Regulations established in the late 1980s and early 1990s set New York on this path. Title 6 NYCRR Part 360 regulations in New York state encompass guidelines and standards for various aspects of solid waste management, including biosolids composting. These rules continue to ensure that the materials are processed properly and meet quality standards to protect public health and the environment. They encompass the following:

- permitting and compliance
- quality standards
- land application
- beneficial use
- monitoring and reporting
- environmental protection

When compost is made with biosolids, the result is a nutrient-rich soil amendment that can be used to improve both soil fertility and soil structure in landscaping, agriculture and soil improvement applications.

These uses would not be possible without New York's advanced composting infrastructure. While some of the state's large-scale compost facilities process biosolids, others receive green waste, leaves and food waste, thus keeping these organics out of landfills and enabling their nutrients to remain in the economy and in the landscapes of New York. These locations include compost sites operated by municipalities and private businesses.

The New York State Department of Environmental Conservation (NYSDEC) oversees the permitting and regulation of composting facilities, ensuring they comply with environmental standards outlined in Title 6 NYCRR Part 360. The number of permitted compost facilities can fluctuate due to changes in regulations, facility closures or openings, expansions, and updates in waste management practices.

The Composting Process

Among the composting sites currently operating in New York, many are composting biosolids to create a very nutrient-dense compost product that has a multitude of uses. All types of compost have their own sets of unique uses, but biosolids compost shares the same general benefits as all other types of compost. It has specific properties that make it especially good for some applications, as well.

Compost is produced naturally through the decomposition of various types of organic matter. When we mix carbon-rich materials—such as leaves or wood chips—with nitrogen-rich materials—such as food waste or biosolids—they come together to play a crucial role in the composting process by driving microbial activity. Their interaction determines the speed at which the material decomposes, and the ratio of these ingredients can have a large impact on the quality and useability of the finished product.

Microorganisms break down organic material and generate heat. The heat plays a crucial role in the compost process as it helps speed up composting as well as assists in killing off pathogens and weed seeds. Managing the heat of compost piles becomes crucial to the success of the composting operation. If a compost pile becomes too hot, it can come with a multitude of negative results. Some of those negative results include: the alteration of microbes, nutrient loss, odor issues and loss of composting. Conversely, if a compost pile gets too cool, it can come with many similar negative results such as: slow or stopped decomposition, imbalanced piles, odor issues and weed seeds that remain viable.

When the composting process is managed properly, you are left with a nutrient-dense humus product that has a multitude of uses. Since compost has been so widely accepted in New York, and compost has so many general benefits, it is easy to see why compost is used in such high volumes throughout the state.

Where Biosolids Compost Excels

Since biosolids compost is compost, just like the compost produced from other feedstocks, it is safe to say biosolids compost shares all the benefits of compost in general. However, biosolids compost has some additional benefits that are worth noting, particularly for applications such as turf management, soil blending, and construction and planting.

Turf Management

Biosolids compost generally has a higher nitrogen content than some other types of compost. This gives it a leg up for applications like turf top dressing or other applications where the user is trying to maximize nitrogen.

Continued on Page 24

Green roof growing media is installed at the Oncenter in Syracuse, New York. *Photo: Denali*

Biosolids compost being applied for miles along the side of a New York state highway project to promote the establishment of vegetation. *Photo: Denali*

Biosolids compost being used to top dress turf using a tow-behind spreader.

Continued from Page 23

When we work with athletic field managers, golf course superintendents, or any other professional focused on healthy turf, it becomes apparent that using biosolids compost not only helps their soil, but it provides their turf with an organically bound form of nitrogen that slowly releases. In many instances, when applying biosolids compost to turf, turf managers are able to skip a liquid or spray application of nitrogen. Biosolids compost can also have a lower moisture content and a lower bulk density, which makes it easier to broadcast across turf fields. Finally, turf managers do not need any type of licensure to spread compost on their fields, such as they would need to spread synthetic fertilizers.

When adding these additional benefits of biosolids compost to the already long list of compost benefits, it becomes quite clear that biosolids compost is a fantastic product for use on turf projects, including new establishments.

Soil Blending

Biosolids compost normally has a higher organic matter content than many of its compost counterparts. This makes it a great fit for blending nutrient-dense soils. With a high organic matter and lower bulk density than some other types of compost, biosolids compost can be blended homogenously with not only dry soils but also with soils that are higher in moisture.

In many locations, especially in the Northeast, we tend to struggle with wet soil at certain times throughout the year due to our weather patterns. Blending a dry biosolids compost with soil that is too high in moisture content not only supplies valuable nutrients to the soil, but it also will help dry out the soil, making it more usable or sellable in certain seasons.

Using biosolids compost as the source of nutrients in manufactured soils allows you to use less compost in the mixture and guards against the final soil blend becoming too heavy. This is abundantly clear in green roof soils or green roof growing medias. In these types of highly engineered soils, we not only need to create a nutrient-dense environment for plant roots; we also need to ensure the soil created does not exceed certain parameters like dry weight and saturated weight.

Construction and Planting

Construction and planting projects come in many shapes and sizes. Many can be large scale and require large volumes of compost and soil. This application pairs nicely with biosolids compost since, generally speaking, biosolids composting facilities tend to generate a consistently large quantity of compost each month throughout the year.

Since the feedstocks at biosolids facilities generally remain the same, the quality of the finished compost product is usually consistent. This type of consistency allows for greater success on large-scale projects that take place over a long period of time. For example, some construction projects take place over multiple years. From the time the materials are specified and approved to the time they are delivered can be many months or longer. This is why it is imperative that a compost product is used that will remain somewhat consistent over that period of time. The same can be said for projects that start, stop, and start again. The users of compost need to know that the material they used in the beginning of the project is the same material they are going to be using toward the end.

Ensuring Compost Quality

Compost quality is a culmination of many factors such as physical appearance and odors, as well as chemical and biological parameters. When all these factors come together, we can determine not only the quality of the compost, but also its recommended uses.

When discussing physical appearance, there are many things to consider, especially when each user has their own opinion of what high-quality compost should look like. For example, a user of leaf compost may not like the appearance of biosolids compost or vice versa. This is why it is vital for compost marketers to focus on educating users on the different types of compost, their appearances, odors, and how they can vary in chemical and biological properties.

One item that stands true for all compost types is contamination in the form of synthetic inerts. These contaminants can include plastics, glass, equipment parts and metals, and any other unwanted items that make their way into the compost piles. Many compost facilities share property with other recycling centers, so it becomes imperative to build contamination monitoring methods into compost facility management plans.

In addition to physical contaminants, there are biological properties that directly affect compost quality and its useability. For example, compost should be assessed for biological impurities such as salmonella, fecal coliform and other biological risks. From a chemical standpoint, compost should be tested for metals, arsenic and other potential chemical risk factors. Once compost is through biological and chemical testing, then nutrient testing should also take place.

Nutrient testing in compost is a great way to measure how the compost will perform and what the best applications may be for that specific compost. There are standard nutrient tests that composters should be performing on their materials regularly, which should be provided to customers as needed. These testing parameters should include:

- carbon-to-nitrogen ratio
- moisture content
- pH levels
- organic matter content
- nutrient content
- maturity and stability
- particle size
- seeding emergence and vigor

The United States Compost Council has developed the Seal of Testing Assurance (STA) Program, which is a compost testing and disclosure program that focuses on clarity, consistency and confidence. When a composter enrolls their compost in the program, they are required to have their compost tested by a certified lab that uses Test Methods for the Examination of Compost and Composting (TMECC) test methods, which are similar to widely recognized ASTM test methods but have been developed specifically for compost testing. When the compost results are complete, they are released on a Compost Technical Data Sheet along with ingredients and recommendations for use. This program provides compost users with the confidence they need to know what is in the compost, the methods in which it was produced, and the testing results that coincide with that compost. Additionally, all the compost that is enrolled in the program is stored in a database that is available to buyers, which they can use to find local, STA-certified compost wherever they need it.

Considering these advancements, users of compost in New York can have more confidence than ever that compost products are good for their lawns, gardens, fields and soils. They should know that they are part of a cycle that is as beautiful and impressive as the state in which they live.

Ryan Cerrato is vice president of product sales and service at Denali, the nation's leading full-service recycler of organics. He oversees the company's sales and marketing activities in Denali's WeCare division and manages a large portfolio of customers. He may be reached at Ryan.Cerrato@denaliwater.com.

Most Common Reasons to Use Biosolids Compost

- Overall soil enrichment
- Establishing healthier plant growth
- Introducing microbial activity to the soil
- Improving soil structure
- Increasing water-holding capacity
- Reducing erosion
- Slowing run-off
- Making plants less reliant on chemical fertilizer
- Reducing waste
- Enhancing carbon sequestration
- Stabilizing and buffering pH

Photo: Denali

The goals of CERCLA, or Superfund, are to protect human health and the environment, make responsible parties pay for the cleanup work, involve communities in the process, and return sites to productive use. *Photo: USEPA*

PFAS in Biosolids:

The Latest on an Ever-evolving Regulatory Landscape

By Mary E. (Firestone) Baker

PFAS are a group of chemicals that none of us can avoid right now. As I was putting my thoughts together for this article, I couldn't help but think of an old Saturday Night Live skit with the Michael Myers' character, Linda Richman. Not sure if many of you remember Linda and the Coffee Talk skit, but she had a Yiddish-sounding word that she would use when a subject matter was overwhelming her with emotion: verklempt.

I'd venture to say many of us get a little—or maybe a lot—verklempt when we hear the word PFAS. Let's try to navigate this somewhat overwhelming subject matter and get an idea of what is taking place currently and what might be in store. We will start on the regulatory side with the U.S. Environmental Protection Agency's (USEPA's) PFAS Strategic Roadmap, and then touch on the designation of PFOA and PFOS as Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) hazardous substances. Finally, we'll delve into the state of current research on PFAS in biosolids.

PFAS Strategic Roadmap

Our first topic is the USEPA's PFAS Strategic Roadmap (*USEPA 2021*). Many of you might be familiar with this. For those that are not, I'll provide a brief overview.

In April 2021, the USEPA created its Council on PFAS, composed of senior technical and policy leaders from across USEPA program offices and regions. That council developed a strategic roadmap to lay out USEPA's whole-of-agency approach to tackling PFAS and set timelines.

Some of you might be familiar with several of the steps in the PFAS Strategic Roadmap that have already occurred, such as the nationwide monitoring for PFAS in drinking water, and the establishment of a proposed national primary drinking water regulation for PFOA and PFOS. As you might recall, those proposed enforceable limits for drinking water are 4 parts per trillion (ppt) for both PFOS and PFOA.

The aspect that I would like to highlight is the final piece or scheduled item on the PFAS Strategic Roadmap, which is the finalized risk assessment of PFOA and PFOS in biosolids, which we are told to expect by the end of 2024.

One thing that members of the USEPA biosolids team have stressed is the important difference between "risk assessment" and "risk management." Anyone involved with biosolids should be aware of the importance of this difference.

When the USEPA risk assessment is developed for biosolids, it will not be "the end" of the subject matter but rather "the beginning" of the path toward determining what can and should happen next as it relates to the risk assessment determination, for each individual community and region. And the USEPA has shared their recommendations on what states and regions should consider doing while they complete the risk assessment, in a memo released as a part of the NPDES permitting and PFAS assessment requirements in that permitting process. As it pertains to biosolids, here is an important aspect of those recommendations:

"Where appropriate, states may work with their POTWs to reduce the amount of PFAS chemicals in biosolids, with these steps - EPA recommends using draft method 1633 to analyze biosolids at POTWs, Where monitoring indicates the presence of PFAS in biosolids from industrial sources, EPA recommends actions to reduce PFAS discharges and EPA recommends validating PFAS reductions with regular monitoring of biosolids." (*USEPA 2022b*)

We have seen several states begin their path to taking these steps. You might be familiar with the actions in Michigan, and more recently in New York's DMM-7/ Biosolids Recycling in New York State—Interim Strategy for the Control of PFAS Compounds (*NYSDEC 2023*)

To summarize the recommendation and the path ahead: it will be important for wastewater treatment facilities to have a basic understanding of where they are relative to PFAS in their biosolids, begin working to identify any primary sources of these PFAS, and start developing a plan to reduce them.

So, are we getting a little less "verklempt" at this point? Let's move on to where the regulatory and legislative path intercept: CERCLA, also known as "Superfund."

Designation of PFOA/PFOS as CERCLA Hazardous Substances

For a little background, what is Superfund? Largely in response to the identification of toxic waste dumps in the 1970s and national attention when the public learned about the risks to human health and the environment posed by contaminated sites, Congress established the CERCLA in 1980. CERCLA is informally called Superfund, and it is intended to allow USEPA to clean up contaminated sites. It also intended to force the parties responsible for the contamination to either perform cleanups or reimburse the government for USEPA-led cleanup work (*USEPA 2023*).

In September 2022, the USEPA proposed the designation of PFOA and PFOS as CERCLA hazardous substances (USEPA 2022a). Following this proposed designation, the Senate Environment and Public Works (EPW) Committee began work on bipartisan legislation that seeks to improve the mitigation and remediation of PFAS contamination. This draft legislation was introduced June 22, 2023, and was followed by a comment period (*U.S. Senate 2023a*).

Why is this of concern to wastewater treatment facilities? As dischargers of PFAS chemicals, treatment plants could find themselves on the hook as Potentially Responsible Parties under CERCLA, be brought into litigation as a source of hazardous substances and face the financial costs for compliance and cleanup.

Wastewater treatment plants, along with drinking water, stormwater management and water recycling facilities, among others, are "passive receivers" of media containing PFAS chemicals. The work these entities are engaged in—safeguarding public health and the environment—does not involve the manufacture or use of PFAS, but PFAS chemicals are nonetheless present in the influent for these facilities from other sources. Many public facilities are only just beginning to figure out how to filter these received PFAS chemicals from their effluent. In a worst-case scenario, a public treatment facility that for decades received influent containing PFAS could find itself being held financially responsible for cleaning up legacy PFAS contamination downstream of its outfall.

A group representing passive receivers, including the Mid-Atlantic Biosolids Association (MABA), sent a joint letter to the Senate EPW Committee on this issue back in April 2023 (American Public Works Association et al 2023), emphasizing the need to incorporate protection for passive receivers from the potential financial impact of this hazardous substances designation for PFAS chemicals under CERCLA We have shared with our members and the biosolids community a continued call to action to reach out to members of the Senate EPW Committee, as well as all legislators, to include a provision to exempt these essential public services from liability under CERCLA.

And our message is being heard. Senator Shelley Moore Capito opened the September 2023 hearing of the EPW Committee with a statement in support of the protection of passive receivers (U.S. Senate 2023b). During another hearing by the EPW Committee, held Mar. 20, 2024, policy considerations for addressing PFAS contamination under CERCLA were discussed, as well as the potential legal and financial impacts to municipalities and treatment plants (*U.S. Senate, 2024*).

On April 19, 2024, the USEPA published the final rule of the designation of PFOA and PFOS as CERCLA hazardous substances (USEPA 2024a). In addition to the final rule, USEPA is issuing a separate CERCLA enforcement discretion policy that makes clear that USEPA will focus enforcement on parties who significantly contributed to the release of PFAS chemicals into the environment, including parties that have manufactured PFAS or used PFAS in the manufacturing process, federal facilities and other industrial parties (USEPA 2024b). The published rule does not explicitly protect passive receivers, although the USEPA provided the discretionary policy by saying that USEPA "…does not intend to pursue, based on equitable factors, PFAS response actions or costs under CERCLA …" against community water systems and POTWs, municipal separate storm sewer systems (MS4s) and farms that apply biosolids to land, among other publicly owned entities. However, this does not preclude other parties from seeking that action under CERCLA against passive receivers.

The Senate EPW Committee, as well as any legislator(s), can still provide an exemption to CERCLA for the passive receivers. However, they have not to date. In other words, the call to action is still very much in effect. Our legislators need to hear from us to help them empower the Superfund to do exactly what it is intended to do: insist that the "polluter pay" model works to provide funds for any clean up necessary for PFAS contamination.

Another key thing to remember about the legislative aspect of PFAS in biosolids—and in the world at large—is that pieces of legislation have been drafted and passed to begin banning these chemicals from ever entering the system.

You might recall that PFOS was banned in 2000 and PFOA was banned in 2014 from domestic production in the United States. And there are many pieces of legislation seeking to ban other forms and types of these chemicals in myriad products throughout the

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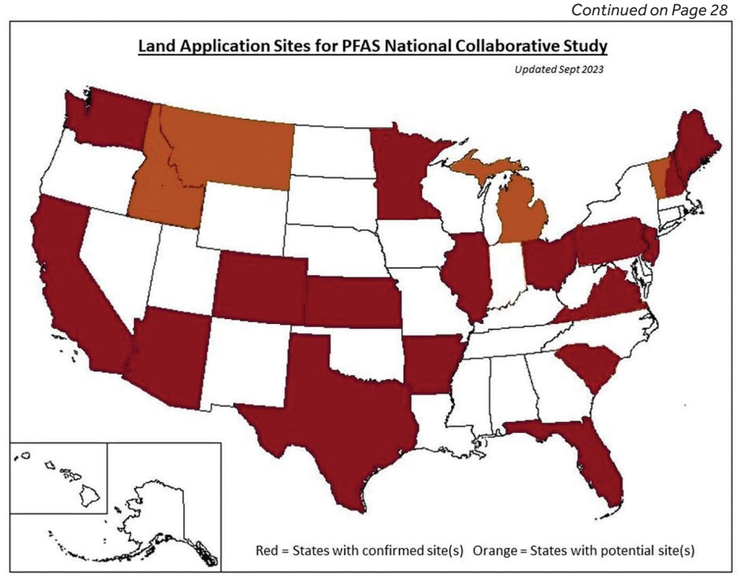

Figure 1. Land application sites for the PFAS National Collaborative Study, as updated in September 2023. States in red have confirmed testing sites, while states in orange have identified potential testing sites. *Credit: Pepper 2023*

Risk Management vs. Risk Assessment

"Risk management is a distinctly different process from risk assessment. Risk assessment establishes whether a risk is present and, if so, the range or magnitude of that risk. In the risk management process, the results of the risk assessment are integrated with other considerations, such as economic or legal concerns, to reach decisions regarding the need for and practicability of implementing various risk reduction activities."

Source: https://www.epa.gov/risk/risk-management

Continued from Page 27

country. If you are interested in some of that legislation, please let me know, and I will be happy to share some of that with you.

OK, so we have talked about the regulatory aspects and the intersection of the regulatory and legislative worlds… are we feeling a little less "verklempt" now? I hope so, and perhaps the next and final thing I'll share will help more with that.

Current PFAS Research

The last piece of information I'd like to share with you is about some of the research happening on PFAS in biosolids. The first I will highlight is the research being done through the National Collaborative PFAS Study, which is being conducted by Dr. Ian Pepper and his team and colleagues at the University of Arizona. This research began in late 2022 and will continue into 2024. The objective of this research is to evaluate whether or not land application of biosolids is a significant public health route of exposure to PFAS.

You'll see in ***Figure 1*** *(previous page)* the states where samples have or will be collected in red, and those potential sites being worked out in orange. And the researchers anticipate at least 30 sample sites.

Dr. Pepper and his team will be working to:

- determine incidence of PFAS in soil (Year 1)
- assess mobility (leaching) of PFAS (Year 1)
- evaluate PFAS in groundwater (Year 1)
- determine crop uptake of PFAS analytes (Year 2)

Important to note, and a positive aspect for the Mid-Atlantic region, is that there are currently sample sites that have already been sampled or will be sampled in Pennsylvania, Virginia and New Jersey.

Why is this important and why should we all get behind this research project? Let's consider those next steps in the works with the USEPA as it relates to risk assessment and risk management. This research methodology at each site will be identical, allowing for direct comparison of data and a national set of real-world field data. It will provide quantitative data for risk assessments on specific sites. And furthermore, this data will be from municipal biosolids, not from industrially contaminated biosolids *(Pepper 2023)*.

If you are interested in learning more about this research or participating in the study, please get in touch with me. They are still considering additional sites at this time, and I am happy to help get you in touch. Also, it is important to note that the only identifying information for sites being sampled is the state they are located in.

There are other studies taking place in a similar vein, and one worth mentioning is the Water Research Foundation's Unregulated Organic Chemicals in Biosolids: Prioritization, Fate and Risk Evaluation for Land Application - Project #5125 (*WRF 2021*).

Thank You for Your Time

I hope that the information and updates I've shared will help you feel less verklempt and a little more knowledgeable and empowered in your work with your respective organizations.

Hopefully, like our pal Linda Richman in the Coffee Talk skit, with just a little time to "talk amongst ourselves," we can return to the conversation about this tricky topic and meet the future with a positive and informed outlook.

I invite you to check out the MABA website. We have a wealth of information about PFAS there, and I invite you to reach me via phone or email to talk more about this and how you can get involved with our organization as well.

Mary E. (Firestone) Baker is the executive director of the Mid-Atlantic Biosolids Association and may be reached at mfirestone@mabiosolids.org

Credit: MABA

References

American Public Works Association, et al. 2023. Letter from the American Public Works Association and 30 other organizations to the Honorable Tom Carper and the Honorable Shelley Moore Capito, U.S. Senate Committee on Environment and Public Works, Washington, D.C. April 24. (https://maba.memberclicks.net/assets/2023May/230424_Joint%20PFAS%20Receivers%20Letter%20on%20CERCLA_FINAL.pdf)

NYSDEC. 2023. DMM-7/Biosolids Recycling in New York State – Interim Strategy for the Control of PFAS Compounds. New York State Department of Environmental Conservation, Office of Remediation and Materials Management. (https://extapps.dec.ny.gov/docs/materials_minerals_pdf/dmm7.pdf)

Pepper, I. 2023. Incidence and Mobility of PFAS in Soil from Land Application Sites Across the United States: A nationwide research project; Assessing the risk of PFAS from land-applied biosolids as other common exposure pathways. PowerPoint presentation, Oct. 24. (https://maba.memberclicks.net/assets/2023October/Incidence%20and%20Mobility%20of%20PFAS%20in%20Soil%20from%20Land%20Application%20Sites%20Across%20the%20United%20States%20Pepper.pdf)

USEPA. 2024a. "Designation of Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS) as CERCLA Hazardous Substances." Superfund. U.S. Environmental Protection Agency. Updated May 8, 2024. (https://www.epa.gov/superfund/designation-perfluorooctanoic-acid-pfoa-and-perfluorooctanesulfonic-acid-pfos-cercla)

USEPA 2024b. "PFAS Enforcement Discretion and Settlement Policy Under CERCLA." Enforcement. U.S. Environmental Protection Agency. Updated Apr. 19, 2024. (https://www.epa.gov/enforcement/pfas-enforcement-discretion-and-settlement-policy-under-cercla)

USEPA. 2023. "What is Superfund?" Superfund. U.S. Environmental Protection Agency. Updated Oct. 30, 2023. (https://www.epa.gov/superfund/what-superfund)

USEPA. 2022a. "Proposed Designation of Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS) as CERCLA Hazardous Substances." Superfund. U.S. Environmental Protection Agency. Updated Oct. 30, 2023. (https://www.epa.gov/superfund/proposed-designation-perfluorooctanoic-acid-pfoa-and-perfluorooctanesulfonic-acid-pfos)

USEPA. 2022b. EPA Issues Guidance to States to Reduce Harmful PFAS Pollution. USEPA New Releases. Dec. 6. (https://www.epa.gov/newsreleases/epa-issues-guidance-states-reduce-harmful-pfas-pollution)

USEPA. 2021. PFAS Strategic Roadmap: EPA's Commitments to Actions 2021-2024. Public webinar slides, October. (https://www.epa.gov/system/files/documents/2021-10/slides-epa-pfas-roadmap-public-webinars.pdf)

U.S. Senate. 2024. "Examining PFAS as Hazardous Substances." Hearings. U.S. Senate Committee on Environment and Public Works. March 2024. (https://www.epw.senate.gov/public/index.cfm/2024/3/examining-pfas-as-hazardous-substances)

U.S. Senate. 2023a. "Stakeholder Comment on Draft PFAS Legislation." Newsroom. U.S. Senate Committee on Environment and Public Works. June 22. (https://www.epw.senate.gov/public/index.cfm/2023/6/stakeholder-comment-on-draft-pfas-legislation)

U.S. Senate. 2023b. "Ranking Member Capito Opening Statement at Hearing on Implementation of Drinking Water and Wastewater Infrastructure Act." Newsroom. U.S. Senate Committee on Environment and Public Works. Sep. 7. (https://www.epw.senate.gov/public/index.cfm/2023/9/ranking-member-capito-opening-statement-at-hearing-on-implementation-of-drinking-water-and-wastewater-infrastructure-act)

WRF. 2021. Unregulated Organic Chemicals in Biosolids: Prioritization, Fate and Risk Evaluation for Land Applications. The Water Research Foundation. Initiated October 1, 2021. (https://www.waterrf.org/unregulated-organic-chemicals-biosolids-prioritization-fate-and-risk-evaluation-land-applications)

The State of Biosolids Management and Regulation in New York: *A Closer Look at Trends*

By Janine Burke-Wells

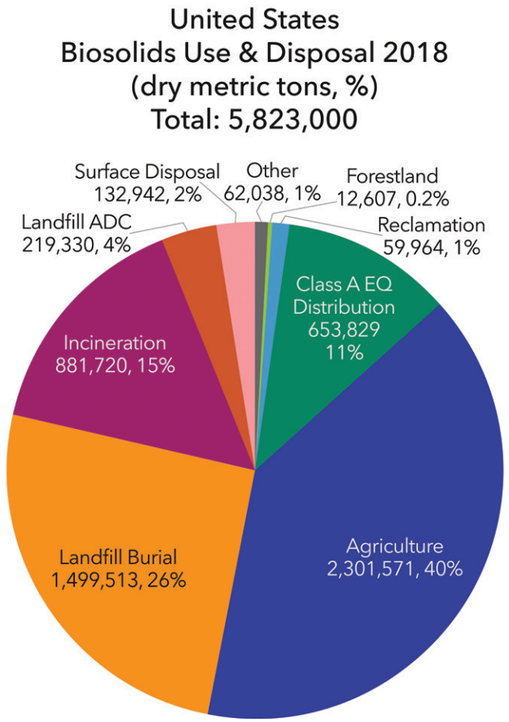

Figure 1a. *Credit: National Biosolids Data Project*

Figures 1a and 1b (opposite page). Data from the NBDP compares the biosolids end-use numbers nationally and for New York state. Data presented here are from 2015, from a NYSDEC report, but are adjusted and assumed to be representative of 2018.

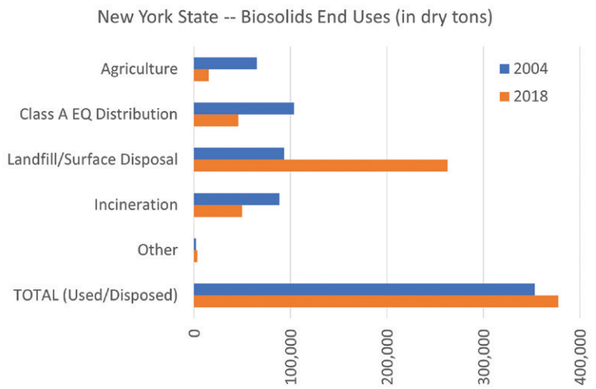

Figure 2. Data from the NBDP show the shift in end uses of biosolids in New York between 2004 and 2018. *Credit: National Biosolids Data Project*

The National Biosolids Data Project (NBDP) has collected comprehensive data on biosolids management practices—first for 2004 and most recently for 2018 data—that provides valuable insights into the management of biosolids across different states in the nation. The NBDP website and project are administered by the North East Biosolids & Residuals Association (NEBRA), a nonprofit professional association advancing the environmentally sound and publicly supported recycling of biosolids and other organic residuals in New England and eastern Canada.

The NBDP (*Beecher et al 2022*) has published the data on the disposal and end uses of biosolids in the United States to help biosolids management professionals make decisions about how to better regulate and manage sewage sludges. In addition to looking at end uses of biosolids, the NBDP also looked at state regulations and programs to manage biosolids, compared with the federal regulations commonly referred to as Part 503 (*40 CFR Part 503*).

This article uses the NBDP data for New York state, specifically examining the trends in biosolids management since 2004. NEBRA's focus is on beneficial end uses so we also want to highlight what's going on in New York with respect to resource recovery.

US versus NY—Current Biosolids Management Practices

On average in the United States in 2018, according to the NBDP data (***Figure 1a***), biosolids are managed as follows:

- 53% land applied/recycled
- 32% landfill/surface disposal
- 15% incineration

The 2018 data in the NBDP for New York state is based on a 2015 report (*NYSDEC 2018*) by the New York State Department of Environmental Conservation (NYSDEC); it is assumed for this article that the data for 2018 would be similar to 2015. The end-use numbers for New York (***Figure 1b***) look a little different from the national averages:

- 17% land applied/recycled
- 70% landfill/surface disposal
- 13% incineration

Less than 1% of all New York biosolids are managed using other methods (e.g., lagoons, reed beds, other on-site storage). According to the NBDP data, New York state falls in line with the national average in terms of pounds of biosolids used or disposed of per person per year. In 2018, New York had to use or dispose of 39 pounds of biosolids per person, slightly higher than the national average of 37 pounds per person.

Trends in Biosolids Management in New York (2004-2018)

Statewide, the amount of biosolids that need to be managed is increasing—about 25,000 dry tons more in 2018 than in 2004. The additional solids reported in the 2018 NBDP could be a result of population increases, system expansions, process changes, or even changes in the way data are reported and tracked. But most likely, the increase in solids is a result of more stringent nutrient removal requirements, generating more wastewater sludges to manage.

According to the NBDP data, there has been a significant decline in the beneficial use of biosolids in New York state, with landfilling emerging as the primary method of management. Between 2004 and 2018, landfill disposal of biosolids from New York state increased significantly—by 180% — while use of other methods declined (***Figure 2***).

Incineration has decreased from 25% of the New York biosolids end-use pie in 2004 to around 13% in 2018. The closure of three fluidized bed reactors during this timeframe (Glens Falls, Saratoga and Watertown) contributed to this reduction.

Heavy reliance on landfill disposal for New York biosolids is a trend that has been developing for several decades now. Historically, relatively low tipping costs and convenience have kept landfilling as a viable option in New York state. However, the NBDP report suggests that a considerable amount of biosolids is being transported out of state to landfills in Pennsylvania and Alabama.

Resource Recovery

The NBDP data shows that a significant number of water resource recovery facilities (WRRFs) in New York state have adopted anaerobic digestion (AD) as a method for biosolids management, reducing volumes going out of the gate and generating heat and power from the biogas produced. In 2018, out of the 612 surveyed plants, 136 utilized AD, a decrease from the 145 reported in the 2004 survey but still a significant percentage of WRRFs. Additionally, there are 47 composting facilities, down from 60 in 2004.

The continued promotion of these activities by state regulators will help with concurrent goals for reductions in greenhouse gas (GHG) emissions. As more and more WRRFs—especially large systems like New York City—begin to account for and reduce their GHG emissions, AD and composting will be at the top of the list of more sustainable options.

One tool being used to analyze GHG emissions from individual WRRFs is the Biosolids Emissions Assessment Model (BEAM). The BEAM (*NEBRA and Northwest Biosolids 2022*) was originally developed by the Canadian Council of Ministers of the Environment working with a consortium of well-known experts from the Northwest Biosolids Association. It can be used to assess potential GHG emissions from a range of biosolids management scenarios (up to 10). BEAM is being used by WRRFs and their consultants to estimate GHG emissions from biosolids management operations (including establishing a baseline). It allows WRRFs to compare emissions from different biosolids management scenarios in order to better understand the factors with the greatest impact on increasing or reducing GHG emissions.

The BEAM results consistently show the benefits from AD and composting. An example BEAM output (***Figure 3***) demonstrates that, in general, the use of ADs (properly operated) and/or composting can significantly lower GHG emissions from biosolids management operations. In comparison, landfilling of biosolids—according to the BEAM results—generates much more significant GHGs.

Biosolids/Residuals Regulation in New York

Wastewater sludges are strictly regulated in New York state. Although NYSDEC is not formerly delegated by the U.S. Environmental Protection Agency (USEPA) to enforce the Part 503 regulations, the state has a robust and active program for regulating and managing these "waste" residuals, according to the NBDP. Those regulations fall under the NYSDEC's Solid Waste program and go well beyond the Part 503 rules.

New York state has implemented biosolids recycling regulations under NYCRR Part 361, effective November 2017, replacing previous regulation under Part 360. The new regulations reclassified biosolids management under the more specific Materials Recovery Facilities rules.

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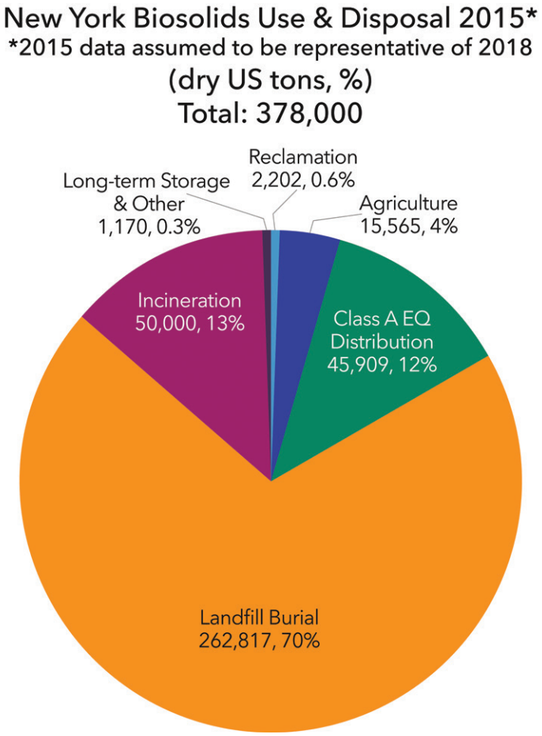

Figure 1b. *Credit: National Biosolids Data Project*

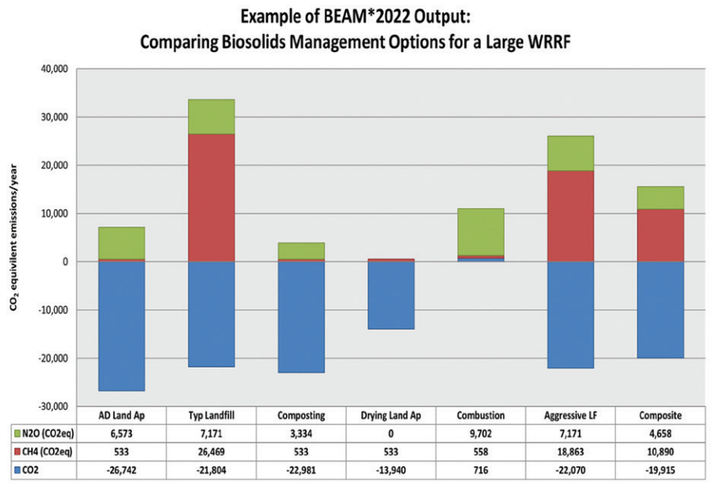

Figure 3. This example of BEAM output shows the different biosolids management options for a large WRRF relative to potential GHG emissions. *Credit: NEBRA and Northwest Biosolids 2022*

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Most recently, the NYSDEC Division of Materials Management (DMM) adopted Program Policy 7 (better known as DMM-7) regarding its biosolids recycling strategy to control and reduce risks from per- and polyfluoroalkyl substances (PFAS) compounds. Effective Oct. 20, 2023, DMM-7 set interim PFOS and PFOA criteria for biosolids that are recycled in New York state. DMM-7 is intended to remain in place until the USEPA has completed its risk assessment and sets standards for recycling biosolids to soils (*NYSDEC 2023*). New York WRRFs have yet to see the effects of DMM-7 in practice. The next NBDP survey will likely reveal any impacts from these new regulations.

The NBDP reports the number of full-time equivalent employees in the NYSDEC programs regulating biosolids decreased from 4.5 in 2004 to 3 in 2018. This mirrors the national regulatory trends of disinvesting in policy and compliance activities related to Part 503. The Part 503 rules were designed to be "self-regulating," but history has shown that constant vigilance is required for these programs. USEPA, as well as numerous other states, are now beefing back up on their regulatory programs around biosolids, thanks in main part to contaminants of concern such as PFAS.

In general, NYSDEC has historically been supportive of various beneficial uses of biosolids, and resource recovery is encouraged by regulations. That is reflected in the steady (although declining) use of AD and composting of biosolids.

Ongoing Biosolids Challenges

The NBDP data offers valuable insights into the trends in biosolids management in New York state. The increase in landfilling as the primary method of disposal, the decline in beneficial use practices, and the evolving state regulations all shape the current landscape.

Landfilling 70% of wastewater sludges is simply not sustainable. Landfill space is limited, especially for biosolids, and continues to decrease all across the Northeast. Incinerators are ageing and closing—yet another pressure on the end-use "market" for biosolids. GHG emissions from drying, landfilling, incineration, and other new thermal processes need further scrutiny. Life Cycle Analysis of various biosolids end-use and disposal options will need to be a consideration in management decisions going forward.

While challenges remain, the state's commitment to achieving GHG mandates may drive innovative solutions in the future. Preserving all end-use and disposal options is very important for the future. Maintaining or even increasing beneficial and sustainable practices for managing that 39 pounds of biosolids per New Yorker per year will be a big part of the solution.

Janine Burke-Wells is the executive director for the North East Biosolids & Residuals Association who may be reached at info@nebiosolids.org.

References

40 CFR Part 503. 1993. "Part 503 Standards for the Use or Disposal of Sewage Sludge." Code of Federal Regulations, title 40, Chapter I, Subchapter O (Feb. 19): 9387-9404. (https://www.ecfr.gov/current/title-40/chapter-I/subchapter-O/part-503)

Beecher, N., J. Beecher, J. Burke-Wells, M. Lono-Batura, N. Goldstein, G. Kester and B. Toffey. 2022. National Biosolids Data Project: Biosolids Management in the U. S. (https://www.biosolidsdata.org), accessed January 2024.

NEBRA and Northwest Biosolids. 2022. Biosolids GHGs: Formulas to Mitigate Climate Change. Sep. 20. (https://www.BiosolidsGHGs.org/)

NYSDEC. 2018. Biosolids Management in New York State. New York State Department of Environmental Conservation Division of Materials Management. March. (https://extapps.dec.ny.gov/docs/materials_minerals_pdf/bsmgmt2015.pdf)

NYSDEC. 2023. DMM-7/ Biosolids Recycling in New York State – Interim Strategy for the Control of PFAS Compounds. DEC Program Policy, New York State Department of Environmental Conservation Office of Remediation and Materials Management. Sep. 7. (https://extapps.dec.ny.gov/docs/materials_minerals_pdf/dmm7.pdf)

Additional Resources

National Biosolids Data Project, New York Biosolids (https://www.biosolidsdata.org/new-york)

Northwest Biosolids (https://nwbiosolids.org/)

NYSDEC Biosolids Management (https://dec.ny.gov/environmental-protection/recycling-composting/organic-materials-management/technologies/biosolids-management#NYS)

NYSDEC. 2023. Statewide Greenhouse Gas Emissions Report. New York State Department of Environmental Conservation, Basil Seggos, Commissioner. (https://dec.ny.gov/environmental-protection/climate-change/greenhouse-gas-emissions-report#Requirements)

Office of the New York State Comptroller. 2018. Local Governments and the Municipal Solid Waste Landfill Business. December. (https://www.osc.ny.gov/files/local-government/publications/pdf/landfills-2018.pdf)

RECYCLING OF BIOSOLIDS IN NEW YORK STATE:
PFAS CONTROL UNDER DMM-7

By Sally Rowland

The New York State Department of Environmental Conservation (NYSDEC) supports the recycling of biosolids and recognizes the benefits to soil health and crop growth associated with this practice. However, biosolids recycling must be performed in a manner that is protective of environmental resources.

In this article, I will describe the roles of the U.S. Environmental Protection Agency (USEPA) at the federal level and the NYSDEC at the state level in addressing PFAS compounds in recycled biosolids.

USEPA's Role in Setting PFAS Standards for Recycled Biosolids

Biosolids Program

The USEPA's Biosolids Program has developed a framework to evaluate risks from exposure to chemicals in biosolids. The framework consists of three steps:

1) Prioritize chemicals for assessment.
2) Screen for human health and environmental risk.
3) Perform a refined risk assessment for chemicals that fail the screening.

The Biosolids Program asks USEPA's independent Science Advisory Board to review this proposed framework and provide input on the approach.

PFAS Strategic Roadmap

As part of the USEPA's PFAS Strategic Roadmap, the agency committed to conducting a biosolids risk assessment for two PFAS compounds, perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS). The assessment is currently underway. Problem formulation, the first step in conducting a risk assessment, includes the following steps:

1) Articulates the purpose for the assessment.
2) Defines the problem (source and occurrence).
3) Identifies the conceptual exposure pathways.
4) Presents data and tools used for analyzing and characterizing risk.

The problem formulation process also involves engagement with states and tribes, risk managers, scientists and members of the biosolids community.

Risk-based Standards

USEPA is currently developing comprehensive risk-based standards for PFAS compounds in biosolids that are recycled. NYSDEC intends to initiate a rulemaking for 6 NYCRR Part 361 (the regulations governing biosolids recycling practices) after the USEPA standards are established. However, USEPA does not anticipate completion of their work until December 2024 or later.

NYSDEC's Role in Regulating Biosolids Recycling

In New York state, biosolids are solid waste, and the recycling of biosolids requires a permit under 6 NYCRR Part 361. Part 361-2 governs the land application of Class B biosolids on agricultural soils and Part 361-3 governs the Class A processes such as composting. The regulations contain pollutant limits, pathogen reduction criteria, nutrient loading restrictions and other requirements to protect environmental resources.

The Need for Interim PFAS Standards

NYSDEC relies on USEPA's expertise in the development of risk-based PFAS standards for biosolids that are recycled. However, it is unlikely that those standards will be promulgated until 2025 or later. In the interim, NYSDEC will reduce potential environmental harm by identifying biosolids that present a greater risk due to the influence of industrial sources to the applicable wastewater treatment plant and requiring those sources to be addressed to reduce the biosolids PFOA and PFOS levels to background (domestic) levels as determined by studies in Michigan. This will reduce the current risk to groundwater resources and provide NYSDEC with data that will assist in rulemaking.

On Sept. 7, 2023, NYSDEC issued DMM Program Policy 7 Biosolids Recycling in New York State – Interim Strategy for the Control of PFAS Compounds (DMM-7). NYSDEC's interim guidelines for PFOA and PFOS in biosolids recycled are shown in ***Table 1***.

Table 1. Interim Standards for PFOS and PFOA in DMM-7

Concentration in Biosolids Dry Weight (µg/kg or ppb)		Action Required for Biosolids that Are Recycled
PFOS	PFOA	
20 or Less	20 or Less	No action required.
>20 but <50	>20 but <50	Additional sampling required. NYSDEC will take appropriate steps to restrict recycling after one year if the PFOS or PFOA levels are not reduced to below 20 ppb or less.
50 or Greater	50 or Greater	NYSDEC will take action to prohibit recycling until PFOS or PFOA concentration is below 20 ppb.

Implementation of DMM-7

NYSDEC has a contract with the State University of New York College of Environmental Science and Forestry (SUNY-ESF) to perform the initial analyses at the water resource recovery facilities (WRRFs) subject to DMM-7. NYSDEC staff will conduct the initial sampling, which includes analyzing the biosolids and the influent and effluent streams of the WRRF. Sampling the influent streams will assist NYSDEC in finding potential incoming sources of PFOS and PFOA from industrial sources. After the initial sampling event, all permitted 361-2 and 361-3 facilities that accept biosolids must sample each biosolids source at a frequency determined by NYSDEC, based on the quantity recycled, potential influent PFAS sources to the WRRF, and previous analytical results.

NYSDEC anticipates completing the initial sampling in the spring of 2024. NYSDEC will review the analytical results and provide the data to each facility with an indication of the next steps required (if any). For facilities with biosolids levels above 20 ppb, the next steps are likely to include additional sampling of the biosolids and the development and implementation of a plan to identify and reduce industrial sources.

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Resources

Link to 6 NYCRR Part 361: https://dec.ny.gov/regulatory/regulations/adopted-parts-360-366-369-371-377

Link to DMM-7: https://dec.ny.gov/environmental-protection/recycling-composting/organic-materials-management/technologies/biosolids-management

NYCDEP'S BIOSOLIDS MANAGEMENT JOURNEY

By Natalia Perez, Jane Gajwani, Andwele McCarthy and Terrence Noel

Anaerobic digesters at the Newtown Creek WRRF. *Photo: NYCDEP*

The New York City Department of Environmental Protection (NYCDEP) stands as the largest water and wastewater utility in the United States, operating 14 wastewater resource recovery facilities (WRRFs) throughout New York City's five boroughs. At these facilities, wastewater undergoes treatment during which separated solids are stabilized via anaerobic digestion. Digested solids or biosolids are dewatered regionally at one of six NYCDEP WRRFs with dewatering facilities. From there, third-party contractors collect, haul, and dispose of or recycle the biosolids. A small portion of the liquid digested solids is managed via an intermunicipal agreement at a facility in Newark, New Jersey, owned and operated by the Passaic Valley Sewerage Commission.

Pursuing Beneficial Use

Each year, NYCDEP produces approximately 500,000 wet tons of biosolids on average, making it by far the largest generator of biosolids on the East Coast. The management of these biosolids has evolved over time.

Decades ago, New York City managed biosolids by dumping liquid digested sludge into the ocean. However, after the federal 1988 Ocean Dumping Ban Act, NYCDEP commissioned its six dewatering facilities. With those constructed, NYCDEP arranged a robust beneficial reuse program that lasted almost 20 years, managing 100% of biosolids through various avenues like rail contracts to Colorado farms; a local pelletizing facility, the New York Organic Fertilizer Company; and further stabilization via Tully Environmental for reuse in Pennsylvania agriculture. Unfortunately, these contracts were cut in the aftermath of the 2008 financial crisis.

In more recent years, New York City and New York state decarbonization goals have led NYCDEP to look for ways to restore its beneficial use programs. New York City has been working on deep decarbonization for over 15 years, and all New York City agencies, NYCDEP included, have been tasked with setting emissions reduction goals. NYCDEP's environmental goals, such as a 40% reduction in greenhouse gas emissions by 2025 and a 50% reduction by 2030, as well as zero waste to landfill by 2030, demand a shift toward beneficial reuse. In addition, New York state passed the Climate Leadership and Community Protection Act in 2019 and the resulting Climate Action Council Scoping Plan (issued January 2023) calls for an end of landfilling organic material, including biosolids, though the timeline for this requirement is unclear.

In order to better understand the benefits of pursuing additional beneficial uses, NYCDEP commissioned Northern Tilth in 2020 to conduct an assessment. The assessment reviewed various forms of land application (direct land application of Class B biosolids, compost, thermally dried biosolids and alkaline stabilized biosolids). The assessment showed that while there were some small differences in the carbon intensity of these various products, they are all net carbon negative and a significant improvement over landfilling.

Planning Efforts

To address the challenges associated with diversifying beneficial end-use outlets, NYCDEP developed an Interim Biosolids Management Plan in September 2020 with Brown & Caldwell. The plan focused on securing dedicated beneficial use management capacity and encouraging development of more beneficial use capacity regionally to allow NYCDEP to both better manage the risk and diversify outlets. The scope of the project involved significant outreach to the vendor community to better understand existing available capacity within a 250-mile radius of New York City and if there was potential to build additional capacity, as well as an exploration of mutually acceptable contracting terms and conditions that will facilitate the growth of beneficial use outlets and facilities.

As a result of the 2020 Interim Biosolids Management Plan, NYCDEP phased out three landfill contracts and replaced them with three beneficial reuse contracts by use of the negotiated acquisition contracting mechanism. This strategy allowed NYCDEP to secure scarce capacity at sites that would not otherwise be fully available/accessible via the traditionally employed competitive bid mechanism, given the limited market size. This novel contracting approach created a market signal and is encouraging continued growth of the sector in the mid-Atlantic region.

As of 2022 about 40% of biosolids are beneficially reused, a notable improvement from the 12% beneficial use rate just four years ago. Over the last few years NYCDEP has made substantial progress toward the goal of directing all biosolids cake to beneficial use contracts by 2026, ahead of the 2030 target.

In addition, NYCDEP undertook two significant planning efforts from 2020 to 2022: the Solids Production Plan and the Energy and Carbon Neutrality (ECN) Plan, Biosolids Master Plan (AECOM and Hazen & Sawyer). The Solids Production Plan was a short-term operational plan up to the year 2030 and included solids production analysis to quantify NYCDEP's existing solids loadings from 2014 to 2018 and project loads through 2030. Accounting for past investments, it recommended further consolidation of dewatering operations to reduce additional capital investments and operational risk, while providing a comfortable buffer to water quality parameters in the Upper East River.

The ECN Biosolids Master Plan is a one-of-a-kind effort focused on the environmental impacts of biosolids management. Utilizing the Solids Production Plan as baseline, the ECN Biosolids Master Plan further strategized NYCDEP's approach by conducting market assessments for product utilization, assessing economic, energy and carbon impacts of 10 multi-facility scenarios for NYCDEP's future biosolids management, and developing a long-term planning recommendation to 2050.

Research and Investment

Significant questions still remain. There are concerns regarding perfluoroalkyl and polyfluoroalkyl substances (PFAS), so-called "forever chemicals," for their extremely stable thermochemical properties. There is also uncertainty about how evolving state and federal regulations regarding PFAS may impact beneficial reuse of biosolids. PFAS are ubiquitous in the environment and are found in various levels in wastewater and biosolids depending on background levels, sewershed characteristics, treatment technology and potentially other, as yet not well-understood variables.

NYCDEP is actively involved in ongoing research and development, particularly in PFAS removal technologies from biosolids. Methods like pyrolysis show promise but require further testing for efficacy, treatment efficiency, and assessing potential byproducts or residues. The top four performing product and end use market combination scenarios evaluated as part of the ECN Biosolids Master Plan address potential risk related to PFAS restrictions and include production of biofuel via burning of dried biosolids in a biomass boiler, and pyrolysis of dried biosolids with biochar reuse in agriculture, land reclamation or urban agriculture.

Given the energy-intensive nature of the drying pre-step required in advanced thermochemical processes, NYCDEP is directing investments into enhancing mechanical thickening at select WRRFs. This targeted approach aims to reduce the overall volume or quantity of biosolids produced. Beyond overall volume reduction, these upgrades will reduce energy needs at the WRRFs and enhance anaerobic digestion treatment capacity, thereby improving the quality of produced biosolids.

NYCDEP's goal is not only to achieve 100% beneficial use of biosolids, but also to ensure its biosolids reuse program is robust and able to adapt as the market evolves. NYCDEP knows from experience that any chosen strategy can be impacted by cost constraints, technological improvements or a changing regulatory landscape. The work the agency is doing now will create a diversified network of options for reuse to ensure NYCDEP's ability to manage biosolids economically and environmentally responsibly.

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Biosolids Management:

A Paradigm Shift

By Seth Foster

Trucks being loaded with biosolids to be taken to local farm fields at the City of Watertown PCF. *Photo: Angel French*

The filter press is used to dewater biosolids at the City of Watertown PCF.

Photo: Angel French

When interpreting biosolids management, the handling of solids is typically classified into three categories:

- beneficial use
- incineration
- landfilling

In 2015, a mere 16% of all biosolids generated in New York state were allocated to beneficial use, in contrast with the over 80% of biosolids that were wasted within the practices of incineration and landfilling (***Figure 1,*** *NYSDEC 2018*). At the time, the City of Watertown Pollution Control Facility (PCF), a 16-million-gallon-per-day (MGD) water resource recovery facility in upstate New York, was one of those plants contributing to the overwhelming statistic that represents the waste of these beneficial resources.

Since 2015, the City of Watertown PCF has implemented effective and permanent changes to its solids handling program that have removed the need for landfilling entirely. The plant received NYWEA's Beneficial Use of Biosolids award in 2020.

The story of the City of Watertown PCF's biosolids management reflects a pragmatic approach to environmental responsibility within the context of evolving industry standards. However, the City of Watertown PCF is not alone in its development. As of 2022, 56% of all biosolids generated across 41 states are being land applied (***Figure 2***). This represents the paradigm shift that is occurring across the United States to find that water is not the only beneficial resource in sewage.

This article, written by an operator of the treatment plant, reviews the history of the City of Watertown PCF's biosolids management practices throughout its 60 years of operation, from landfilling to incineration and finally to beneficial use.

The Early Days

The City of Watertown PCF was initially brought online in 1963 as a primary treatment plant. Solids handling consisted of primary sludge being collected and pumped into a lagoon for storage. This lagoon would be dredged annually, and solids would be disposed of by means of landfilling. This primitive method of solids removal would be practiced for nearly two decades.

In 1982, "Big Bertha" came online at the City of Watertown PCF. The incinerator, appropriately named by its operators, could burn up to 80 cubic feet of pressed sludge per hour at approximately 30% solids. It was common practice to incinerate raw sludge to make use of the fats, oils and grease as a fuel source to save capital on natural gas.

Through regular maintenance and proper operation, Big Bertha ran full-time for nearly double its 20-year life expectancy. The incinerator was finally shut down in 2016 was due to its inability to meet changing carbon emission regulations put in place by the U.S. Environmental Protection Agency (USEPA). During this time, the City of Watertown PCF landfilled all incinerated ash without the means of applying it to any beneficial use.

After the shutdown of Big Bertha, solids dewatering for the 16-MGD plant was accomplished through pressing. The process begins with three anaerobic digesters running in series to achieve a detention time of around 15 days and volatile solids making up 65% of total solids concentration. After digestion, sludge is met with a pair of plate and frame presses, generating nearly 80 tons of sludge per week at 20% solids. Coagulation is achieved through a dry polymer make-up system.

The presses, originally used to feed sludge cake to Big Bertha, were now being used to directly send sludge cake to the landfill. While the cake generated by the presses alone is free of carbon emission regulations, it has a much greater mass than incinerator ash, and is therefore more costly to dispose of.

Transition to Beneficial Use

The terms "biosolids" and "sludge" are often used interchangeably. However, biosolids are typically identified as such when they are used beneficially. These beneficial uses include land application to agricultural fields, timber farms and home gardens (*USEPA 2023*).

The goal of finding a beneficial use for the plant's biosolids began nearly 20 years ago and continues to expand in innovative ways. Long before accredited studies had been performed on the biosolid's desirable properties, a few operators were performing their own "backyard studies" to find that tomato plants from their vegetable gardens fertilized with biosolids would grow to be twice the size of a tomato grown without biosolids. Of course, without proper classification deeming the tomatoes safe for consumption, they were discarded after backyard studies had been concluded, in the name of science.

In 2017, sludge generated by the City of Watertown PCF was found to meet the requirements of Class B biosolids. This generally means that biosolids may be land applied as a fertilizer on crops that are intended for secondary consumption by humans, i.e., that the fertilized plant must be consumed by livestock. Since this classification, all biosolids produced by the City of Watertown PCF have been land applied to various farms on grain and corn fields used to feed dairy cows. The amount of money saved from no longer paying to dispose of solids by landfilling is immense.

The City of Watertown PCF's next logical venture is to achieve Class A biosolids. The objective of this project is to reduce pathogen levels and vector attraction to a limit that would allow biosolids to be used as fertilizer for crops intended for the primary consumption of humans. Currently, research is being done on the installation of a sludge dryer as well as additional components. Among the steps taken so far, a trip was taken to the water resource recovery facility in Endicott, New York, to see their newly installed dryer and inquire about its operation. While there is no definitive date to complete the project, the City of Watertown PCF remains dedicated to the pursuit of more advanced biosolids management practices as the industry expands.

In Conclusion

The evolution of biosolids management at the City of Watertown PCF reflects a gradual transition from conventional practices to more sustainable methods. The facility's journey, spanning six decades, highlights the shift from basic sludge storage, landfilling, and adjustments in response to changing environmental regulations, to achieving Class B biosolids standards and contributing to cost savings as well as reducing its carbon footprint. The ongoing efforts to attain Class A biosolids through research into sludge drying technologies demonstrate the facility's commitment to continuous improvement.

Seth Foster is a former process worker II 3A operator at the City of Watertown PCF.

References

NYSDEC. 2018. Biosolids Management in New York State. New York State Department of Environmental Conservation, Division of Materials Management. Albany, New York. (https://extapps.dec.ny.gov/docs/materials_minerals_pdf/bsmgmt2015.pdf)

USEPA. 2023. Basic Information about Biosolids. Dec. 15. Accessed Jan. 25, 2024. (https://www.epa.gov/biosolids/basic-information-about-biosolids)

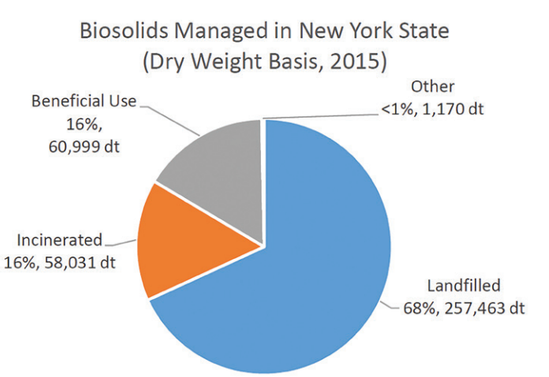


Figure 1. In 2015 NYSDEC's Division of Materials Management conducted a survey of publicly owned treatment works (POTWs) in New York state that generate biosolids. The POTWs reported generating a total of 377,663 dry tons (dt) of biosolids in 2015. The proportion of biosolids management methods used are shown in the chart. *Credit: NYSDEC*

City of Watertown PCF's ash lagoon, circa 2003. *Photo: City of Watertown PCF*

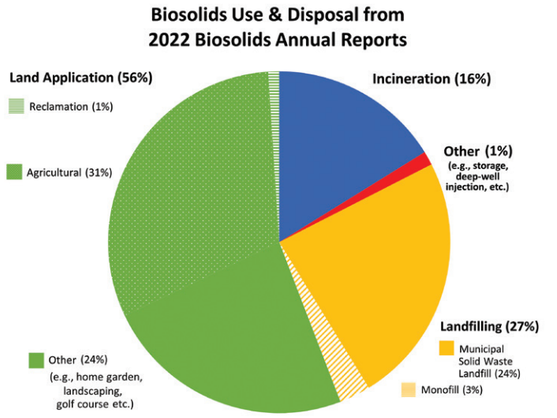
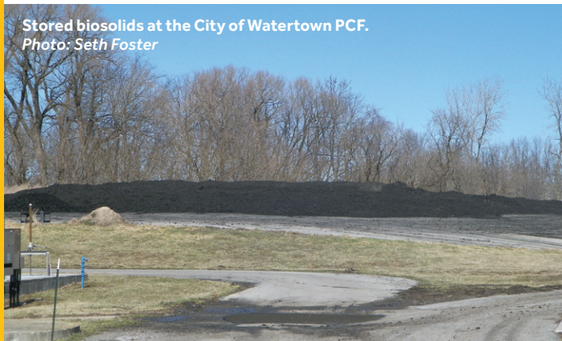


Figure 2. The USEPA collects annual biosolids reports from roughly 2,500 larger facilities in 41 states in the U.S. The chart shows USEPA's 2022 estimates based on these reports. *Credit: USEPA*



Stored biosolids at the City of Watertown PCF. *Photo: Seth Foster*

AN EXPERIMENT TO ASSESS THE FATE OF PFAS FROM LAND-APPLIED BIOSOLIDS

By Jay T. Slate

Findings have shown that synthetic fertilizers, especially for the cereal farmland industry, are becoming more expensive and are harder to create containing the necessary nutrients. Land-applied biosolids from sewage plants provide a much-needed, nutrient rich fertilizer that is financially stable and pathogenically safe for humans. However, manufactured chemicals, such as PFAS, are making their way into our water pipelines adding potentially dangerous chemicals to these biosolids and water supply that are becoming ever increasingly difficult to remove.

The City of Watertown Pollution Control Facility (PCF) is aware of the risks posed by PFAS and is committed to protecting and preserving our environment. Currently the Watertown PCF's goal is to maximize the beneficial reuse of wastewater. The plant converts solids waste removed from the wastewater into what is called "Class B biosolids," leaving behind a clear, clean, recycled and almost fully decontaminated water to be returned to the river replenishing our water supply for beneficial reuse. The sludge taken out of the water is now land applied and no longer is sent to and received by the landfill, thus reducing the carbon footprint of the Watertown PCF.

An experiment was conducted to determine if land-applied biosolids are contaminating the farmland soils and vegetation with pollutants like PFAS leaching into the ground, and the effect on crop growth and future variability. This experiment is an attempt to raise public awareness of the potential environmental and domestic impacts from PFAS.

Background

PFAS have become ubiquitous in products we use in our daily lives. PFAS compounds today are still growing at a rate unmanageable to the ecofriendly organizations looking to prevent them from entering the environment. Many of these manufacturers still hold numerous patents on PFAS-containing products and much of their success is due largely to the durability of their products that PFAS imparts.

PFAS are organic molecules, chains of carbon atoms whose bonded hydrogen atoms have been synthetically replaced with covalently bonded fluorine atoms, creating a significantly stronger chemical bond. The carbon-fluorine bond is the shortest and strongest bond in nature.

As public concern for PFAS begins to grow, so do the regulations to prevent the addition of new compounds and continued formation of old compounds. As PFAS chemicals are outlawed, the focus now turns to extracting PFAS out of the waters and wastes already contaminated.

"Class B biosolids" are defined as the finished product of raw sludge digested under anaerobic conditions and dewatered to meet specific limitations as defined under U.S. Environmental Protection Agency (USEPA) guidelines 40 CFR Part 503. This sludge is digested by microorganisms in a biological reactor at specific temperatures and conditions to achieve a level of vector attrition (i.e., removal of pathogenic organisms) suitable for the beneficial use of land application as a nutrient-rich fertilizer. These digested biosolids are combined with cationic polymer and sequentially dewatered by plate and frame press filters, to achieve Class B biosolids. The Class B biosolids have a finished product similar to that of a dry fertilizer. Started as sanitary sludge from human waste, the sludge is then digested, dewatered and converted into new stabilized, beneficial compost compounds. These new beneficial compost compounds, "biosolids," are unrecognizable, both physically and chemically, from the human constituents from which they came.

Experimental Approach

This experiment is designed to answer the following questions:

1. Will the Watertown PCF's Class B biosolids (***Photo 1***) adversely affect the ground below with a significant amount of PFAS?
2. Does the biosolid production process trap PFAS therein and hinder their ability to infiltrate the soil and vegetation?
3. Does the addition of biosolids increase the bioaccumulating factor (BAF) of PFAS in the adjacent vegetation growth?

The answers to these questions will determine the most beneficial use of the biosolids, and if further processes are needed to refine them.

The goal is to determine whether the PFAS will be fixed to the biosolids and remain in the soil, percolate into the ground water, or be mitigated into plant growth above.

The procedure will emulate the natural course of rainwater leaching through the soil, simulating the conditions affecting our land-applied biosolids. The soil and vegetation will then be tested for 20 PFAS compounds and other analytes against a control sample from a control test. The nutrient levels or agronomic rate of the nutrients in these tests will also be analyzed in the future to determine the best applications for the biosolids, and which crops will yield the best results.

Methodology

The scope of this experiment is to ascertain an accurate, representative model of a large-scale farm fertilized with biosolids and document the effects the biosolids will have on the ground water below regarding PFAS concentrations. The experiment entails two identical totes filled with soil representing plots of farmland scaled to size and managed in accordance with the rules and regulations stipulated in 6 NYCRR Part 361. Biosolids are added to one of the totes proportional to the quantity of biosolids applied to the land.

The totes were set outside in a position fully exposed to atmospheric conditions, free from obstructions and potential contamination (***Photo 2***). Subjecting the totes to meteorological conditions occurring throughout the year will establish good representative samples to analyze. All applicable regulations, rules and laws have been followed. The biosolids were applied using an agronomic rate for grass of about 120 pounds of nitrogen per acre. Grass seed was then planted.

Results

Results obtained from the analysis of the soil and vegetation have confirmed that PFAS is detectable in both totes, however the biosolids-applied tote had significantly higher values. The analysis of the vegetation also shows a significantly higher concentration of PFAS in the biosolids-applied tote. The growth of grass on that tote (***Photo 3***) was twice as high and twice as thick as the control tote (***Photo 4***).

Using these results, I have formulated uptake rates and bioaccumulating factors (BAF) for PFAS uptake in the vegetation growth at the Watertown PCF. The results are based off the initial values from spring 2023 and the ending soil and vegetation growth values from fall 2023.

BAF Analysis

The BAF describes the PFAS uptake rate of vegetation growth in proportion to the PFAS uptake in the soil. Biosolids are applied at the beginning of the year. After that, PFAS from the biosolids begin seeping into the soil and are absorbed into the vegetation. After numerous months outside in the weather, the soil has accumulated a significant amount of PFAS.

So, given the amount of PFAS in the soil and vegetation at the end of fall, we can then calculate the BAF. The BAF describes the percentage of how much more PFAS accumulated in the vegetation than in the soil.

The BAF was calculated using soil and vegetation data collected from the test totes that were exposed to the elements from spring to fall 2023. The BAF is calculated as follows:

$$BAF = (—\ln(\frac{(V*SB)}{(S*VB)})+1)*100\%$$

Where:

BAF = Percentage increase in PFAS uptake over the control sample
V = PFAS concentration of the biosolids applied tote vegetation sample
S = PFAS concentration of the biosolids applied tote soil sample
V_B = PFAS concentration of the control tote vegetation sample
S_B = PFAS concentration of the control tote soil sample

Inputs	Calculation
V = 1.365 ng/l	$BAF = (—\ln(\frac{(1.365*2.90)}{(3.13*0.843)})+1)*100\%$
V_B = 0.843 ng/l	$BAF = (—\ln(\frac{(3.9585)}{(2.63859)})+1)*100\%$
S= 3.13 ng/l	BAF = (—ln(1.5)+1)*100%
S_B = 2.90 ng/l	BAF=(—ln(-0.40547)+1)*100%
	BAF = 59.4%

Note: The PFAS BAF is formulated for process control only and is not intended for use in all legal and regulatory requirements and professional results' sheets.

Discussion

A BAF of 59.4% indicates that the PFAS uptake rate in the vegetation is 59.4% more than the uptake rate of PFAS into the soil. In other words, more PFAS is incorporated by the vegetation than stored in the soil. So, by means of the BAF, the Watertown PCF can accurately determine that PFAS is making its way into the vegetation growth above. Therefore, more treatment may be needed for land application criteria to be met. New operational processes for sludge digestion and dewatering need to be investigated.

PFAS is also not destroyed in our current plant schematics, and the world's PFAS issue is continuing to grow at a pace larger than anyone ever imagined. PFAS will need to be eliminated from water and ground sources in the future, and currently there are no cost-effective ways for this to be done.

Conclusions

The purpose of this experiment was to determine if land-applied biosolids are contaminating the farmland soils and vegetation with pollutants like PFAS leaching into the ground, and the effect of this leaching on crop growth and future variability.

1. The Watertown Pollution Control Plant's Class B biosolids adversely affect the ground below with a significant amount of PFAS.
2. The biosolid production process does not appear to trap PFAS therein, nor hinder their ability to infiltrate the soil and vegetation.
3. The addition of biosolids increases the BAF of PFAS in the adjacent vegetation growth.

More data is needed to show more accurate trendlines, concentrations and differences due to the low levels of PFAS we are measuring (in nanograms).

In the future, the Watertown PCF may consider production of Class A biosolids. Class A has a higher level of biodegradation than Class B, which makes them safer for humans and the environment. The amount of PFAS destroyed will depend on the process used to produce the Class A biosolids. Currently the dryer/ biochar system is claiming complete PFAS destruction, though the Watertown PCF will investigate all options. PFAS are growing into our vegetables or are eaten by our domesticated animals. The data resulting from the PFAS study at the Watertown PCF describes several issues regarding the spread of PFAS. Most importantly is the need to stop the spread and find processes that can destroy it.

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1 Watertown PCF Class B biosolids are suitable for the beneficial use of land application as a nutrient-rich fertilizer.

2 The two identical totes filled with soil (biosolids-amended "A" in the foreground, control "B" in the background) were set outside in a position fully exposed to the weather, free from obstructions and potential contamination.

3 In the biosolids tote, labeled "A Biosol," the soil was amended with biosolids scaled proportional to the quantity that would be applied to the farmland, using an agronomic rate for grass of about 120 pounds of nitrogen per acre. This image, taken at the end of fall (Dec. 17, 2023), shows more robust grass growth compared to the control tote.

4 In the control tote, labeled "B Blank," unamended soil representing a plot of farmland scaled to size was seeded with grass. This image was taken at the end of fall (Dec. 17, 2023).

All Photos: Jay T. Slate

"The transition to a water resource recovery facility represents a significant milestone in our sustainability journey, allowing us to reduce our carbon footprint, improve water quality and enhance ecosystem health."

Supervisor Tom Flaherty

Driving Sustainability in Biosolids Disposal:
How Innovation and Collaboration Enabled Evolution of the Webster WRRF

Forms are in place for the next concrete pour for the new gravity thickeners to provide thickening of primary sludge and WAS prior to digestion. The new gravity thickeners replace the original undersized unit utilized for WAS and a gravity belt thickener utilized for primary sludge that is well past the end of its useful life. The gravity thickeners provide low energy thickening with minimal operator attention required, allowing the plant staff to focus on other priorities. *Photo: Dennis Clough*

The new outside waste acceptance building will include a new Saveco Beast unit to screen debris from septage and grease interceptor waste. The two tanker discharge lanes will allow the plant to accept outside waste for either co-digestion or treatment through the liquid treatment stream, while keeping all of the truck traffic out of the main treatment area. *Photo: Dennis Clough*

By Dennis Clough

A Typical Town Sewer Plant Scenario

Webster, a town of 45,000 residents in Western New York, is on the cusp of a groundbreaking transformation in wastewater management. In 2020, the town's water pollution control facility (WPCF), faced with aging systems and escalating biosolids disposal costs, embarked on a visionary journey from a traditional plant to a cutting-edge water resource recovery facility (WRRF). The Asset Renewal and Wastewater Resource Recovery Improvements Project, in multiple phases totaling approximately $80 million, demonstrates how the collaborative efforts of a forward-thinking municipality, its performance contracting partner, and an unexpected industrial opportunity succeeded in driving change and sustainability for a community.

As a medium-sized facility in the northeast corner of Monroe County, the Webster WPCF has been processing wastewater for over 50 years and averaging a little over 3 million gallons per day over the last decade. But its aging infrastructure was in serious need of a comprehensive update. Its systems were outdated and maintenance-intensive, and costs and other concerns for biosolids disposal — sludge hauling and regional landfill closures — posed significant financial and environmental challenges for the facility's future. Biosolids disposal had become one of the plant's largest budget line items and the plant's upgrade would be one of the largest capital investments in the town's recent memory.

A Not-So-Typical Approach to Biosolids Management

Their plant upgrade project began with Phase 1 in 2019, by replacing the plant's 50-year-old secondary clarifiers and stopping a long cycle of Band-Aid repairs on outdated and obsolete parts.

Plans for Phase 2 were similar to Phase 1 (e.g., replacement of old equipment with new); however, the proposed solution did not address future revenue generation or cost savings for the plant. Tom Flaherty (elected Webster town supervisor midway through Phase 1 in January 2020), along with leaders from the town's Department of Public Works (DPW), began considering an alternative approach that could meet the plant's sustainability challenges in a more proactive and forward-thinking manner, helping the town regain control of its financial future by increasing resource recovery and revenue opportunities.

With the more costly Phase 2 approaching, the town leadership began considering a revision to the plan. With Flaherty's support, Webster's Chief Plant Operator Rick Kenealy and Deputy DPW Commissioner Art Petrone started working with the project engineers, Barton and Loguidice, to tweak the Phase 2 design to create future revenue generation and cost savings for the plant. They visited state-of-the-art sewer plants throughout New York and Pennsylvania to get insights and subsequently recommended the evolution of Webster's traditional WPCF to a modernized WRRF. Though utilizing the same liquid treatment systems, the WRRF would usher in a new era of resource recovery and environmental stewardship for the town, upgrading the facility's infrastructure and shifting its operational mindset from "treatment of waste" to "recovery of resources."

The updated Phase 2 proposal came with an additional cost. However, thanks to the due diligence of the town leadership and engineers, the incremental expense would expeditiously pay for itself through revenue production and cost savings and help pay down debt on the asset renewal portion of the Asset Renewal and Wastewater Resource Recovery Improvements Project.

How Energy Performance Contracting Enabled Success

By leveraging Article 9 of New York state's Energy Law (see sidebar), Webster determined that an energy performance contracting (EPC) approach could enable the town to implement its project with significant potential savings. Through cooperative decision-making with its EPC partner, Navitas, Webster could maximize the impact of its investments, ensuring cost predictability, risk mitigation and timely delivery throughout the project lifecycle.

In collaboration with Navitas, town leadership was able to identify opportunities for system optimization, cost savings and environmental sustainability, thus maximizing the impact of the town's investments and ensuring the long-term viability of its water treatment operations.

In a very transparent manner, the town began sharing its new vision for Phase 2. Mr. Flaherty's weekly online "Supervisor's Column" shared information and updates about the revised plan, along with the rationale and research to support the recommended transition. Their proposed solution would enable nutrient recovery, methane gas usage and landfill diversion, while positioning the town as a leader in innovative wastewater management and sustainability practices. A detailed table outlining the project's scope, including operational changes and infrastructure upgrades, highlights the multifaceted nature of the transformation. Tom Flaherty and the Town of Webster wanted transparency regarding this project and had presented one topic or another about the project for 40 consecutive weeks; Tom compared it to Joe DiMaggio's hitting streak!

Solving the Biosolids Issue… Not Exactly a Piece of Cake

Webster's escalating landfill disposal costs and the impending closure of nearby landfills necessitated a shift in biosolids management strategies. Investing in a biosolids dryer offered a sustainable solution, reducing sludge and hauling costs while minimizing environmental impact. However, considerations of accepting biosolids from other communities presented both revenue opportunities as well as operational challenges, requiring careful evaluation of economic viability and regulatory compliance.

Continued on Page 46

Understanding Article 9

New York Energy Law Article 9—Energy Performance Contracts in Connection with Public Buildings and Facilities—provides a framework for the procurement and implementation of this alternative project delivery methodology. Originally enacted in 1985, it is one of the oldest pieces of state-based enabling legislation for performance contracting in the U.S. The law states its purpose is to: "…obtain long-term energy and cost savings for agencies and municipalities by facilitating prompt incorporation of energy conservation improvements or energy production equipment—or both—in connection with buildings or facilities. Such arrangements will improve and protect the health, safety, security and welfare of the people of the state by promoting energy conservation and independence, developing alternate sources of energy, and fostering business activity."

By adhering to the principles outlined in Article 9, projects prioritize cost predictability, risk management and cooperative decision-making. This approach enabled the project team to navigate complex challenges effectively, ensuring timely delivery and maximizing community benefits.

Webster's application of Article 9 reflects the town's commitment to responsible fiscal stewardship and sustainable infrastructure development. It proved to be instrumental in shaping the Asset Renewal and Wastewater Resource Recovery Improvements Project.

> *"Throughout the project, we've prioritized community engagement and collaboration with stakeholders to ensure transparency, accountability and inclusivity."*
>
> Supervisor Tom Flaherty

Excavation for the foundation of the new 1.15-million-gallon primary anaerobic digester. The site constraints and soil conditions required the use of sheeting to support the excavation. *Photo: Dennis Clough*

Continued from Page 45

Weighing the pros (new revenue opportunity, improved purchasing economics) and cons (increased operating and staff expenses, permitting requirements, PFAS issues), the Webster team carefully weighed the business decision between operating a dryer only for in-plant sludge and one that would accept cake from other municipalities. Due to the additional complexity of accepting outside cake, the regulatory uncertainty and potential regulatory impacts on the fertilizer product from the dryer, the town elected to only process in-plant sludges and not to accept outside cake.

Enter Project Izzo, Primed for a Nimble Community with Performance Contracting Solution

In fall 2022, with Phase 2 at approximately 60% completion, "Project Izzo" was presented to the Town of Webster. An unknown corporation seeking a site for a new food production facility, Project Izzo was evaluating an available 100-acre property in Webster. With the Asset Renewal and Wastewater Resource Recovery Improvements Project already underway utilizing performance contracting, Webster and its Navitas project team were in an ideal position to adapt to Project Izzo's wastewater treatment needs and timeline, as well as addressing implications on the project scope, such as treatment capacity, tank sizing, conveyance piping and others. Project Izzo would potentially utilize all of the reserve treatment capacity at the facility. Yet with the flexibility to quickly amend the plant project scope, Webster was able to plan for a facility expansion to address the additional flows and loads from the new food production facility.

In parallel, Webster was able to allocate capacity in the drying facility originally planned for outside cake to process the remaining solids from the digestion of additional high-strength organic wastes, primarily DAF (dissolved air floatation thickener) float produced by the new Project Izzo facility. In April 2023, Governor Hochul announced that Project Izzo had selected Webster, New York, as the location for the new $650 million facility for Coca-Cola's new Fairlife subsidiary's production facility.

When the Fairlife announcement was made, the Asset Renewal and Wastewater Resource Recovery Improvements Project pivoted. The designed improvements to the treatment plant that were unaffected by Fairlife were identified by Navitas and construction began on that scope in June 2023. In addition, systems affected by Fairlife were redesigned by the Navitas team for the increased flows and loads coming to the plant. Also, the town assessed the project's financial implications for ratepayers and continued to manage cost predictability and risk, demonstrating its commitment to responsible fiscal stewardship.

Webster's Realizes Its State-of-the-Art WRRF

From equipment modernization to process optimization, each aspect of the project was meticulously planned to maximize efficiency and sustainability. By investing in state-of-the-art technology and embracing best practices in biosolids management, the Town of Webster is on track to realize its evolution from a traditional WPCF to a modern, sustainable WRRF. By embracing resource recovery principles and an innovative performance contracting approach, Webster positioned itself as an ideal corporate partner, poised for sustainable operations and environmental stewardship.

As the Asset Renewal and Wastewater Resource Recovery Improvements Project reaches completion, the community celebrates its achievements and looks forward to a future defined by resilience, innovation and sustainability.

"By sharing our experiences and best practices with other municipalities and stakeholders," said Tom Flaherty, "we hope to inspire and inform future wastewater management initiatives."

Dennis Clough, DBIA, is the managing director for infrastructure solutions with Navitas, LLC, who may be reached at dclough@navitas.us.com.

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Biosolids Market Assessment:
Town of Webster, New York

By Nickolas Hines

Material Matters conducted a Biosolids Market Assessment on behalf of Navitas and the Town of Webster for the solids produced at the Webster Water Resource Recovery Facility (WRRF). The Biosolids Market Assessment was initiated as part of the Town of Webster's Asset Renewal and Wastewater Resource Recovery Improvements Project to identify local market opportunities, challenges and corresponding economics associated with managing a Class A/Exceptional Quality (EQ) thermally dried biosolids product.

Background

The baseline solids management program employed by Webster has been a historically reliable program, in which digested solids are transported by a third-party hauler for landfill disposal. Although this has been a reliable method in the past, the solids management program has been impacted by recent landfill closures and rising tipping fees. In addition, with Webster's continued growth and potential interest from new industries, solids production is anticipated to continue to increase.

To tackle these challenges, Webster has elected to pursue the Asset Renewal and Wastewater Resource Recovery Improvements Project, which includes increased anaerobic digester capacity, new solids handling equipment and introduction of thermal drying technology to achieve volume reduction and market diversification for the resulting thermally dried biosolids product.

The overarching goal of the Market Assessment was to assist Webster in the selection of one or more local market outlets for the management of Class A/EQ dried biosolids to be produced at the WRRF. The assessment included a review of Webster's baseline solids management program, as well as an assessment of local beneficial use outlets available for Class A/EQ thermally dried products produced via the Gryphon Belt Dryer (***Figure 1***).

Local Beneficial Use Outlet Survey

Surveys with local market outlets were used to compare physical and chemical characteristics of the belt-dried granule with the requirements of local market outlets. In total, six markets were identified as potential outlets to accept dried biosolids (***Figure 2***).

Market Assessment criteria were developed to compare potential market outlets, which included market maturity, level of interest, seasonal demand, capacity to accept the product, preferred or required product characteristics and market pricing. Market outlet representatives were contacted via phone and surveyed using the criteria described above to develop the main opportunities and considerations for each potential market.

Bulk Agriculture Market

The bulk agriculture market includes the production of feed crops (crops consumed by livestock), including corn, hay, small grains and forage grasses. The bulk agriculture market is a low value, high volume market.

A wide variety of products are used and accepted in the bulk agriculture market nationwide including Class B and EQ cake (neither are included in this assessment) and EQ dried products. Land-applied biosolids replace and/or supplement conventional fertilizer and soil amendments to provide a recycled source of nutrients and organic matter.

The bulk agriculture market in the region surrounding Webster, New York, is vast, with more than 420,000 acres of crops best suited for land application of biosolids (corn, soybeans and forages) found in the six counties surrounding Webster (***Figure 3***). Based on the estimated annual production of dried biosolids at the WRRF (3,350 wet tons/year), the management of all Webster's dried biosolids would require between 1,200 and 1,400 acres, or 5 to 8 farm sites.

Local agriculture extension agencies, farms and third-party contractors operating in the region were surveyed to evaluate the use of biosolids in the region. Survey results confirmed various opportunities in the bulk agriculture market including historical demand for low-cost nutrient sources driven higher by rising costs associated with conventional fertilizer. Odor nuisance potential was also evaluated and determined to be of minimal risk due to the range of moderately odorous products already accepted within the market (cattle, swine and horse manure).

The surveyed farmers confirmed the value of biosolids and willingness to pay for the product. However, one of the main considerations for biosolids use within the bulk agriculture market is the high volume of organic nutrient sources generated and used locally. The need for three to six months of on-site storage was also a notable consideration confirmed via surveys. The seasonal demand for biosolids fluctuates with the weather and contributes to land application event limitations.

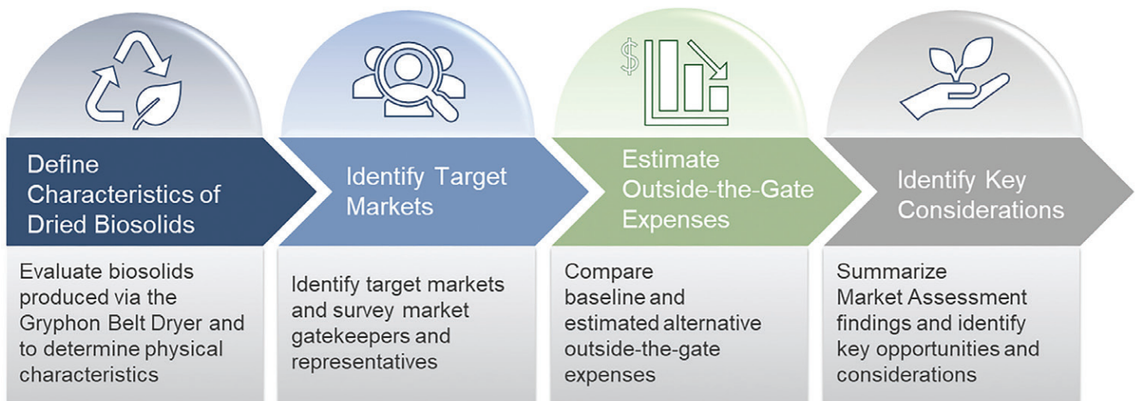
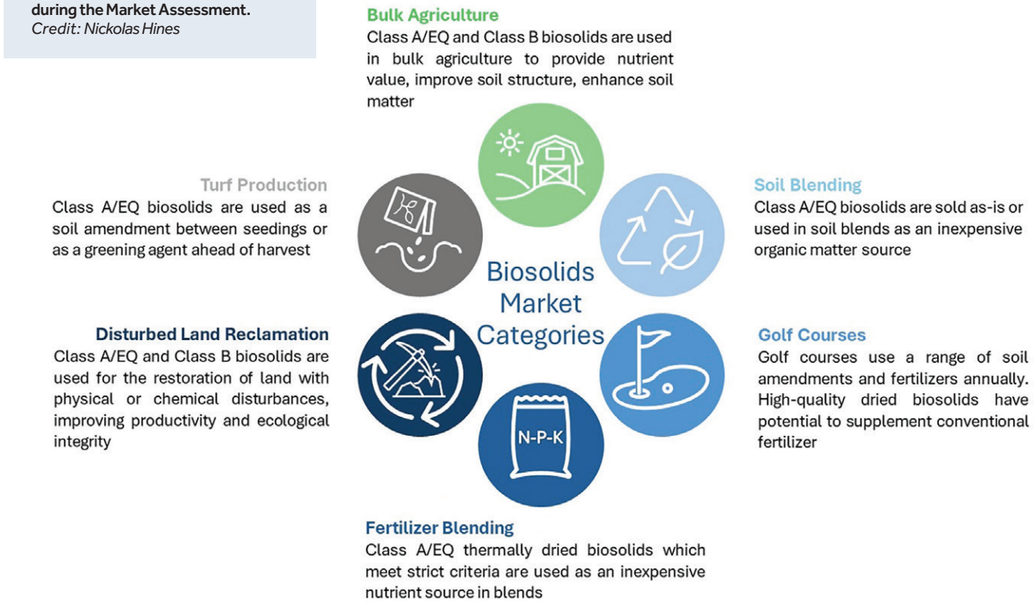


Figure 1. Market Assessment process. *Credit: Nickolas Hines*

Figure 2. Six markets evaluated during the Market Assessment. *Credit: Nickolas Hines*



Disturbed Land Reclamation

Disturbed land reclamation includes the restoration of disturbed sites that have significant physical and/or chemical disturbance (surface mines, brownfield sites or fire ravaged land) to improve productivity and ecological integrity. Class B and EQ cake biosolids have been used in multiple states to replace lost topsoil and improve soil fertility and stability at reclamation sites. On these sites, soil is highly erodible with little capacity to sustain vegetative growth over time.

The disturbed land reclamation market was evaluated to determine the existence of permitting pathways and established biosolids programs throughout the region. Initial research confirmed over 1,700 permitted surface mining facilities throughout the state, which account for more than 144,000 acres. Over 100 permitted facilities were identified within the six surrounding counties.

In total, 10 reclamation companies were contacted as part of the Market Assessment with limited feedback provided. Overall, it was determined that to enter the disturbed land reclamation market, a permitting pathway for the use of biosolids would need to be established, as there was no clear evidence of consistent biosolids use within the market.

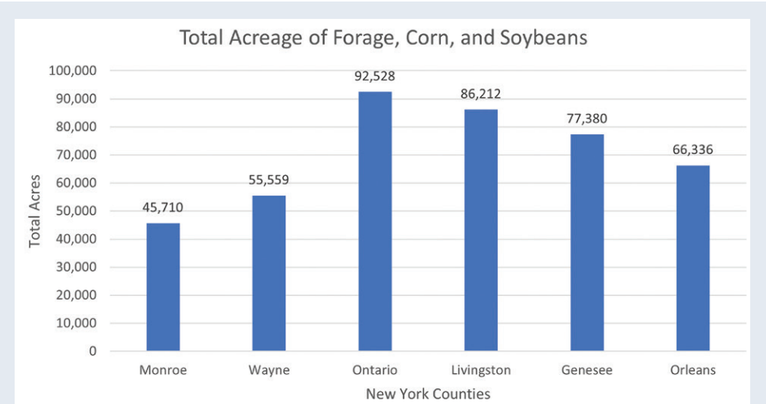


Figure 3. Acreage in feed crops that are commonly used for biosolids application in counties surrounding Webster. *Credit: Nickolas Hines*

Fertilizer Blending Market

The fertilizer blending market consists of blending dry fertilizer components at specified ratios to create bulk or bagged fertilizer products with specific nutrient content for distribution into the bulk agriculture, turf or landscape markets. The fertilizer blending market is typically a moderate value, large volume market.

Surveys with local fertilizer blenders confirmed strict market acceptance requirements related to the physical characteristics of a dried biosolids product. Specifically, the industry requires granules meet narrow particle size distribution measured using the size guide number (SGN) standard, with commonly accepted granule sizes ranging from 150 to 300 SGN (1.5 to 3 millimeters). Notably, biosolids that have been thermally dried via belt dryer technology will typically not meet those specifications without post-processing equipment such as a pelletizer.

Overall, the market outlet displayed potential with survey results indicating fertilizer blender familiarity and experience paying for and using biosolids in the region. However, additional considerations related to physical characteristic requirements were noted such as particle hardness, uniformity and dustiness.

Soil Blending Market

The soil blending market includes the production of manufactured soils that are distributed for use by contractors for construction and highway projects, landscape supply stores or nurseries. Depending on the application, soils must closely follow specifications (such as organic matter, soluble salts and soil texture) as directed by the customer. Biosolids are used to supplement or substitute for organic matter and nutrients. The soil blending market is only compatible with Class A/EQ biosolids products.

Locally, the soil blending market was determined to be large in size with survey results confirming interest in using dried biosolids for

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soil blending and/or distributing as a stand-alone product. Similar to the bulk agriculture market, surveys established a local demand for low-cost, local organic nutrients. The main consideration for the soil blending market determined from survey responses was the limited experience from market representatives working with or blending biosolids, leading to the conclusion that further market development may be required to ensure compatibility.

Turf Production Market

The turf production market is a specialized agricultural market that involves growing a stand of high quality turfgrass and harvesting the grass with the roots and a thin layer of topsoil. Biosolids replace/supplement conventional fertilizer, manure and compost to provide nutrients and organic matter.

While the turf production market has potential, initial research determined that the turf production in New York is limited, with less than 6,500 acres of sod harvested in 2019. Locally, two turf farms were identified as potentially viable with one farmer confirming interest. Notably, experience using biosolids for turf production was limited and, similar to the soil blending market, further market development may be required to confirm compatibility and acceptance requirements for biosolids products.

Golf Course Market

The last market included in the Market Assessment is biosolids used as fertilizer for golf courses. Golf courses take extreme care to manage the quality of the greens, fairways and overall landscaping to achieve the professional look demanded by the industry's customers. Biosolids replace/supplement conventional fertilizers or can be incorporated into soils during course reconstruction or re-establishment.

Golf courses are a high-value, low-volume specialty market available locally. The local golf course market is large in size, with 19 golf courses identified and contacted as part of the Market Assessment. Survey results confirmed strict physical characteristic requirements for biosolids use within the market due to high potential for human contact, with the main consideration confirmed to be granular size, uniformity and odor potential. Surveys with superintendents established the current use of common biosolids products such as Milorganite and a high level of interest in low-cost local nutrients.

However, despite the high level of interest, golf courses are low-volume users (less than 10 tons per course). Superintendents confirmed limited capacity to accept biosolids ranging from 1 to 5 tons per year, placing market capacity at less than 10% of Webster's annual production.

Market Assessment Outlet Ranking

In an effort to evaluate each market outlet surveyed throughout the Market Assessment, each outlet was scored relative to achieving success on a three-point scale, with 0 being the lowest score and three being the highest. Each market/product combination was scored relative to the individual market's level of interest, potential for revenue and capacity to accept the Town of Webster's product. Product scoring can be seen in ***Table 1.*** Notably, the final ranking is only applicable to the finished product and representative of market findings related to regulations, beneficial use and product management.

Scoring results show bulk agriculture, soil blending and fertilizer blending as the top-ranking market outlets for the beneficial use of thermally dried biosolids produced at the WRRF. Bulk agriculture was determined to be the high-ranking option for beneficial use due to number of acres available locally, high level of interest and the potential for revenue generation confirmed via surveys with farmers, third-party contractors and agriculture extension agencies.

The Market Assessment results led to the following recommendations:

- Conduct pilot testing of the selected drying technology to ensure local market acceptance.
- Increase biosolids storage to 30 to 60 days of on-site storage to increase program flexibility during seasons with low demand.

What's Next?

Following the initial Market Assessment completed by Material Matters, Navitas and Webster completed a secondary evaluation of the potential for outside cake receiving. This evaluation used updated costs for the equipment necessary for local market acceptance, as identified in the Market Assessment. A review of the regulatory landscape following updates from the New York State Department of Environmental Conservation was also undertaken and completed. This secondary evaluation concluded that outside cake receiving was no longer a viable option due to the estimated costs for market acceptance, the handling and processing of outside cake, and the potential impacts of updated state regulations.

Meanwhile, Coca-Cola's Fairlife subsidiary's decision to locate in Webster has shifted the focus from outside cake receiving to outside high-strength waste receiving. This opportunity added another facet to the Webster Asset Renewal and Wastewater Resource Recovery Improvements Project.

Construction of the Webster Asset Renewal and Wastewater Resource Recovery Improvements Project began at the end of 2023 with project completion anticipated for fall 2025. Once the project is completed, thermally dried biosolids will be available to local dairy farmers to close the loop on nutrient management.

Nickolas Hines is an environmental scientist with Material Matters who may be reached at nhines@materialmatters.com.

Table 1. Market Assessment summary of metric scores for Class A/EQ belt-dried granules.

Market	Metric Scores			Weighted Market Score	Market Outlook
	Level of Interest	*Potential Revenue*	*Capacity (%)*		
Bulk Agriculture	3	3	1	6	Excellent
Soil Blending	1.5	3	0.5	3.8	Good
Fertilizer Blending	1	3	0.7	3.7	Good
Golf Course	3	3	0.1	3.3	Good
TPC Management	2.5	0	1	2.5	Fair
Landfill Disposal	2.5	0	1	2.5	Fair
Turf Production	1	1	0.25	1.3	Poor
Disturbed Land Reclamation	0	0	1	0	Poor

Ranges for weighted market scores:
Poor = 0 to 1.5; Fair = 1.6 to 3; Good = 3.1 to 4.5; Excellent = 4.6 to 6

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TEAM NAME	POINTS	RANK
Brown Tide	467.07	1
Coyotes	432.47	2
Notorious BOD	363.23	3
Water Recyclers	343.20	4
Water Bears	342.71	5
Digested Dragons	314.38	6
Buffaflows	229.08	7

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ATAD REVIEW AFTER 10 YEARS OF OPERATION

By Tim Carpenter and Nick DeMaria

Photo: Nick Demaria

Photo 1. View of the City of Geneva WWTP ATAD Complex.

"OK–let me say it right up front: I was an ATAD skeptic, but the performance of the system installed 10 years ago at the Geneva WWTP has made me a believer," said Tim Carpenter.

Tim is the engineer and project manager for the current Autothermal Thermophilic Aerobic Digester (ATAD) Upgrade Project, currently in design for the City of Geneva Wastewater Treatment Plant (WWTP), where co-author Nick DeMaria is the chief operator.

The City of Geneva is preparing to expand the existing ATAD system to increase the WWTP capacity for future growth. ATAD systems are coming into more widespread use around New York state, so this is a good time to review some of the critical ATAD design and performance parameters and consider actual ATAD operation and performance experience over the past 10 years in Geneva.

Original ATAD Project History

The ATAD system (***Photo 1***) was retrofit into an existing anaerobic digester system, consisting of primary and secondary digester vessels, back in 2013. The ATAD retrofit required the following equipment to serve each vessel: mixing pumps, aeration blowers, foam suppression systems, sensors and control. An existing tank located at the WWTP had previously been used for an in-vessel composting operation and was retrofit into a biofilter to treat the ammonia-laden air generated in the head space of the ATAD vessels. The original ATAD project was completed under a performance contract process in 2013 and has been in successful operation ever since.

ATAD Basics

The ATAD process is becoming more common in New York state each year. The basics of the process begin with a thoroughly mixed aerobic digester vessel where primary and thickened waste-activated sludges (TWAS) are combined (***Figure 1***). The digester is fed once per day, allowing the aerobic microbes to convert the combined sludges into carbon dioxide, water and ammonia. The microbes also generate the heat required to maintain the temperature at 140°F to 160°F. Hydraulic residence time is approximately 10 to 14 days.

A portion of the digester vessel contents is transferred daily to the storage nitrification denitrification reactor (SNDR). The SNDR operates at approximately 100°F in an aerobic mesophilic range allowing continued digestion of the sludge, while the pH of the sludge is varied allowing nitrification and then denitrification to occur. This liberates the ammonia generated by the process to gaseous phase for efficient treatment in the biofilter. The SNDR hydraulic residence time is six to 10 days.

Periodically, material is transferred from SNDR to the dewatering belt filter press. The biosolids produced are Class A, due to the combination of heat and residence time in the digester vessel.

A supervisory control and data acquisition (SCADA) system allows operators to control the ATAD process. The SCADA system cycles the various pumps, blowers and foam suppression systems, as well as records the times and temperatures to verify the Class A status of the biosolids.

Geneva WWTP specifics:

- **6.0 million gallons per day (MGD) average daily design flow**
- **3.4 MGD actual 2023 average daily flow**
- **WWTP constructed 1978; anaerobic digesters 1982; in-vessel composter 1993**
- **Traditional activated sludge plant**
- **Produces about 1,700 tons of wet biosolids per year**
- **Former Part 360 permit for Class A compost**

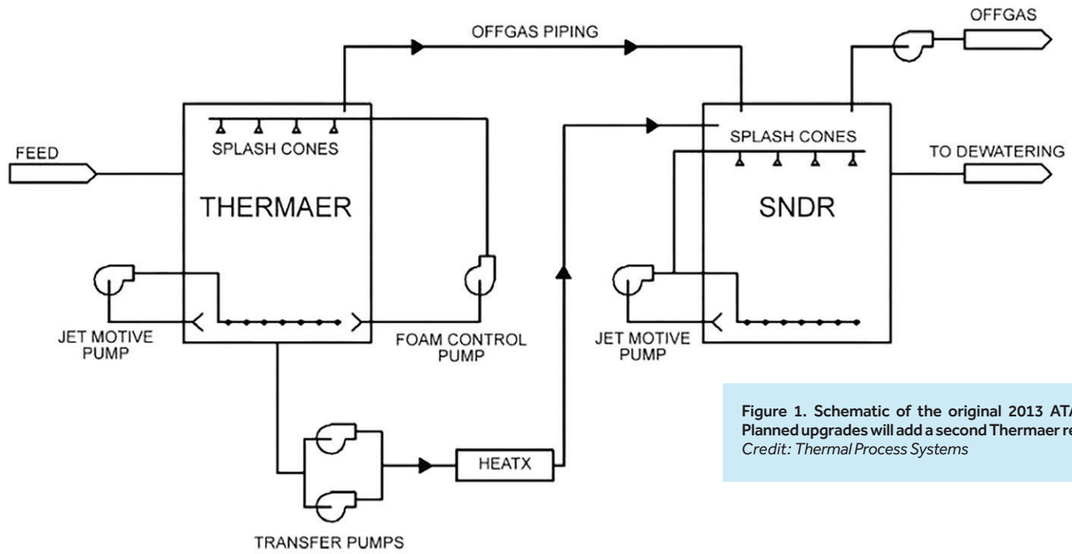

Figure 1. Schematic of the original 2013 ATAD system. Planned upgrades will add a second Thermaer reactor.
Credit: Thermal Process Systems

Actual Performance of Geneva ATAD System 2013-2023

After the system was installed in 2013, the WWTP operators spent some time learning how to run the ATAD system. Startup and operational support have been provided continuously by Thermal Process Systems of Crown Point, Indiana, which also provided the ATAD and SNDR equipment and process support. The performance of the system over 10 years has been excellent.

When the ATAD was first installed, the project team was unfamiliar with the technology and had the following concerns:

- ATAD feed management
- Reactor temperature stability
- Biosolids considerations
- Electrical usage

Once the project team had acquired some experience with the ATAD system, these concerns were addressed as described in the remainder of this article.

ATAD Feed Management

The system is designed to have an occasional, periodic feeding of sludge into the system, rather than multiple feedings over the course of a day. A once-a-day feed period is considered optimal and so the WWTP feeds primary sludge directly to the Thermaer reactor for about 60 minutes each day. Operators check the sludge blanket depth in the primary clarifiers (typically maintained at 6 to 12 inches) each morning and then feed the sludge.

The primary sludge is typically at 5% to 6% solids and needs no thickening prior to feeding. The amount of primary sludge fed is adjusted based on flows to the plant and special conditions as they arise, which is now well understood by operators. Operators simply adjust the amount of time that the sludge feed pump operates based on daily conditions.

TWAS is also fed daily, after mechanical thickening by a gravity belt thickener (GBT). The activated sludge system is typically operated with 5,000 milligrams per liter (mg/l) mixed liquor suspended solids (MLSS). The waste-activated sludge from the final clarifiers is typically at 10,000 mg/l prior to thickening. The GBT produces TWAS at 4% to 5%, which is then fed into the Thermaer reactor. TWAS sludge feeding to the Thermaer reactor typically happens each morning after the primary sludge feeding period is complete. TWAS feeding takes about an hour and so new sludges are added to the Thermaer reactor for about two to three hours each day.

Operators found that it is important to keep the feeding time to a minimum since the newly added sludges decrease the temperature in the Thermaer reactor. After addition, the temperature rises over a couple of hours back into the target range of 140°F to 160°F. The heat needed to achieve and maintain 140°F to 160°F in the Thermaer reactor is generated by thermophilic bacteria and no outside heat source is required (even at startup). The temperatures are monitored by the SCADA, so that the sludge always exceeds the time and temperature combination required to qualify the product as a Class A biosolid per New York state solid waste regulations (***Figure 2***).

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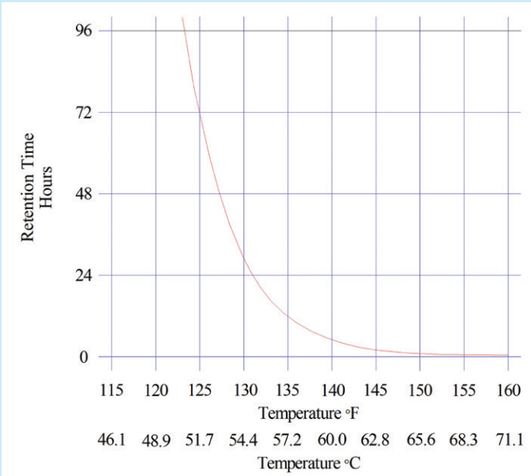


Figure 2. This chart shows the relationship between retention time and temperature for solid waste pathogen reduction. The higher the temperature (x-axis) the shorter the retention time (y-axis). The curve is based on the New York state solid waste pathogen reduction equation found in NYCRR Part 360.
Credit: Thermal Process Systems

Photo 2. The Class A biosolid end product of the ATAD system ready for shipment to a local farm for use as a soil amendment. *Photo: Nick Demaria*

Continued from Page 53

Daily feeding allows the temperature to recover and then remain steady for 18 to 22 hours per day, far exceeding the five hours at 140°F minimum requirement for pathogen control for Class A biosolids. This provides a documented margin of safety.

Reactor Temperature Stability

The ATAD is a thermophilic process operating at 140°F to 160°F, compared to the more traditional anaerobic digesters that operate in the mesophilic range at 95°F to 100°F. The thermophilic bacteria are already present in the sludges and thrive in the Thermaer reactor when significant mixing energy and aeration are maintained within a narrow band.

A high level of process control is required to maintain these favorable conditions but has not proven to be difficult. Instruments in the Thermaer reactor constantly measure temperature, oxidation reduction potential (ORP), pH and foam levels. The mixing energy added is adjusted via variable speed jet mixing pumps, while the air flow is controlled via variable speed positive displacement blowers. The temperature is controlled via sludge to WWTP effluent heat exchangers. Since the thermophilic bacteria generate more heat than is needed to maintain the process, some heat is wasted to the WWTP effluent.

This advanced level of control is much more complicated than was needed for the previously operated anaerobic digesters at the site (which had no aeration or mixing and only required temperature adjustment via boilers). The ATAD control process has proven to be reliable and automatic, so that the operators monitor the system via the WWTP SCADA system, but rarely have to make ATAD process adjustments.

A system programmable logic controller (PLC) was provided by the primary ATAD equipment supplier at the time of installation in 2013. This PLC adjusts mixing energy, aeration and heat exchange to maintain optimal conditions in the Thermaer reactor.

Biosolids Considerations

Prior to the ATAD installation in 2013, the WWTP generated approximately 3,360 wet tons per year (TPY) of Class B biosolids dewatered to 17% solids. These biosolids were largely sent to the local landfill for disposal. After the ATAD installation, total annual tonnage of biosolids generated dropped to 1,715 TPY and these biosolids were much drier at 23% solids. The net reduction of 570 dry TPY (prior to ATAD) to 394 dry TPY (after ATAD) is a 30% reduction in total solids production and demonstrates that the ATAD process converts much more of the sludge solids than the previous anaerobic process did. Wet tonnage reductions are even better—49%—due to the increased dewatering efficiency associated with the ATAD digested solids (***Photo 2***).

The ATAD end product also has the advantage of being a Class A biosolid. When the ATAD was first installed in 2013, the local market for Class A biosolids was only just beginning to develop. End users had no familiarity with using WWTP generated biosolids for landscaping, soil amendments on cropland, or other uses that might bring the products in contact with people or the food supply. The Class A biosolids were accepted by the local landfill as a soil amendment for cover and several local farms were willing to accept the product as a soil amendment.

The Class A biosolids market is much stronger in 2024. The ATAD Class A biosolids are now more readily accepted by local landscapers, farms and landfills. Geneva WWTP Chief Operator Nick DeMaria reports that in 2022 and 2023 almost all the biosolids generated were put to some type of beneficial reuse. The City of Geneva is still transporting some of the biosolids to end users who will accept it for free but require the city to deliver it.

When compared to the pre-ATAD disposal costs, which included both transportation and tipping fees, the annual savings to the city are very significant. The current 1,715 wet TPY would cost over $100,000 per year at a combined transportation and tipping fee of $60 per wet ton. Current annual transportation costs for the small amount of ATAD biosolids that the city transports are approximately $15,000 and are expected to be eliminated in the next year or two as the local market for the product continues to improve.

Photo 3. The Thermaer mixing pump typically runs constantly to keep the reactor thoroughly mixed, creating the largest electrical load of the ATAD system. *Photo: Tim Carpenter*

Electrical Usage

The ATAD process uses significant amounts of electricity for aeration, tank mixing, foam suppression and biofilter operation (***Photo 3***). The total annual electrical cost for the system is currently estimated at $72,000 per year (at $0.07 per kilowatt-hour). This estimated total energy cost is similar to the estimated total energy cost for an anaerobic digester system sized for the same solids handling capacity.

Summary

Ten years of successful operation have proven that the ATAD technology was a great choice for the City of Geneva WWTP. The process is fully automated and requires daily operator monitoring but very little adjustment or control.

Tim Carpenter, P.E., lead author, is the Syracuse operations manager with MRB Group Engineering, Architecture and Surveying, D.P.C., who may be reached at tcarpenter@mrbgroup.com. Nick DeMaria, co-author, is Grade 4A chief operator for the City of Geneva Wastewater Treatment Plant, who may be reached at nDeMaria@Geneva.ny.us.

CHIEF OPERATOR NICK DEMARIA REFLECTS ON HIS DECADE OF EXPERIENCE WITH ATAD:

Our belt filter presses work much better on the ATAD digested sludge than they did on anaerobically digested sludge. Labor, chemical usage and polymer usage have each decreased by about half, which is a big deal for us.

The process is robust and has worked well through high- and low-flow periods, high solids loading periods, and during occasional upsets at the plant.

Our only process control interaction is to decide how much sludge to feed to the ATAD system each day and how many gallons of Class A material to transfer from the ATAD to the SNDR. We monitor temperature, aeration and pH on our SCADA system and there are very few times when we have to make adjustments.

The elimination of the anaerobic digester and the associated hazards of flammable and explosive gases is a big improvement for us; that was always the biggest hazard we had at the plant.

Interest in receiving our biosolids is growing each year and has allowed us to almost eliminate hauling and tipping fees, which I hope will approach $0 in 2024.

Outputs from FLG Process

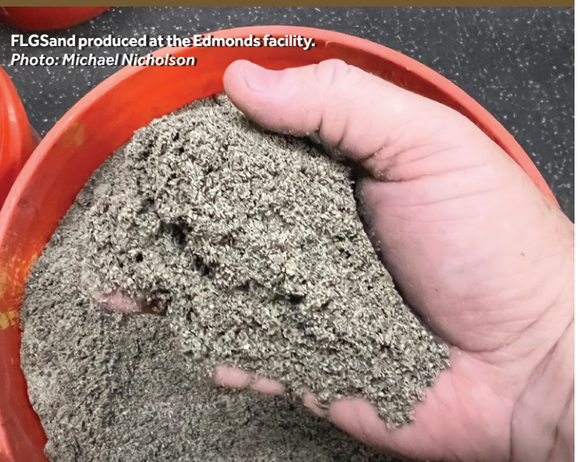
Syngas—Produced in gasifier and then converted to heat in the Thermal Oxidizer then used to dry the biosolids in dryer.

Residual from gasifier—FLGSand or Flexchar

Class A-EQ biosolids—May be produced if more energy is provided than needed.

Key Gasification Platform Attributes

- **Production of 100% renewable energy (syngas)**
- **Syngas produced is used for drying and offsets $18-$30 a wet ton of cost for natural gas**
- **Greater than 92% mass reduction (i.e., 100 tons per day of cake to less than 8 tons per day of gasifier residual)**
- **Destruction of PFAS in gasifier residual (FLGSand or Flexchar)**
- **Destruction of microplastics**
- **Not subject to sewage sludge incineration (SSI) regulations**
- **Product regulated as Class A EQ (metals must meet 40 CFR Part 503 Table 3 pollutant limits)**
- **Horizontal and vertical layouts to meet site-specific characteristics**
- **Systems made in the USA**



FLGSand produced at the Edmonds facility. *Photo: Michael Nicholson*

FOR THOSE OF US DISCUSSING BIOSOLIDS IN ELEVATORS

By Michael Nicholson

Ecoremedy Gasifier. *Photo: Kelly Mooney*

Last fall I attended the New England Biosolids and Residuals Association fall meeting in Portsmouth, New Hampshire. The conference was excellent, well attended and the technical sessions were very interesting. Many topics were reviewed and any technical presentation that did not include the topic of PFAS was very much appreciated. But ultimately, the topic of PFAS had to be considered and was done so, thoroughly and ad nauseam. The session ended with a panel discussion, at which time the following question was asked:

"If you were on an elevator ride and had three minutes to explain what the answer for biosolids management in the Northeast would be in the next five years, what would be the message?"

This was the billion-dollar question, and it was pretty much left unanswered. The current market issues were very well vetted and include but are not limited to:

- Regulatory actions
- Landfill and incinerator limitations
- Costs
- Carbon reduction
- Exportation

Regulatory actions include reducing or banning the use of biosolids in agriculture, and banning or restricting the use of biosolids in landfills. Landfill limitations come in the form of restrictions on the amount of biosolids received due to physical characteristics of dewatered biosolids. Landfills are now asking for more than 750 PSI plasticity index for dried or soil stabilized materials. As for incinerators, there's only so much available capacity. Capacity and the cost of existing in-state and out-of-state/out-of-region options, including fuel costs, are limiting factors. Hauling and disposal costs are in the range of $100 to $230 per wet ton, and costs are climbing. Exportation of biosolids to Canada, as well as carbon reduction goals, are also current market issues that were discussed at the conference.

To further understand and address these issues, I ask the following questions:

- What technologies are available to address the issue of PFAS and other contamination like microplastics?
- Will the technology address the PFAS in the product?
- Will the technology address the PFAS in any off-process streams (i.e., air and water)?
- If a contaminant cannot be destroyed, can the process concentrate the contaminant to reduce or eliminate disposal cost?
- Is there a process that can reduce the mass or volume of the biosolids by 90%, while utilizing the energy value in the biosolids?
- Incineration used to work well for most of these issues. Are there technologies that perform like incineration with a cleaner emission?
- Are there technologies that are recognized as non-incineration, and can I regulate the product as Class A, exceptional quality (EQ) product?

When you list the challenges facing our industry, gasification and pyrolysis technologies check all the boxes as effective biosolids solutions, including destruction of PFAS and microplastics at high temperatures.

Ecoremedy's Fluid Lift Gasification (FLG) system is a biosolids management platform that gives the operator the flexibility to either maximize energy conversion, energy use in-situ and mass reduction, producing a low-carbon product called FLGSand, or "Flex" the operation to produce Flexchar, a product with higher carbon content. The decision to produce Flexchar is based upon market conditions, which optimize the monetary value and environmental attributes of carbon. A bit of a mouthful, but operationally, a push of a button.

Projects using gasification and pyrolysis technologies are being developed across the country, including multiple projects being operated by Ecoremedy on both sides of the U.S. in 2024. The City of Edmonds, Washington, will receive its new facility in the first quarter of 2024; Ecoremedy has been successfully operating the facility through its commissioning phases since August 2023. Another facility will be running in Hershey, Pennsylvania, by the fourth quarter of 2024. Other gasification and pyrolysis projects are equally seeing success and commissioning.

By now, you may have figured out that I may be slightly biased

Continued on Page 58

FLGSand, with a pen for scale. *Photo: Kelly Mooney*

Pellets and ash. *Photo: Kelly Mooney*

Continued from Page 57

about a particular technology! I have spent 33 years in the wastewater industry, and I have not seen such urgency regarding the need for biosolids management options since the mad rush to get out of the ocean by Dec. 31, 1991. But as an industry, we got out of the ocean! And now we are implementing commercially available technologies to bring biosolids management into the future.

West Coast

On the West Coast, the Edmonds Project was purchased by the City of Edmonds, Washington, under an energy services performance contract through Ameresco. Located near Seattle, the 11.8-million-gallon-per-day wastewater treatment facility (WWTF) can process up to 14,250 wet tons per year of dewatered sludge into FLGSand or a higher carbon content Flexchar, with excess thermal energy used for plume abatement. Ecoremedy was the most cost-competitive thermal treatment among the technologies evaluated by the city. The project passed the city council unanimously in the second quarter of 2020, and engineering and fabrication were completed a year later.

During the air permitting process with the Puget Sound Clean Air Agency and the U.S. Environmental Protection Agency (USEPA), Ecoremedy received a technology-wide determination from USEPA that the patented process is not subject to the Sewage Sludge Incineration (SSI) Rule.

The incinerator decommissioning and demolition was complete by the end of 2021. This was a challenging process given that the WWTF is located in an urban setting. Ecoremedy was able to build the FLG process within the existing space of the former incinerator at the facility. The small incinerator room (56 feet long by 39 feet wide by 37 feet tall) is below grade, and the only access is an opening in the wall facing a four-lane road, including a ferry terminal lane. Mechanical and electrical installation of the FLG process, including all gasification, thermal oxidation, drying, material handling, and air emission control equipment was largely completed in 2022.

As of May 1, 2024, the Edmonds project is completing the requirements for commissioning, training and performance testing. Highlights for the project include:

- Confirmation of regular operations using 100% renewable biosolids energy (RBE).
- Confirmation of mass and volume reduction greater than 92%.
- Documentation of the presence of PFAS in the City of Edmonds biosolids and the successful destruction of PFAS in the resulting residual FLGSand.
- The successful testing of stack emission per the requirements of the Puget Sound Clean Air Agency and the USEPA.
- The successful testing of air and water emissions for PFAS.

East Coast

On the East Coast in 2022, Derry Township Municipal Authority in Hershey, Pennsylvania, purchased the refurbished, previously demonstrated Ecoremedy system, which operated for two years at the Morrisville Municipal Authority WWTF in Morrisville, Pennsylvania. Leveraging past commercial successes with gasification and drying of manure-based feedstocks, Ecoremedy designed, built, owned, operated and maintained the system during the demonstration in Morrisville until the demonstration concluded in 2021.

The Derry Township Municipal Authority plans to complete installation of the FLG process during 2024, followed by commissioning and full-scale operations by the utility's existing staff. The WWTF already accepts organic waste from industrial and municipal sources, with a co-digestion and combined heat and power (CHP) project recently commissioned. Once the drying and gasification system is operational, the utility plans to receive additional waste streams in the future, with up to 75 wet tons per day of digested sludge processed by the Ecoremedy system.

Thermal treatment of PFAS is a major project driver. During the demonstration in Morrisville, 36 PFAS compounds were each reduced to nondetect levels (less than 2 parts per billion), from a cumulative sum of 100 parts per billion of PFAS in the incoming pressed sludge. PFAS is treated through 60- to 90-minute residence times at over 1,500 °F in the gasifier and combustion of syngas at over 2,000 °F in the thermal oxidizer.

Insight from the demonstration project informed the design of modular, pre-engineered, pre-wired, skid-mounted drying and gasification units capable of processing 15 to 30 wet tons per day of dewatered municipal sludge. These systems are now being evaluated by multiple wastewater utilities here in the U.S. and internationally.

Ecoremedy's autothermal gasification and drying system uses the incoming dewatered sludge as the sole energy source and the energy demand. The solids component of the biosolid provides the carbon (energy source) and the water component requires evaporation (energy demand). Typical natural gas cost for biosolids drying is $18 to $30 per wet ton of cake dried from 20% to 95%. The gasification system is offsetting this cost by replacing natural gas with syngas. This is a reduction of the annual operating cost for drying by 40% to 60%. That's big!

Elements of the FLG Platform

Fluid Lift Gasifier

The Ecoremedy gasification platform is elegant in its simplicity. We have combined off-the-shelf, commercially available components with time-tested practices to create a unique gasification method and apparatus (U.S. Patent 6,948,436 B2). Precision air control technology combined with infinitely variable feed rates in a horizontal configuration drives the slow, calm gasification process. The quiescent bed ensures consistent syngas production and low fly ash carry-over, assuring continuous and efficient energy production from a wide variety of waste materials.

Thermal Oxidizer and Heat Exchanger

The thermal oxidizer is the combustion chamber where syngas is blended with a predetermined amount of air and ignited to generate heat in the range of 2,000 to 2,200 °F. The oxidizer feeds the heat exchanger. The air-to-air heat exchanger is used to regulate the temperature of air entering the dryer and for process energy needs such as plume abatement or water heating.

Rotary Dryer Systems and Emissions Control

The rotary drum dryer is commercially produced by a manufacturer with extensive experience serving the industrial and municipal sludge markets. The dryer is fed dewatered material at an operator-adjusted rate. The dryer will be controlled automatically via the programable logic controller (PLC). The operational capability of the dryer is 24 hours per day, seven days per week.

The air within the dryer serves as the motive force for the biosolids through the dryer vessel. The necessary thermal energy to perform the evaporation within the dryer comes from the gasifier/oxidizer system and is exclusively produced from the energy within the biosolids. Once the biosolids reach programmed dryness, the solids and process air exit the dryer and are separated in the product collection chamber where the dried biosolids are collected and transferred to a conveyor and the process air is directed to a series of separators for dust removal.

Flue Gas Conditioning (Emissions Control)

A cyclone or multiclone removes particulates from the air stream and returns the captured particles to the system for reuse. Scrubbers further condition the flue gas stream to prepare for the flue gas entry and exit of the heat exchanger. Water conditioning chemicals for oxidation reduction potential (ORP) and pH can be added to this equipment. Removal of sulfur compounds (hydrogen sulfide and sulfuric acid) has two benefits. The first benefit is to prevent corrosion attack on the downstream heat exchanger tubes, and the second benefit is odor removal.

The fugitive dust baghouse captures dust from all dry conveyance and material metering bins. The baghouse discharges the collected dust into the wet sludge cake bin to return all material to the process. The particulate-free exhaust from the dust collector is utilized to control relative humidity entering the carbon filter, if incorporated. By utilizing the baghouse exhaust in this manner, we consolidate all air emission points to the single process vent at the carbon filter outlet.

Material Handling System

All equipment components are connected by a material handling system comprised of enclosed conveyors, bucket elevators, bins, a primary mixer for biosolid and recycle material blending, and any secondary mixers required for additional feedstocks such as screenings or grit. All material handling equipment is industry standard for the application and will include ultra-high molecular weight (UHMW) polyethylene liners where appropriate.

Process ID Fans

The ID fan provides air movement throughout the system as required and is automatically controlled to maintain a predetermined draft within the system.

PLC Control System using Allen Bradley Components

The control systems will monitor and automatically control the process and will be designed to interface with the client's supervisory control and data acquisition (SCADA) system as required. Motor starters and variable frequency drives (VFDs) are included in this scope of supply.

Residual Distribution and Marketing

The resulting FLGSand or Flexchar will be the predominant residual from the process. Currently FLGSand is being produced in Edmonds, Washington. The material meets the criteria for Class A and EQ biosolids (meaning the metals meet 40 CFR Part 503 Table 3 for pollutant limits). We anticipate PFAS data to be generated in January and February. The material is under evaluation by several topsoil and soil amendment managers in the Seattle region. The product has further been evaluated by other soils companies. Ecoremedy provides marketing and distribution support for the residuals produced from the process.

Conclusion

I am not sure this story can be told in a three-minute elevator ride! But if we were to meet in an elevator, and you asked me, "What is the answer for biosolids management in the Northeast in the next five years?" I would say:

"A company developed a platform or 'magic green box' that will treat biosolids. Inside the magic green box, renewable free energy is extracted from the biosolids through a gasification process producing heated hot air. The heated air produced is then used to dry biosolids. This alternative to using natural gas as a fuel, significantly reduces the operating cost of the system. This combination of gasification and drying reduces the mass and volume of the biosolids by more than 92%. The resulting product does not contain PFAS or microplastics because they are destroyed at high temperatures. The resulting Class A and EQ product has the characteristics of sand that can be used a sand alternative or blended into local topsoil for distribution and marketing. The platform can also 'Flex' or be operated to produce a product with higher concentrations of carbon for monetary or other environmental attributes. Here is my business card, please call me if you would like to hear more or see a facility."

Michael Nicholson is the vice president of sales and development for Ecoremedy, who may be reached at mnicholson@ecoremedyllc.com. Ecoremedy's website is www.ecoremedyllc.com. FLGSand and FlexChar are Ecoremedy trademarks.

Thermal oxidizer.
Photo: Kelly Mooney

Allen Bradley control board.
Photo: Kelly Mooney

Ecoremedy direct rotary dryer.
Photo: Kelly Mooney

SCAN FOR PIC ARCHIVE

2024 Spring Meeting

L-to-R: Mike Hoyt, Donna Grudier, Gregg Palmer, Lisa Derrigan, Lauren Livermore and Bill Nylic.

Custom-made first place trophies courtesy of Billy Grandner.

All Photos: Trent Wellott

Alvin Montana aims true and drops a colleague in the drink.

Chris Korzenko sharing his knowledge of wastewater processes with students from Buffalo.

Rick Roll leading a tour of the Niagara Falls Water Board.

OPERATION SOS
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SUPPORT OPERATOR SCHOLARSHIPS

Mark Koester, poses with Donna Grudier, after reapportioning the Michelle Koester Scholarship for Operation SOS.

Wayne LaVair.

Lauren Sternberg.

Lucas Kasperowicz.

The pipe cutting event was a big hit, helping to raise money for Operation SOS.

All Photos.

InFlow scholars pose with NYWEA members Nadia Mugisha (far left) Regina Harris and Madision Quinn (far right).

InFlow

SPRING 2024 – BIOSOLIDS

The following questions are designed for individuals/trainees pursuing certification as they prepare to take the ABC wastewater operator test. It is also designed for existing operators to test their knowledge. Each issue of *Clear Waters* will have more questions from a different process of wastewater treatment. Good luck!

1) What is a typical ORP for an anerobic digester?

A) 200 – 300 mV
B) 50 – 150 mV
C) -50 – -150 mV
D) -200 – -400 mV

2) What is the primary function of polymer in the dewatering process?

A) To decrease solids content
B) To disinfect the sludge particles
C) To adjust PH
D) To make water easier to separate

3) Calculate the pounds of polymer per dry ton of solids if a properly operated centrifuge is being fed 190 GPM of sludge at 3.2% TS and 40 GPM of polymer at a concentration of 0.4%.

A) 47 lbs/DT
B) 50 lbs/DT
C) 53 lbs/DT
D) 58 lbs/DT

4) What is the cause of a "sour" digester?

A) Sludge temperature swings less than 1°F per day
B) Sludge feed rate too high
C) Sludge feed rate too low
D) High alkalinity in the sludge

5) To meet the biosolids requirement for reducing vector attraction you must meet ____ % reduction in volatile reduction.

A) 26%
B) 38%
C) 44%
D) 58%

6) What are two of the reaction-forming stages of anaerobic digestion?

A) Volatile solids and total solids
B) Foam and oxygen
C) Acid and methane
D) Nitrogen and methanol

7) Feed solids to an anerobic digester contain 80% volatile solids and the digested solids contain 55% volatile solids. What is the volatile solids reduction?

A) 58%
B) 25%
C) 69%
D) 31%

8) Which digester, in a two-stage anaerobic digestion process, is normally not mixed and/or heated?

A) Primary digester
B) Secondary digester
C) Neither is normally mixed or heated
D) Both are normally mixed and heated

9) What is a typical range for gas production in a properly operated anaerobic digestion process?

A) 1 to 2 ft3 per lb VS reduced
B) 5 to 7 ft3 per lb VS reduced
C) 11 to 20 ft3 per lb VS reduced
D) 40 to 60 ft3 per lb VS reduced

10) The density of fecal coliform in Class A biosolids must be less than?

A) 1,000 MPM per gram TS
B) 1,000 Colonies/100ml
C) 10,000 MPM per gram TS
D) 100 Colonies/100ml

Answers:

1) D: -200 – -400 mV
2) D: To make water easier to separate
3) C: 53 lbs/DT
4) B: Sludge feed rate too high
5) B: 38%
6) C: Acid and methane
7) C: 69%
8) B: Secondary digester
9) C: 11 to 20 ft3 per lb VS reduced
10) A: 1,000 MPM per gram TS

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Biological Agents Webinar

July 16, 2024 12:00PM - 2:00PM
2.0 RTC (requested)
Instructor: Nellie Brown
Location: Virtual

Wastewater Microbiology - 3 Sites w/Virtual Instruction

July 22, 2024 8:00AM - 1:00PM
4.0 RTC (requested)
Virtual Instructor: Ryan Hennessey
4 Locations : Van Lare WRRF, Rochester NY;
Bergen Point WRRF, West Babylon NY;
New Rochelle WRRF, New Rochelle, NY;
Koester Associates, Canastota, NY

Disinfection Alternatives

August 13, 2024 8:00AM - 12:00PM
4.0 RTC (requested)
Instructor: Sal Adamo & Louis Finelli (NJ based)
Location: Bergen Point WRRF, West Babylon NY

PFAS Webinar

October 17, 2024 12:00PM - 2:00PM
Instructor: Laura Stock
Location: Virtual

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