# Mid Atlantic Biosolids Association 2021 Annual Meeting

## Focusing on Resilience in our Biosolids Programs

November 17, 2021
Wilmington, Delaware

The Mid Atlantic Biosolids Association Programs committee welcomes you to the 2021 Annual Meeting.

The program focuses on aspects of biosolids treatment and use that advance the principle of resiliency. Preparing biosolids products that have to meet the expectations of multiple customers results in a resilient utilization program. Optimizing the utilization of capital equipment in a way that captures revenue and reduces expenses results in a resilient operational program. As biosolids managers, we can direct our programs toward resiliency by being on top of issues of changing regulation of soils and nutrients, of emerging concerns for organic microcontaminants such as PFAS, and of growing public expectation that we respond to climate and ecosystem deterioration.

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# Mid Atlantic Biosolids Association Program

## Morning Session

**Moderator:** Micah Blate, Hazen and Sawyer

Welcome and Seminar Purpose/Overview
Bill Toffey, MABA

Think Regionally, Act Locally: Planning for Biosolids Resilience
Mary Strawn, Arlington County

Using Customer Feedback as a Guide for Selecting a New Solids Handling Technology for Kent County, DE
DJ Wacker, RK&K

Enhanced Pasteurization in Morehead City, NC
Carolyn Christy, RDP

State of the Science for Microplastics in Biosolids
Cayla Cook, Carollo

The Impact of PFAS on Municipal Utilities and Biosolids Management: A Cost Analysis
Peter Loomis, CDM Smith

Innovative Approach to Biosolids Management
Ricardo Bernal, Heartland Water Technology

## Afternoon Session

**Moderator:** DJ Wacker, RK&K

Turning Exceptional Quality Biosolids into a Marketable Product
Malcolm Taylor, WSSC

Can THP Biosolids Be Composted? Why Even Consider It?Lessons From the First-Ever Full-Scale Pilot
Sebastian Smoot, HDR

Most Efficient and Economical Method to Produce High Solid Cake
Abis Zaidi, Schwing Bioset

Innovative Solids Thickening Approaches to Maximize Resource Recovery, Increase Digestion Capacity, and Reduce Operating Costs
Becky Luna, Carollo

How to Take Advantage of Excess Digester Capacity
Micah Blate, Hazen and Sawyer

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# PRESENTATIONS AND SPEAKERS

*Think Regionally, Act Locally: Planning for Biosolids Resilience*
Mary Strawn, Arlington County

**Mary's Bio**
Mary Strawn is Chief Engineer at the Arlington County Water Pollution Control Plant, where she manages the Engineering Programs section, which is responsible for implementing the capital program and maintaining the facility's process control system. She previously worked for the Water Environment Research Foundation as a program manager for wastewater research. She has a BS from Rensselaer Polytechnic Institute and a Master's from Virginia Tech.

*Using Customer Feedback as a Guide for Selecting a New Solids Handling Technology for Kent County, DE*
DJ Wacker, RK&K

**DJ's Bio**
DJ is a Project Manager at RK&K and has 10 years of professional experience concentrated in the study, design, construction and start-up of wastewater treatment plants. He has a bachelor's degree in physics and a master's degree in environmental engineering. His biosolids experience ranges from thickening and dewatering to conventional anaerobic digestion, two-phase digestion, biogas utilization and thermal drying. DJ is a licensed Professional Engineer in five states and is a MABA board member.

*Enhanced Pasteurization in Morehead City, NC* Carolyn Christy, RDP

**Carolyn's Bio**
Carolyn has serves as Research and Technical Sales Support at RDP Technologies for over 6

years. She holds a bachelor's degree in Environmental Earth Science from California Polytechnic State University-San Luis Obispo.

*State of the Science for Microplastics in Biosolids*
Cayla Cook, Carollo

**Cayla's Bio**
Cayla is the Microplastics Lead, Southwest Deputy Regional Carollo Research Group (CRG) Lead, and Microconstituents Community of Practice Chair with more than 7 years of experience studying the intersection of polymer science and water resources. She spearheads all micro-and nanoplastic-related efforts at Carollo for water, wastewater, and biosolids. Her experience includes extensive water quality analysis, process design, process analysis, and operations manuals for both water and wastewater treatment facilities.

*The Impact of PFAS on Municipal Utilities and Biosolids Management: A Cost Analysis*

Peter Loomis, CDM Smith

**Peter's Bio**

Peter is Vice President with CDM Smith in Fairfax, VA. With project tasks ranging from wastewater and biosolids treatment plant planning to design, construction management and operations, Peter has contributed to the success of some of CDM Smith's most impactful wastewater projects. As the project manager and commissioning manager for the DC Water project, Peter led the design and start-up teams to deliver a $215 million facility that lowered operating costs, reduced the facility's carbon footprint and improved energy efficiency

*Innovative Approach to Biosolids Management*

Ricardo Bernal, Heartland Water Technology

**Ricardo's Bio**

Ricardo is the Business development director with Heartland Water Technology and has 25+ years of experience in the water industry; He has held different roles from Engineering, Product

Management, Business Development to Business Strategy. He has worked as Business Developer, and Project Developer in the USA and abroad; Currently, he is responsible for business strategy and Biosolids Market for Heartland Water. He had responsibilities for project financing on BOO/BOOT structures and O&M contracts in multiple regions. Previously, he was responsible for business development for Industrial Water for Jacobs O&M group worldwide.

*Turning Exceptional Quality Biosolids into a Marketable Product*

Malcolm Taylor, WSSC

**Malcolm's Bio**

Dr. Malcolm Taylor is a principal Environmental Engineer with the Washington Suburban Sanitary Commission. His work focuses on optimization of advanced wastewater treatment processes and promoting the beneficial reuse of biosolids. Before coming to WSSC Malcolm earned his PE as an engineering consultant and taught at Penn State University where he received his PhD in Agricultural and Biological Engineering. In his spare time Malcolm enjoys surfing &snowboarding, golf, and mountain biking. Malcolm also serves as the vice-chair of the Ocean City, MD Chapter of the Surfrider Foundation and is dedicated to promoting

environmental stewardship and protecting clean water and healthy beaches.

*Can THP Biosolids Be Composted? Why Even Consider It? Lessons From the First-Ever Full-Scale Pilot*

Sebastian Smoot, HDR

Sebastian Smoot graduated from one of America's top engineering schools with really good grades. In his role as a process engineer at

HDR, Sebastian helps public utilities implement safe, reliable, cost-effective, and environmentally friendly solutions for converting sludge into valuable end products. He generously feeds biosolids to his houseplants but sometimes forgets to water them.

*Most Efficient and Economical Method to Produce High Solid Cake*
Abis Zaidi, Schwing Bioset

**Abis' Bio**
Abis Zaidi is a Regional Sales Manager at Schwing Bioset Inc, which is known as the market leader in solids handling for more than 30 years. He completed his master's degree in Mechanical Engineering from Concordia University, Montreal, Canada in 2013. Since then, he has worked on countless projects with world-known consulting firms to reduce the operation and maintenance cost at hundreds of municipalities in North America by improving and optimizing their processes.

*Innovative Solids Thickening Approaches to Maximize Resource Recovery, Increase Digestion Capacity, and Reduce Operating Costs*
Becky Luna, Carollo

Ms. Luna is a Senior Vice President and Project Manager with Carollo Engineers. She obtained a B.S. in Civil Engineering and an M.S. in Civil and Environmental Engineering from the University of Illinois at Urbana-Champaign. Becky has 19 years of experience in the evaluation, design, and construction of municipal wastewater treatment facilities. Her primary areas of focus have been in solids handling and biogas facilities.

*How to Take Advantage of Excess Digester Capacity*
Micah Blate, Hazen

**Micah's Bio**
Micah is an associate for Hazen and Sawyer, located in their Philadelphia office, and is a licensed PE with 10 years of experience focused in biosolids and wastewater process. Micah serves as Hazen's NE Region Biosolids Lead. Micah received a BS in Civil Engineering from the University of South Florida, a Masters in Environmental Engineering from the Johns Hopkins University, and is currently pursuing a PhD in Environmental Engineering at Drexel University. He has assisted utilities throughout the US and Canada with process modeling, process upset, optimization, planning, feasibility, study, and design of wastewater and biosolids facilities.

## SUBMITTED PAPERS

**Think Regionally, Act Locally: Planning for Biosolids Resilience**

Mary Strawn, City of Arlington; Allison Deines, AlexRenew; Maureen O'Shaughnessy, PWCSA; Lori Stone, Black & Veatch

In 2018, the National Capital Region experienced the wettest year on record. The volume of precipitation and a period of sustained cold weather disrupted biosolids land application in the region, forcing water resource recovery facilities (WRRFs) to quickly find alternatives, such as landfilling or onsite storage. This challenge highlighted the need for increased redundancy in local biosolids programs and a desire to better understand available regional options for storage, processing, and hauling as well as future opportunities to strengthen these networks. Loudoun Water, Prince William County Service Authority, Upper Occoquan Service Authority, DC Water, Arlington County, Fairfax County, WSSC Water, and Alexandria Renew Enterprises have formed a regional work group with the ultimate goal of developing a technically based, practical framework to provide greater regional redundancy and resiliency.

Currently, the eight regional WRRFs operate individual biosolids processing facilities that are subject to emergency and planned outages as well as capacity limitations. The regional work group is developing a framework to allow for short-term transfers of thickened and/or dewatered wastewater solids from one facility to another for storage or treatment during transient events while fully respecting regulatory limitations and potential risks and ensuring an equitable financial arrangement is in place. The initial phase of this collaboration is expected to lead to agreements for plant-to-plant processing in emergency situations and further regional collaboration.

This presentation will cover the determinations of the work group to date, including discussion of the following:

- Definition of needs and current capacity to haul, process, and store biosolids at the representative WRRFs;
- Costs and transfer options among the WRRFs to transfer and receive both liquid sludge and dewatered cake;
- Potential hurdles to regional management;
- Regulatory and permitting issues associated with the interagency transfers, including interstate permitting;
- Surveys of interjurisdictional partnerships and agreements that could be used as mechanisms to provide services between jurisdictions;
- Conceptual management strategies to increase the redundancy of biosolids programs at a local level and regional resilience; and
- Future research.

**State of the Science for Microplastics in Biosolids**
Cayla Cook, Carollo

Microplastics (MPs), polymeric particles which occur at a size range between 5,000 µm and 1 nm per regulatory definition by California State Water Resources Control Board, are associated with public health concerns and increasing environmental concentrations even in the unlikely event should plastic production and consumption cease today. Currently, the public's exposure is estimated at the ingestion of a credit card equivalent per person each week with sources including seafood, food packaging, bottled water, tap water, and even water infrastructure. Therefore, it is no surprise that microplastics are present ubiquitously in the environment and wastewater including via human excretion. MP contamination may pose considerable challenges for industries as these particles fragment into infinitesimally smaller size fractions, with nanoplastics being considered by US EPA as the potentially most concerning size fraction for human and aquatic health.

Recent research suggests that microplastics might have various impacts on wastewater treatment previously unknown: reduction of methane production in anaerobic digesters, plastic leakage from epoxy coatings, pipes, and pipe fittings, harbor for pathogens to evade disinfection, and becoming a carrier of attached toxins, such as per-and polyfluoroalkyl substances (PFAS).

Regulatory developments are gaining momentum in Europe and North America. California decided on a precautionary regulatory framework when recently proposing total maximum daily loads (TMDLs) for microplastics in ambient waters.

Research is in the process of quantifying different microplastic size classes reliably and defining treatment efficacies of conventional and advanced wastewater treatment processes for their removals.

Removed plastics from the wastewater liquid stream typically end up in the solids process stream along with microplastics partitioning to the solids. Microplastics are generally not removed during digestion and first studies indicate the potential for agricultural crop uptake of nanoplastics. Evidence of microplastic accumulation in agricultural soils is solidifying through international studies. A At this time, California is the first state in the US to regulate non-degradable plastics in composts.

Canada and certain European countries have proposed or established limits for plastics contamination in biosolids and compost as well. These limits typically focus on the macro and mesosize fractions of plastics. Smaller size ranges of microplastics that research is indicating may be uptaken by agricultural crops are not yet addressed, as analytical method development is lagging behind.

The occurrence of microplastics has been linked with PFAS contamination. Both contaminants can co-occur because: 1) polymeric PFAS such as polytetrafluorethylene (PTFE) and polyvinyl fluoride (PVF) degrade into microplastics, 2) water-resistant coatings on polymeric clothing items release PFAS-laden microfibers, 3) PFAS adsorb onto microplastics, and 4) the propensity for fluoridated plastics such as polyethylene (PE) and polypropylene (PP) of all sizes to release PFAS. This last reason was recently discovered by the US EPA This presentation will bring these scientific, analytical, regulatory, and

treatment developments to the attention of utilities, designers, and regulators. Source control options will be discussed along with recommended monitoring and mitigation strategies.

**Most Efficient and Economical Method to Produce High Solids Cake**
Abis Zaidi, M.Eng., Schwing Bioset Inc.

While there are many methods of dewatering municipal biosolids in wastewater treatment plants, screw press technology has emerged as a low energy alternative to these historical technologies. It is incredible that the power consumption of high-performance Screw Press is 10 to 15 times less than conventional dewatering technologies. Not only the operating cost, the maintenance cost of screw press technology is also lowest amongst any other technology available in the market for dewatering municipal biosolids. The secret behind these two advantages, which makes screw press the most efficient and economical technology, is very simple and straightforward – that is low operating speed.

It is surprising to know that screw press operates at less than 1 rpm as compared to conventional technology, which operates at 2500-3500 rpm. The other advantage of low operating speed is that screw press has the highest reliability in market, as there is no catastrophic failure.

Until recently, it was a common misbelief that screw press technology was a good fit for only small water and wastewater treatment plants and it could not match the capacity of these legacy technologies. This is not true because a new high-performance screw press offers improved throughput, capture, and consistent high dry solid content for the full range of capacities providing plant operators the features, benefits, low energy consumption, low maintenance cost, and high reliability expected from a screw press with the performance similar to high-speed technologies. For example: there are large size screw presses available in market which can produce up to 4,400 dry lbs/hr solids.

Two decades ago, it was considered unrealistic for screw press technology, but now with high-performance screw press technology, it's all possible. Municipalities and treatment plants all over the world have been benefiting from this improvement and innovation in dewatering technology. In addition to that, wash cycles of advanced screw press occur without interrupting the dewatering process allowing greater uptime and dewatering capacity. It also offers simple start up and shut down cycles as well as the ability of fully automatic and unattended operation, which reduces operating hours (manpower) on the machine. In summary, the advantages of high-performance screw press:

- Low power consumption
- Low maintenance cost
- High reliability and low downtime
- Slow operating speed (0.5 to 1 rpm)
- Higher throughput through smaller machine
- Low water usage and machine keeps running even during wash cycle
- More operating time per shift

**Innovative Solids Thickening Approaches to Maximize Resource Recovery, Increase Digestion Capacity, and Reduce Operating Costs**

Becky Luna, Carollo

Solids thickening at water resource recovery facilities (WRRF) traditionally increase the concentration of primary and waste activated sludge streams before these streams are fed to downstream processes like digestion. Thickening is often considered in passing rather than as a critical process or as a way to benefit these downstream systems and WRRFs' resource recovery goals. Improvements to the thickening process can yield multiple benefits:

- Increased digester capacity relative to solids retention time (SRT) without costly new digester construction.
- Increased biogas production by allowing the addition of more feed to anaerobic digesters.
- Operational savings from reduced digester heating and polymer consumption.
- Production of volatile fatty acids (VFAs) as carbon sources for secondary treatment processes, avoiding the need to purchase costly external carbon sources such as methanol.
- Production of a concentrated phosphorous-rich feed for struvite harvesting systems.

Additionally, as interest grows in co-digestion to produce more biogas/renewable energy and reduce methane emissions from organics in landfills, improvements in thickening to maximize use of existing digestion infrastructure become more important. Any approach that increases the solids concentration of digester feed or the digestate itself increases the SRT-related capacity of the digesters to accommodate more WRRF residuals or external feedstocks for co-digestion.
Process improvements can include changes in thickening equipment, innovations in thickening technology and automation, or implementation of less common practices such as recuperative thickening, combined fermentation/thickening systems, and targeted phosphorous release paired with thickening. This presentation will highlight improvements in thickening technology, process optimization through automation, and case studies from across the United States where each of the thickening approaches described above has been implemented. Process overviews, performance results, and design and operational considerations from the facilities will be described.

This presentation aims to increase utilities' understanding of available innovative thickening options and how thickening can help WRRFs achieve operational, resource recovery, and processing capacity goals.

**How to Take Advantage of Excess Digester Capacity**

Micah Blate, Hazen and Sawyer

The Easton Area Joint Sewer Authority (EAJSA), located in Easton, PA owns and operates a 45,460 cubic meter per day (10 million gallons per day (MGD)) Wastewater Treatment Plant (WWTP). The EAJSA is interested in environmental stewardship and envisions being at the forefront of sustainable initiatives. As such, EAJSA undertook an initiative to evaluate biogas utilization alternatives and the potential of performing high strength waste (HSW) co-digestion to increase biogas production.

The WWTP separately digests waste activated sludge (WAS) and primary sludge (PS) through three existing anaerobic digesters (AD). Digester 1 (AD1) receives WAS, Digester 2 (AD2) receives PS and Digester 3 (AD3) serves as a secondary digester for digested PS. AD3 is not currently heated or mixed. The biogas produced from the AD process is utilized to fuel sludge heating boilers.

The first phase of the project identified capacity in the existing anaerobic digesters and showed an economic benefit to implement a co-digestion program and CHP system. The evaluation was completed utilizing Hazen's Energy Balance Analysis Tool (EBAT). The second phase of the project including performing a market assessment of the surrounding area to identify potential high-strength waste (HSW) feedstocks for co-digestion. A steady supply of FOG in excess of the digester's capacity was identified. The third phase of the project was to perform an ultimate digestibility and biomethane potential study. EAJSA separately digests WAS and PS, so the FOG will be tested separately with each sludge, providing a different insight into the mechanisms of co-digestion with different sludge types.

The project is currently in detailed design, with an anticipated start-up date in Summer of 2023. Additionally, EAJSA was able to procure a state-funded $1.75M Energy-Related Grant