Speaker and Abstract Information for

2023 Onsite Wastewater Mega-Conference

October 2023

Listed alphabetically by speaker last name. Subject to change.
Updated 10/9/23

Frank Aguirre, TOWA

A Horse of a Different Color - Texas OSW

Presentation, 25 minutes

Abstract:

A HORSE OF A DIFFERENT COLOR - Texas Objective: To improve upon the application of an OSW program for the sake of the general public. The perennial template of OSW programs is that state legislators pass a LAW on this issue and assign its application to a state agency which, in turn, writes its specific regulations. The program is then handed down to various state and local bureaucracies across the state for them to execute the DIRECT APPLICATION AND ENFORCEMENT of the program. Typically, LITTLE or NO funding for the program is included. The unsurprising result of such an arrangement is a program that consists of low-paying jobs and the hiring of people with no OSW experience whatsoever. The final degradation of the thrust for an effective and PROFESSIONAL OSW program lies in the fact those new septic inspectors, here in Texas, are released into the field after a 3-day introduction to the industry. They quickly become emboldened because of their newly gained authority over licensed septic personnel, often with decades of experience. The saddest and final note is that the end user "the general public" receives a septic system of questionable dependability. Often their system is not the correct type for their situation, not sized properly, will not be properly maintained and, in the end, will fail and possibly even cause a public health hazard. The effectiveness of any state program is only as strong as its weakest link. The horse of a different color is that OSW professionals, not untrained, inexperienced bureaucrats, are the best suited for applying an effective septic system program. The best fix for this is for a non-profit organization, made up of true OSW professionals, to write & apply an EFFECTIVE state program, receive/review ALL designs, inspect ALL systems and ensure proper maintenance of ALL units.

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Don Alexander

Shaping State Regulations Based on Field Experimental and Demonstration Projects, Virginia Experiences.

Presentation, 50 minutes

Abstract:

Benefits of using land instead of surface water for discharging treated wastewater are numerous and so are the challenges, both from technical and regulatory perspectives. Land offers significantly greater capacity for assimilating/polishing treated wastewater compared to surface water body, mainly because of the complex physical, biological, and chemical reactions that occur both on land surface and in subsurface soil. However, these complex reactions are not well understood and are very hard to quantify. Historically in onsite wastewater industry certain types of soil and site characteristics are considered as "not acceptable" for discharge of treated wastewater no matter what level of treatment has occurred prior to discharge or no matter what design is used for effluent dispersal. Typically, deep well drained soils are viewed as "suitable" for use and regulations typically restrict use of soils that do not fit this category by requiring minimum vertical separation distance to limiting features such as seasonal water table or impervious layers and specifying upper limit to soil percolation rate. Due to inadequate funding, not much field research was done on determining how to use these soil types for dispersal of adequately treated wastewater. Back in 1990s and 2000s, Virginia Department of Health Onsite Wastewater Program implemented statewide field experiment and demonstration programs to demonstrate use of aerobic treatment units (media filters and package plants) and engineered effluent dispersal systems. The experimental and performance-based permitting was used to allow installation of alternative designs which did not meet the then prescriptive rules specified under the Sewage Handling and Disposal Regulations. This paper presentation will summarize those projects and discuss details from two of many projects that allowed the development of new Regulations for Alternative Onsite Sewage System.

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Carley Allison, Michigan State University

On-Site Greenhouse Ecosystem to Treat Craft Beverage Wastewater

Presentation with paper, 25 minutes

Abstract:

A greenhouse ecosystem, often referred to as a Living Machine, is a technology for biological wastewater treatment using plants in a greenhouse structure. It has a small footprint relative to traditional onsite systems, has been shown to manage high strength wastewater, and can provide a high level of treatment to reuse for purposes like irrigation, toilet flushing, and landscaping. Craft beverage wastewater (winery, brewery, and cidery) is high strength and contains chemical oxygen demands (COD) close to 20,000 mg/L, total nitrogen (TN) up to 80 mg/L3, and total phosphorous (TP) up to 70 mg/L3. Due to the variability of the wastewater in both flow and composition, it is hard to treat with a conventional wastewater treatment system. The ability of this system to treat craft beverage wastewater is determined through this project. The experimental system consisted of three parallel system, with one always serving as a control to treat representative synthetic winery wastewater. Each system had three reactors in series with 5 species of plants. The first two reactors had 12-hour aeration cycles. Synthetic wastewater was prepared to test the ability of the system to treat a variety of wastewater characteristics that are found from these sources. Once the performance of the greenhouse ecosystem is understood for various wastewater characteristics, actual wastewater from the three

sources will be tested. Wastewater characteristics routinely measured included pH, dissolved oxygen, and conductivity, as well as visually inspecting the plants and checking microbial viable cell count by flow cytometry. Nitrate, nitrite, ammonia, TN, COD, and TP levels were measured weekly. Results show that the system is effective at removing the nutrients and COD. COD was treated from 6039 mg/L to 1147 mg/L, TN was treated from 7.43 mg/L to 2.02 mg/L, and TP was treated from 7.08 mg/L to 0.82 mg/L.

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Lilith Astete Vasquez, student

Field Study on Intermittent Mixing of Septic Tank Fecal Sludge

Presentation, 25 minutes

Abstract:

This presentation introduces a field study to assess the increased stabilization of fecal sludge caused by intermittent mixing of septic tank contents. This study builds on findings from previous work that explored the effects of different methods for managing non-dilute fecal waste in bench-scale simulated onsite sanitation systems. Results following two years of waste introduction and monitoring suggested that degradation of organic solids was higher under mixed conditions in contrast to traditionally static systems, including a 6.1% increase in pH and reductions of 44.0%, 14.9%, 39.8%, and 43.3% respectively for dissolved organic carbon (DOC), chemical oxygen demand (COD), total ammoniacal nitrogen, and aerobic biodegradability. These results suggest the need for further exploration in full scale onsite sanitation systems, and imply potential benefits including extended periods of usage for septic systems between mandatory pumping events. Septic systems at four residences and one fire station located in unincorporated rural regions of San Diego County, California will be monitored for two sequential 8-month usage periods, with and without the use of a prototype retrofittable mixing device that promotes intermittent homogenization of traditionally stratified contents. Accumulated sludge depth will be monitored at 4-month intervals, and laboratory analysis of sampled sludge and supernatant including pH, conductivity, turbidity, chemical oxygen demand (COD), dissolved organic carbon (DOC), nutrients (nitrogen and phosphorus), volatile fatty acids (VFAs), and total solids, will be used to quantify the effects of mixing upon the stabilization of organic constituents.

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Robert Bair and Jilian Maxcy-Brown, NOWRA Emerging Professionals Committee

Shaping the Future of the Onsite Wastewater Industry: A Panel Discussion with Emerging Professionals in the Industry

Presentation, 50 minutes

Abstract:

Companies and government departments within the onsite wastewater sector often find it challenging to find new workers that are both interested and knowledgeable about the sector. This has led to persistent job vacancies, overburdened staff, and some people within the sector staying well past retirement age to keep companies alive. Recruiting and professionally developing young people within the sector can alleviate these challenges while increasing the visibility of and professionalism of the

sector. This presentation will be a panel of emerging professionals from a variety of roles within the onsite industry (students/academia, regulator, installer, manufacturer, etc.) who will discuss how they became involved in the industry, their experience with onsite systems, and factors that have impacted their experience with the industry. The panelists will also be asked to reflect on what resources have been helpful in their careers and how they can be better supported as an emerging professional in the industry. The discussion will be approximately 30-35 minutes to allow for 15 minutes of audience engagement. Below is the format that will be used for this guided panel discussion: Presentation Outline (50 minutes) --Framing and introduction (3 minutes) --Panelist introductions (2-3 minutes each) --Name --Role in the industry --Experience in the industry (types of projects, number of years, etc.) --Panelist reflections (5 minutes each- lead by moderator) --How did you get involved in the onsite wastewater sector? --What resources (mentoring, educational, financial, etc) have been helpful as you have become involved with onsite systems? --How can the industry better support emerging professionals? --Summary (1-2 minutes) into Audience Q&A (~20 minutes)

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Amal Bakchan, University of South Alabama

Exploring County-wide and Regional Responsible Management Entities for Decentralized Wastewater Infrastructure Systems in the Rural Alabama Black Belt

Presentation, 25 or 50 minutes

Abstract:

Wastewater issues in the rural Alabama Black Belt region have long been exacerbated by high poverty, low-population density, and non-perc soils that cause hydraulic failure in conventional septic systems. While ongoing research efforts are investigating decentralized wastewater infrastructure systems “clusters of 90+ homes and onsite” as promising solutions in these rural, low-income communities, how to establish a responsible management entity (RME) that provides proper operation and maintenance (O&M) services for systems in such communities is still not well understood. This study (1) empirically assesses the most feasible scale of management for enabling more effective responsible management in the Black Belt; and (2) identifies challenges and opportunities for the adoption of various scale solutions based on stakeholders’ perception and their understanding to the social and institutional dynamics inherent in the Black Belt wastewater crisis. Enabling this study is 114 survey responses from management entities spanning 27 states in the US, as well as semi-structured interviews with 11 stakeholders involved in the wastewater sector in Alabama. Using statistical inferencing of the survey data, coupled with a hybrid deductive-inductive qualitative content analysis of the interview data, preliminary findings suggest a gradual management scale approach. This approach could start with a county-wide RME to manage the alternative decentralized systems, moving towards regionalization once a sufficient customer base is achieved. The study sets the stage for highlighting policy changes to better support the adoption of suggested scale solutions in the Black Belt (and other rural communities) moving forward, potentially addressing the wastewater challenges in these underserved communities.

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Brian Baumgaertel, Barnstable County's Department of Health and Environment; and Sara Wigginton, Barnstable County, MA, Massachusetts Alternative Septic System Test Center

Innovative/Alternative Septic Systems for Nutrient Pollution: State of the Science, Technology, and Management

Presentation, 25 or 50 minutes

Abstract:

Nutrient pollution from on-site septic systems is a significant challenge across the US, where nearly Â¼ of homes depend on decentralized treatment systems. In coastal and fresh water bodies, excess nutrient loading jeopardizes human and environmental health, impacts our fisheries and tourism-based economies, and threatens peoples' way of life. This presentation will focus on the state of Innovative/Alternative (I/A) septic system technology, one of several cutting-edge technologies being implemented across the US to address nutrient loading at its source. We will introduce audiences to the ground-breaking research being conducted on I/A systems at the Massachusetts Alternative Septic System Technology Center, North America's premier independent testing and research facility dedicated to this technology, on topics including viruses and contaminants of emerging concern including. We will discuss important developments around non-proprietary I/A septic system technologies and highlight the development of enhanced I/A systems, a newer generation of technologies able to achieve significant levels of contaminant removal currently being piloted in Cape Cod, MA. Beyond exploring the science on these systems, we will examine considerations for the long-term management, maintenance, and monitoring of on-site septic systems by introducing the audience to MASSTC's Responsible Management Entity Pilot, a management utility for I/A septic systems jointly funded by the Environmental Protection Agency and the Nature Conservancy. Overseeing every aspect of these systems' lifecycles, from design and installation through ongoing maintenance and monitoring, is critical to ensuring these systems continue to protect human and environmental health. We will share early lessons learned from this pilot in the interest of transferring this management model to other municipalities and regions across the US seeking to deploy I/A technology to address environmental problems.

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Marie-Christine Belanger, Premier Tech Water and Environment

Eco-design, a Way to Leverage Innovation in Sustainable Product Development

Presentation, 50 minutes

Abstract:

With growing environmental concerns, environmental assessment should be at the heart of the product development process. The environmental assessment must encourage businesses and their development team to rethink the production and consumption system and do everything possible to ensure that the conditions for the system's sustainability are applicable and applied. This is called eco-design. A key aim of eco-design is to reduce to a minimum the overall environmental impact of a product or service. For products, it refers to an innovative design that considers the entire lifecycle from the extraction of raw materials to production, distribution, and use "all the way to recycling, reparability," and disposal. Minimizing pollutants during production is just as important as during the product's lifetime. In 2017 Premier Tech Water and Environment invested in an initial life cycle analysis

process that aimed at comparing the ecological footprint of different types of onsite wastewater treatment systems. This study has allowed, among other things, the identification of axis of improvement in a context of an eco-design approach. One element that emerged clearly is that the element "sand", traditionally the preferred material for conventional onsite wastewater treatment, is one of the major contributors to the overall carbon footprint. Sand increasing scarcity and its non-renewable nature, combined with the high CO2 emissions associated with its transportation, amplifies this overall impact. Wanting to enter the combined treatment and dispersal system market segment, it is with the achievements of these first life cycle analyses as a background that PTWE began the development of its new and innovative CTDS by applying the eco-design precept in a wholistic approach for each of the system components. During this conference, we will present an overview of the influence and benefits of integrating the eco-design approach to product development.

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Allison Blodig, Infiltrator Water Technologies

Characterizing Commercial High Strength Wastewater

Presentation, 50 minutes

Abstract:

Commercial high strength wastewater is dealt with improperly in some areas across the country. A lot of this is due to a lack of understanding of what activities can affect the wastewater strength from these types of facilities. This presentation will describe some of the more common facilities and discuss ideas on how to gather information, provide operational suggestions, and try to dial in a wastewater strength that can be used to size a treatment system for the facility.

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Gabriele Bonaiti, Texas A&M AgriLife Extension

Improve Performance of Drip Irrigation in OSSF Systems in Texas - Updates

Presentation, 25 minutes

Abstract:

Drip irrigation provides precise application and allows for improved use of the application area. Because of this, its use in OSSF installations is increasing in Texas in direct response to issues such as limited space and challenging site conditions. However, there is a lack of standard procedures needed by designers, installers, and maintenance providers such that OSSF professionals have frequently observed problems. There is great potential for improving drip irrigation system performance in OSSF installations, especially in terms of effluent distribution uniformity and maintenance. Drip irrigation systems are quite common in central Texas; demonstrated success in this region would encourage application in other parts of the state. Texas A&M AgriLife Extension has contracted with the Texas Commission on Environmental Quality (TCEQ) to gather and summarize information from surveys, existing literature, field visits, and experimentation with focus on aspects specific to Texas conditions (i.e., dosing technique, application rate, effect of soil type, installation configuration, flushing method, filtering type and method, and tubing cleaning). This much-needed compilation will provide guidance

document supporting license holders, regulators, and landowners for successfully implementing drip irrigation systems. It will also identify gaps in current regulations and aid TCEQ regarding potential rule or policy changes. This presentation will provide an update on project monitoring activities and preliminary results.

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Krista Capps and Nandita Gaur, University of Georgia

Re-thinking Decentralized Infrastructure as Blue-Green-Grey Infrastructure: The Need for Industry-University Partnerships

Presentation, 25 or 50 minutes

Abstract:

Decentralized wastewater treatment infrastructure, such as onsite wastewater treatment systems (OWTS), is a critical component of existing water infrastructure in many regions of the globe, and it will continue to be a key aspect of expansion and innovation in enhancing access to sanitation services. Failing leach fields within OWTS are a threat to the regional environment, local community and come at a prohibitive cost to homeowners. Effective management of OWTS is waging a failing battle at two fronts: 1) at the household level where poor maintenance and periodic hydraulic overloading caused by periods of high water use or household leaks cause untreated sewage to flood into a home, and 2) at the community or watershed level when soil conditions, taxed by aging and obsolete systems, lead to failure of the system when untreated waste flows into surface and groundwater. Well-functioning OWTS depend on physical, chemical, and biological conditions of the soil and distance from the water table and surface water. System function is also influenced by underlying geology and plants on and around the surface of the leach field. Acknowledging the inherent blue and green components of properly working OWTS grey infrastructure is essential for proper planning and subsequent management of large networks of OWTS. Though OWTS are an essential component of supporting sustainable growth and development of human populations and protecting human health and the environment, there are major information gaps about how home water use, system condition and maintenance history, and environmental conditions, such as soil conditions or extreme weather events, interact to influence the efficacy of OWTS. These information gaps create new and exciting opportunities for industry stakeholders to partner with university researchers and extension agents to collaborate to investigate and understand OWTS function under variable conditions. In this presentation, we show spatially distributed data on leach field functionality collected in-situ at a 30-minute frequency using a complete septic system monitoring system- Septic Sitter-- that monitors and remotely transmits effluent levels in the leach field and septic tank. We have analyzed the changing effluent levels as a function of changing weather conditions, groundwater conditions and water use and will highlight environmental and homewater use conditions that prime well installed septic systems for leach field failure. These results provide a path forward to develop SMART SEPTIC, a novel tool to bring DWWI management into the 21st century. We highlight some of the grey-green-blue interactions of OWTS that need to be studied to support community resilience to extreme weather events, and we discuss exciting opportunities that could be created through industry-university partnerships.

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Rachel Chai, University of South Alabama

Life Cycle Assessment of Decentralized Wastewater Treatment and Collection Technologies in the Alabama Black Belt

Poster, NA-Poster

Abstract:

A quarter of the United States' population uses onsite wastewater treatment systems (OWTS). OWTS is particularly popular in Alabama Black Belt, where up to 85% of households have an OWTS. The Alabama Black Belt consists of 17 counties and is characterized by low economic growth. Other characteristics of the Alabama Black Belt include its median household income of $29K, roughly half the national average. In the United States, the poverty line is $31K. Additionally, many OWTS fail in this area due to the impermeability of the vertisol soils. Pooling of effluent near residential areas is the result of this failure. A last characteristic is that the Alabama Black Belt's population density is less than one third of the United States population density, with 26.4 people per square mile. In light of these characteristics, this Life Cycle Assessment (LCA) aims to determine the effectiveness and appropriateness of decentralized wastewater and collection systems within the Alabama Black Belt. This LCA includes constructed wetlands, aerated activated sludge reactors, and lagoons for treatment systems. Pressure Sewer, Gravity Collection System, and Effluent Collection System are included collection systems. By analyzing cost, public health concerns, electricity usage, and carbon footprints using programs such as RS Means, OpenLCA, and Greet, and using a multiple criteria decision analysis tool, Black Belt stakeholders can choose the most appropriate treatment and disposal system according to resources, funding, surrounding environment, and effectiveness.

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Stuart Coleman, WAI and Jim King, Eljen Corporation

Transforming Hawaii's Cesspool Challenges Into Innovative Solutions

Presentation, 25 minutes

Abstract:

Hawaii has over 83,000 cesspools that discharge over 52 million gallons a day of wastewater into Hawaii’s waters. These cesspools and failing septic systems contaminate drinking water, ruin underground aquifers, and pollute marine environments. Hawaii has a goal of replacing all of the cesspools by 2050 and WAI is helping bring technologies to Hawaii to meet that goal. One of the technologies to meet this challenge is the Eljen GSF. We will discuss the recent training event in Waialua that shows the challenges of operating in Hawaii.

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Eric Daniels, Eljen Corporation

Flushable Nightmare

Presentation, 25 minutes

Abstract:

The global flushable wipes market stood at $3.0 billion in 2022 and the global market is projected to reach $ 5.1 billion by 2031. Love them or hate them, Flushable Wipes are here, and they are causing a nuisance in the onsite industry as well as the municipal level. We explore the meaning of “flushable” and the testing protocol to make a “flushable” product.

The market value of flushable wipes is also increasing due to rising consumer awareness about hygiene and sanitation. In many parts of the world, including developed countries, consumers are becoming increasingly aware of the importance of maintaining good hygiene practices. Rapid urbanization and changing consumer preferences towards eco-friendly and biodegradable wipes are the key factors driving the global market for flushable wipes.

Flushable wipes manufacturers are innovating products to expand their business. Leading players in the flushable wipes market are focusing on untapped regions around the world to broaden their revenue streams. In this twenty-five-minute class we will discuss the history of the products we use to wash our rear ends, and the developments in that industry that are causing our septic concerns today.

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Marcia Degen, Virginia Dept of Health

Onsite System Discharges vs Stream Discharges in Virginia

Presentation with paper, 25 or 50 minutes

Abstract:

In Virginia, domestic sewage sources with design flow of 1,000 gallons per day or less must utilize an onsite sewage system if no central sewer is available. If there is no onsite solution for a site, or in repair situations, a direct discharge to a stream through a Virginia VPDES permit may be a possibility. This presentation will describe the stream discharge program and then compare the required construction components, operation and maintenance, and monitoring requirements between the onsite wastewater treatment system program and the stream discharge program.

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Marcia Degen and Nicole Sandberg, VA Dept of Health

Panel Discussion - Funding Septic System Repairs

Presentation, 25 or 50 minutes

Abstract:

Funding repairs in the onsite wastewater sector is a continuing challenge. In recent years, however, new funding sources have emerged and some states have figured out how to use existing funding sources for onsite sewer system repairs. In this session, representatives from states and federal agencies will share their programs and experiences with funding onsite repairs. Each of the four panel members (EPA, USDA, Washington, and Virginia) will share a brief overview of their programs and then

the panelists will take questions from the audience. The intent is to provide basic information on funding sources and innovative ways that states have adapted funding sources for onsite repairs.

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Matthew, Dowling, Town of Charlestown, RI

A Blueprint for Watershed Resource Protection through Community Scale OWTS Management

Presentation, 25 or 50 minutes

Abstract:

Like many communities, Charlestown (RI) relies heavily on OWTS to manage wastewater and on groundwater as a source of potable water. Charlestown is also a coastal community situated on three coastal salt ponds along the south shore of RI. The region's highest densities of OWTS are located within proximity to these ponds, with some areas exceeding 10 OWTS/ac. Local economies depend on healthy watersheds and associated coastal ecosystem services where tourism, recreation, and coastal businesses thrive. OWTS are an effective method of managing wastewater in the absence of a sewer system by treating and recycling wastewater onsite. Yet, even in the best circumstances, not all pollutants are removed during treatment. Conventional OWTS can be effective at removing bacteria and pathogens; however, pollutants, primarily nitrogen (N) can remain elevated in effluent plumes from older conventional and substandard systems and is problematic for human health and water quality. Understanding the risks to water resources, our community has implemented a robust local OWTS management program that 1) Identifies OWTS within the jurisdiction by type, age, size and use through required routine maintenance inspections; 2) Tracks data in a comprehensive database; 3) Conducts community engagement and education, and fosters partnerships; 4) Implements enforcement action; 5) Secures funding to promote modernization to advanced N reducing OWTS technology in critical areas; and 6) Conducts research to further OWTS science, policy and management options for watershed protection. Our program has become widely recognized in the northeast and can serve as a blueprint for local scale OWTS management. Here we explain our methods by identifying proven management practices that work to protect water resources by incorporating data collection, community engagement, implementing science-based assessments, securing funding sources and ongoing adaptive management.

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Mark Elliott, University of Alabama

Sustainable Wastewater Management for Unserved Communities using Federal Infrastructure Funds: Barriers, Bottlenecks, Incentives, and Tradeoffs

Presentation, 25 or 50 minutes

Abstract:

Recent federal infrastructure funding provides an opportunity for adequate wastewater management for thousands of U.S. communities that are effectively unserved. However, the incentives of individual decisionmakers in state agencies and engineering consulting firms often determine which communities receive which systems. For example, most key decisionmakers are incentivized toward larger and more

expensive systems. While preference for disadvantaged communities (e.g., Justice40) is incorporated into federal funding opportunities and numerous stakeholders prioritize the neediest communities, the embedded perverse incentives and asymmetric information present substantive obstacles to these goals. This presentation seeks to leverage the authors' experiences spanning multiple U.S. states "including Alabama, North Carolina, and West Virginia" to potentially disrupt the wastewater management status quo in small, unserved communities. Accordingly, the objectives are to: (1) describe briefly the major system typologies that can be implemented when a community has no centralized system; (2) identify available funding sources to address both capital costs and ongoing costs, in the context of ARPA and BIL; (3) discuss the challenges and tradeoffs of each system typology for both short-term implementation and long-term system sustainability; and (4) propose approaches that have shown promise for addressing some of the major obstacles to sustainable wastewater management for unserved communities. These include liquid-only sewer connected to existing gravity sewer, distributed system management, managed OWTS, creative approaches to funding and technical assistance, are promising paths to appropriate and sustainable wastewater management for communities with the greatest need.

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Heidi Faller, USEPA

EPA Office of Wastewater Management Programmatic Update 2023

Presentation, 25 or 50 minutes

Abstract:

The U.S. Environmental Protection Agency (EPA) Office of Wastewater Management, Decentralized Wastewater Program provides resources, education, and outreach at a national level for managing and maintaining decentralized wastewater systems. This presentation will highlight the major accomplishments and updates of the Decentralized Program in 2022-2023, including SepticSmart Week and the ongoing work of the Decentralized Wastewater MOU Partnership. The Decentralized Program's annual outreach campaign, SepticSmart Week, promotes proper care and maintenance of septic systems primarily for homeowners. EPA's Decentralized Wastewater MOU Partnership, which consists of associations and experts in the decentralized field, play a key role in the success of SepticSmart Week. This presentation will include progress updates on the MOU Partnership priorities such as homeowner outreach, data needs, technology, finance, and workforce development.

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Casey Fiedler, NAWT

Tips and Tricks to Locating System Components

Presentation, 50 minutes

Abstract:

At the conclusion of the presentation the attendee will be able to: Discuss the importance of understanding the OWTS as a whole and multifaceted component of an OWTS. They will be able to identify the key structures of an OWTS and how vital they are to the entire system. They will be able to

explain that each component is not a stand-alone component but relies on those pieces before and after for the system to function as intended. Recognize different “signs and signals” that will lead the practitioner to locate and identify the components of a system. The attendee will be able to describe differences in topography, site conditions, potential pitfalls that present themselves when searching for OWTS components. Identify methods that can be used to uncover and expose how and where a system is located. They will be able to list and compare the different tools that are available to practitioners for locating, identifying, and exposing the components of a system. In the end they will be able to create a personal system of investigation to help the practitioner methodically identify, locate, and define the components of any system.

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Xueqing Gao, Florida Department of Environmental Protection

Monitoring Nitrogen-Removal by Florida Inground Nitrogen-Reducing Biofilter

Presentation, 50 minutes

Abstract:

Additional treatment beyond septic tanks and drainfields is needed in areas where nitrogen contributions by onsite sewage treatment and disposal systems (OSTDS) to nutrient impairments are considered significant. One option for nitrogen treatment incorporated into Florida regulations is an inground nitrogen-reducing biofilter (INRB). The INRB consists of conventional drainfield material installed on top of an 18-inch-thick unsaturated sandy layer (nitrification) overlying a second layer consisting of a mixture of lignocellulosic (woody) material and loamy to sandy material (denitrification). This configuration is estimated to provide 65% nitrogen-reduction. In Florida, over 2,000 INRB systems have been installed since 2019 to comply with Basin Management Action Plan (BMAP) requirements for nutrient-impaired karst springs. The Florida Department of Environmental Protection initiated a monitoring project to gather more data on INRBs. Quarterly sampling began in November 2021, for two systems with gravity distribution installed in June 2021, to serve single-family residences in North Florida. Observation ports were installed to monitor water ponding depth at the media interfaces and to monitor settling of the media. The department measured household water use and collected samples of septic tank effluent and samples from suction and pan lysimeters installed under each of the two layers. So far, monitoring results show that the wide range of observed water use and the uneven distribution of effluent within the drainfields contribute to the variability of ponding depths, nitrogen concentrations and estimated nitrogen reduction between the two systems and among observation points. Incomplete nitrification, apparent alkalinity limitations and pH drops were observed occasionally. The first 15 months of monitoring showed no significant settling of these INRBs. The department intends to monitor additional INRBs around the state to further assess their performance.

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Jonathan Godfrey and Jeffrey Kerr, Onsite Wastewater Professionals

Septic Inspection Standards of Practice, Resources, and Comprehensive Training Approach

Presentation, 50 minutes

Abstract:

In an industry characterized by increasing environmental regulations and a need for proficient professionals, accessible education, standardization, and a supportive community are key to promoting excellence in onsite wastewater management. Our presentation will primarily spotlight the Standards of Practice for Inspections, a model proposed by the Onsite Wastewater Professionals (OWP). Serving as an exemplary guide for areas without formal certification programs, these standards outline best practices for conducting efficient, compliant septic inspections, ensuring thoroughness, professionalism, and environmental safety. We will discuss the value of these industry standards in guiding inspection processes and boosting service quality. Adherence to these standards not only helps inspectors maintain consistency in their work but also enhances their marketability and reputation in the industry. Further, our presentation will cover the wealth of resources and guides available to support inspectors in their duties. These include forms, contracts, and other templates that assist in streamlining the inspection process and refining reporting accuracy. With these tools, inspectors can produce comprehensive, compliant, and clear reports, enhancing their service to clients and regulatory authorities. In the spirit of accessibility and continuous professional development, we will delve into both online and in-person training opportunities. These programs offer a blend of theoretical learning and practical experiences, equipping participants with a deep understanding of various septic system types, inspection techniques, and regulatory requirements. By making quality education in wastewater management reachable, we foster a more informed and capable community of professionals.

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Jonathan Godfrey and Jeffrey Kerr, Onsite Wastewater Professionals

Beyond the D-Box: Pressure Manifolds for Precise Distribution

Presentation, 50 minutes

Abstract:

Beyond the D-Box: Pressure Manifolds for Precise Distribution" offers an exploration into the design principles and innovative applications of pressure manifolds in onsite septic systems. Over the course of this one-hour session, participants will gain valuable insights into the integral role these components play in achieving accurate and efficient wastewater distribution, and how their design and operation can impact the overall performance and longevity of septic systems. Emphasis will be placed on understanding the principles of manifold design and the importance of equal distribution. This class will include case studies of best practice designs and offer practical tips for troubleshooting common issues. Whether you're a seasoned professional seeking to enhance your skills or a newcomer eager to grasp the complexities of septic system design, this class offers an engaging and insightful journey beyond the distribution box."

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Claude Goguen, National Precast Concrete Association

State Wastewater Association Tool Kit

Presentation, 50 minutes

Abstract:

State based associations are essential to the growth of the onsite wastewater treatment industry. They provide a critical means for local service providers, manufacturers, designers and regulators to network and address challenges and opportunities in their markets. Managing these associations effectively is key to serving existing members and attracting new ones. One of the foundations of an effective state association is the annual meeting. This event is often the largest source of revenue for the association and provides significant benefits to its members such as continuing education, sales and networking. Recognizing that there are many steps involved in organizing a successful annual meeting, NOWRA board members started working on a State Association Tool Kit. This tool kit would include guidance for organizing an annual meeting, based on the wisdom of those executive directors, board members and other volunteers who have been through this process many times. During this session, the presenter will describe this tool kit and identify some key components of a successful state association event. We will discuss aspects such as scheduling and effective means of advertising and registration. We will explore what to look for and what to avoid when considering events spaces, food and beverage, and audio/video vendors. We will talk about how to organize an education curriculum and presenters that will fulfil the needs of your members and keep them coming back year after year. Whether you're with a brand new or a long-established state association, this session will offer valuable tips on how to make sure your next event exceeds your members' expectations.

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Lance Gregory, Virginia Department of Health

What's New at the Virginia Department of Health

Presentation, 25 or 50 minutes

Abstract:

This presentation is intended for individuals working in the onsite industry in Virginia. Information on new policies, regulatory changes, proposed changes, and funding opportunities will be provided. Lance Gregory is the Director for the Division of Water and Wastewater Services at the Virginia Department of Health. This Division works with Virginia's 35 Health Districts and industry stakeholders to develop and implement regulations related to onsite sewage systems, alternative discharging systems, private wells, and marinas.

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Roxanne Groover, Florida Onsite Wastewater Association (FOWA)

Big Ideas - Little Tiny Space ... OSTDS Design & Install Challenges

Presentation, 50 minutes

Abstract:

Often your client has big ideas" for that small piece of property. Our panel will share insight on how to overcome challenges when designing and installing an OSTDS in space limited locations. Real-life examples of design and installations on both residential and commercial properties in various locations

in the US will be discussed. The panel will host an open presentation with the attendees to create opportunities to add "tools to your toolbox" and grow your business while protecting public and environmental health."

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Dennis Hallahan, Infiltrator Water Technologies

Grease Interceptors Function and Design

Presentation, 25 minutes

Abstract:

Grease Interceptors are typically specified on plans with little knowledge on their design and function. There are many misunderstandings regarding interceptors. Regulatory sizing is mostly prescriptive. Fats, oils, and grease (FOG) are very high in strength and are very difficult to break down. FOG is common in restaurant discharge. A significant reduction in FOG concentration is necessary prior to entering an Advanced Treatment System or the subsurface disposal system. This presentation will discuss the different kinds of grease traps, how they function, how codes size them, and best practices.

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Sara Heger, University of Minnesota

New National Level Training Materials for Property Owners

Presentation, 25 minutes

Abstract:

With EPA funding NOWRA in partnership with the Rural Community Assistance Program has developed an interactive homeowner/public training module for residential decentralized wastewater systems to provide septic system owners and the public with best management practices to keep their septic systems functioning properly. These materials focus on the importance of wastewater treatment, an overview of treatment in an onsite system, typical onsite system features, final treatment and dispersal, management, maintenance, safety, and system troubleshooting. While the material's target audience is property owners who have an onsite system, the concepts are also applicable to the public, realtors, local health officials, and septic system professionals. The training materials include a printed or electronic Onsite Wastewater Treatment System User Guide and educational materials which can be offered in person or virtually. The training materials include a pre/posttest, four modules on (1) an overview of septic system treatment, (2) management, (3) home management tips, and (4) troubleshooting. Information about how to access and utilize these free materials will be provided.

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Sara Heger, University of Minnesota

Evaluating Septage and Septic Tank Performance with Bioaugmentation at Rest Areas

Presentation, 50 minutes

Abstract:

With support from the Minnesota Department of Transportation the University of Minnesota has collected and analyzed the septage pumped out of rest area septic tanks. Due to the predominance of toilet flushing it is assumed that this septage is higher in concentration in many contaminants than typical residential septage. Data from over thirty systems has been analyzed for organic content (BOD, COD, FOG), nutrients (ammonia, TKN, and phosphorus), along with selected metals and at five sites PFAS were also tested. Sludge and scum data were also obtained when possible. This data will help assist maintainers of commercial systems in maintaining similar commercial systems and potentially impact rates for land application or inform WWTP accepting septage. At one of these rest areas, a bioaugmentation product is being tested to determine if can positively impact sludge production and downstream treatment of a commercial aerobic treatment unit. Data will be presented on the wastewater effluent from the septic tank and after the aerobic tank along with sludge and scum measurements from the system.

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Ryan Homeyer, R&D Engineer at Brightwater Tools

Source Separation of Toilet Waste for Nitrogen and Phosphorus Recovery and Water Reuse

Poster, NA-Poster

Abstract:

Nutrients from high strength wastewater can be recovered through freeze concentration, the process of partially freezing a solution to create two fractions: a concentrated liquid and a relatively high purity ice. When implemented in a building, freeze concentration of source-separated toilet waste can generate a small volume of sustainably-sourced, concentrated liquid fertilizer product, and a large volume of nutrient-reduced effluent. Testing of a bench-scale block freeze concentrator has shown that source-separated urine can be fractionated into a concentrated stream containing 30g-N/L and a dilute effluent containing 0.5g-N/L (Noe-Hays et al., 2021). We have developed an analysis tool that uses a mass-balance approach to predict: effluent nutrient flows, fertilizer generation, and energy consumption for various building scales with the implementation of freeze concentration under several toilet waste generation scenarios (e.g., vacuum flush toilets, urine source-separation). The process model takes the number of system users (e.g., building occupants), the available space for onsite toilet waste storage, the wastewater generation scenario, and the desired level of fertilizer concentration as inputs to determine effluent nutrient concentrations, fertilizer production rates, and energy usage over a specified timescale. It is the goal of this research to evaluate the practical effectiveness of freeze concentration to improve a building's ecological impact by recovering nutrients in a resource-efficient manner at a wide range of scales.

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Charles Humphrey, East Carolina University

Reduction in Groundwater Transport of Nitrate from an Onsite System 9 Years after Installation of a Permeable Reactive Barrier

Presentation, 25 minutes

Abstract:

There are approximately 2 million onsite wastewater systems (OWS) in North Carolina that provide soil-based treatment of wastewater. Wastewater contains elevated concentrations of environmental pollutants including nitrogen. Prior studies have shown that many OWS are efficient at oxidizing nitrogen, but groundwater plumes enriched with nitrate (NO3) may extend beyond required setback distances to surface waters and/or to wells creating various environmental and human health risks. The goal of this study was to assess the long-term (9-years) efficiency of a permeable reactive barrier constructed to reduce nitrate transport from an OWS. Groundwater monitoring near the OWS drainfield of a school in Eastern North Carolina showed NO3 concentrations routinely exceeded the 10 mg/L groundwater standard. In 2014, a permeable reactive barrier (PRB) was installed between the OWS and monitoring well (with elevated NO3) to enhance nitrogen removal via denitrification. The PRB was constructed by excavating a trench with the approximate dimensions of 1.2 m wide x 6 m long x 8 m deep. The bottom of the trench was excavated below the water table. Woodchips were used to fill the bottom 2 to 3 m of trench, and the rest of the trench was filled with the excavated soil. The woodchips were used a carbon source for denitrifying microorganisms. Groundwater samples were collected from the well and analyzed for NO3 three times each year (2005- 2023) following the installation of the PRB. Groundwater NO3 concentrations in a down-gradient well were increasing by almost 2 mg/L each year prior to installation of the PRB, but dropped by an annual average of 1 mg/L afterwards. Groundwater NO3 concentrations were lower post (mean of 8 mg/L) relative to pre (mean of 13.7 mg/L) PRB installation. Results show that PRBs may be effective practices for reducing the groundwater transport of NO3 for many years with little ongoing maintenance.

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Guy Iverson, East Carolina University

Evaluating Nitrogen Treatment by Onsite Wastewater Systems in the Raleigh Belt of North Carolina's Piedmont

Presentation, 25 minutes

Abstract:

On-site wastewater systems (OWSs) can be a significant source of nitrogen to water resources, which may contribute to water quality degradation in nutrient-sensitive waters. Recent studies in the Piedmont of North Carolina found that OWSs can be significant contributors of nitrogen to shallow groundwater and surface water. Most of these studies occurred within the Triassic Basin and they noted a need for additional research in differing geological settings. The goal of this study was to quantify nitrogen treatment efficiency of OWSs in Raleigh Belt geology. Four residences were identified and instrumented with piezometers between or downgradient of OWS drainfields. Two of the sites were intersected by small streams that drain the neighborhood, which were also monitored. The sites were sampled 11 times from Feb 2022 to Apr 2023. During each sampling event, samples were collected from OWS tanks, groundwater beneath and downgradient of OWS drainfields, and streams. These samples were analyzed for total dissolved nitrogen (TDN), ammonium, nitrate, and chloride. Chloride was used to estimate mass reductions via a mixing model. At the time of abstract submission, samples collected

from Sep 2022 to Apr 2023 were awaiting laboratory analysis. Preliminary results indicated that wastewater contained the greatest median concentration of TDN (59.3 mg/L). Median TDN concentration in drainfield groundwater, downgradient groundwater, and adjacent streams was 83%, 97%, and 97%, respectively, lower than wastewater. Mass removal of TDN ranged from 57 to 91%, suggesting that dilution was not the only reduction mechanism. Despite these reductions, concentrations of TDN in groundwater and surface water remained elevated relative to reference conditions to the ecoregion where this study occurred. Preliminary findings suggest that OWSs in Raleigh Belt geology contained similar TDN treatment efficiencies and can be substantial nitrogen sources to downstream water resources.

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Anish Jantrania and Ryan Gerlich, Texas A&M AgriLife

Reduction of Wastewater Effluent from On-Site Sewage Facilities - Current Updates and Future Plans

Presentation with paper, 25 or 50 minutes

In Texas, under the current 285 rules specifications for the design requirements, availability of adequate and suitable disposal area will continue to be a challenge for properties served by On-Site Sewage Facilities (OSSFs). Residential and commercial properties are constantly faced with choosing between on-site disposal and the use/enjoyment of valuable real estate. In the realm of OSSFs, several aerobic treatment technologies are available to the public, however, adequate, and suitable effluent disposal area is proving to be less than available. The goal of this project is to develop design solutions for alternate disposal areas using Enhanced Vapor Effluent Discharge (EVED) techniques to reduce effluent volume through increased atmospheric discharge. While the results may not reduce costs associated with OSSFs, they will offer the option to trade-off use of valuable real estate space for a disposal system that offers other beneficial usage. EVED technologies, if proven reliable, may offer OSSF solutions for properties that are not currently suitable for development, especially those limited by space (i.e., available land area) through improved OSSF efficiency. This paper presentation will discuss the current status of a two-year long study underway at the Texas A&M research center, present the data collected so far, and discuss future plans for continuing this research by installing a new design of high-efficiency effluent dispersal trench at the center.

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Justin Jobin and Derek Betts, Coastal Wastewater Solutions

Nassau County, NY's Nitrogen Reducing Septic System Grant Program, 2023 Update

Presentation, 25 or 50 minutes

Abstract:

Nitrogen pollution from cesspools and septic systems has been identified as a leading cause of degraded water quality on Long Island, contributing to restrictions on shell fishing, toxic algae blooms, and massive fish kills. Tens of thousands of properties on the North Shore of Nassau County are currently served by cesspools and septic systems. Reversing degradation of water quality depends on the replacement of existing systems with new nitrogen reducing technologies. In an effort to incentivize

these technologies and protect the public and environmental health, Nassau County and New York State have created a septic system replacement program for eligible properties. The Septic Environmental Program to Improve Cleanliness (S.E.P.T.I.C.) provides grant funding of up to $20,000.00 to eligible homeowners, not-for-profits, and small businesses to replace conventional septic systems and cesspools with a nitrogen-reducing innovative and alternative onsite wastewater treatment system (IA OWTS). Launched in May of 2021, the S.E.P.T.I.C. Program has funded over 80 installations to date and has expended over $1 million in grant funds to property owners. The Program's success has led to an increase of over $8 million to fund over 400 upgrades to nitrogen-reducing technologies. This presentation will cover Program updates for 2023. These updates include the following: (1) Receipt of $4 million in additional funding; (2) Building the programmatic capacity to fund an average of four installations per week; (3) Assisting towns and villages to enact mandates for nitrogen reducing systems; (4) Developing a septic industry training program; and (5) implementation of a targeted public engagement campaign.

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Justin Jobin, Coastal Wastewater Solutions

The need for Regionalized Standard Operating Procedures for the Acceptance, Use, and Management of Nutrient-Reducing Septic Systems

Presentation, 50 minutes

Abstract:

As communities across the country work to implement programs requiring the use of nutrient-reducing septic systems to help mitigate the effects of harmful algal blooms (HABs), it is becoming increasingly important to streamline and regionalize the process for acceptance, use, and management of these technologies. In 2015, thanks to work from the EPA, representatives from Delaware, Maryland, Pennsylvania, Virginia, and West Virginia signed a Memorandum of Cooperation to share data related to the performance of nitrogen-reducing septic systems. This approach centered around the Chesapeake Bay Watershed area and allowed for a holistic regional approach to mitigating nutrient pollution from onsite wastewater sources. In addition, it provided regulators with the necessary tools to permit these technologies and prevented delays associated with manufacturers seeking approvals in the 5 represented states. In 2016, EPA tried to continue these efforts with the New England/Long Island Data Sharing initiative but the efforts ultimately stalled. However, all was not lost as the recommendations have been adopted on Long Island, where regulators seek to upgrade over 400,000 conventional septic systems and cesspools to nitrogen-reducing technologies. Both Suffolk and Nassau Counties have developed stringent, science-based regulations for the acceptance, use, and management of nitrogen-reducing septic system technologies. These acceptance processes allow manufacturers to submit data from other Jurisdictions and require a statistically significant dataset to prove a technology's nitrogen reduction capabilities. This presentation will explain the benefits of revisiting the New England and Long Island data sharing initiative, review the technology acceptance process on Long Island, outline existing obstacles with individual state and county approval processes, and outline an approach to develop regionalized SOPs without sacrificing the control of local regulatory jurisdictions.

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Reed Johnson, Orenco Systems, Inc.

Virginia's County Ordinance; A Rural Environmental Injustice.

Presentation, 50 minutes

Abstract:

This presentation will evaluate rural environmental injustices where no municipal sewer exists. We will review the homeowner's and Reed's actions to identify steps to solve this injustice. James City County, Virginia, has supported an arbitrary capricious local county ordinance to deny a homeowner a direct discharge permit where there is no other reasonable solution. This denial affects all county onsite treatment owners whose property can be condemned when the primary and reserve fails. The current state of a call to action" is under review by the State Attorney General's office of the state of Va. Does a county, through local ordinances, have the right to condemn a home where a state-regulated solution provides relief?"

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Jon Kaiser, Infiltrator Water Technologies
Ashley Donnelly, Infiltrator Water Technologies

Worst Case Scenario: Design and Installation considerations for Difficult Sites

Presentation, 25 or 50 minutes

Abstract:

Decentralized system engineers, designers, contractors, and regulators often encounter challenging sites. The challenges include limiting layers, tight soils, high water table, site elevations, steep slopes, set-backs, maximum system depths (system soil cover) contaminants of emerging concern, and environmentally sensitive areas to name a few. This presentation will discuss possible solutions to these challenging site conditions.

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Jeffrey Kerr and Jonathan Godfrey, Onsite Wastewater Professionals

Tech Tools for Your Onsite Wastewater Business

Presentation, 50 minutes

Abstract:

This class is designed for onsite wastewater professionals who want to learn how to leverage technology to streamline their business operations and improve their bottom line. Attendees will learn about the latest tech tools and software solutions for managing day-to-day tasks, tracking projects, and increasing efficiency. This Tech Tools for Your Onsite Wastewater Business class is designed to provide onsite wastewater professionals with the knowledge and skills necessary to leverage technology to streamline their business operations and increase efficiency. Through a combination of presentations, case studies, and discussions, attendees will gain valuable insights into project management software, financial

management tools, customer service solutions, and more. Attendees will also learn how to select the right tech tools for their business needs and implement them effectively.

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David Lentz, Infiltrator Water Technologies

Pipes, Pores, and Other Pathways of Hydraulic Engineering Principles for Onsite Installers

Presentation, 50 minutes

Abstract:

Water flow is a critical aspect of onsite wastewater treatment systems. Understanding its behavior is essential for effective system design, operation, and maintenance. This presentation covers a range of engineering principles associated with water flow in, around, and over onsite wastewater systems. The discussion encompasses foundational elements of hydraulic engineering such as flow in pipes, water pressure, water hammer, flow in dispersal media and soil pores, and vegetated and unvegetated open channel and overland flow. The presentation delves into the fundamental principles underlying each flow mechanism and investigates their interactions within the context of onsite wastewater treatment systems through case studies. The insights gained from this discussion can aid in understanding the mechanics of onsite wastewater treatment systems, leading to improved construction, operation, and maintenance for industry practitioners.

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Zachary Lowenstein, EPA, multiple co-presenters

Closing America's Wastewater Access Gap Technical Assistance Initiative: Challenges and Opportunities in Improving Rural Wastewater Infrastructure and Community Resilience

Presentation, 50 minutes

Abstract:

As part of the U.S. Environmental Protection Agency (EPA) and U.S. Department of Agriculture Rural Development's (USDA-RD) Closing America's Wastewater Access Gap Community Initiative, eleven communities across rural and historically underserved areas of the country, including tribal lands, are receiving technical assistance (TA) to address long-standing wastewater challenges. Community assessments were conducted to understand wastewater needs and challenges, which leveraged the use and analysis of public and community-provided information, including census and geospatial data. Based on the assessment of need, built and natural environment, site reviews, and community input, recommended solution options were developed for each community. For example, a proposed solution for one community included a phased approach for multiple cluster systems in more densely populated areas and onsite upgrades or repairs for residents in more sparsely populated areas. In addition to the development of potential solutions, the team assisted in identifying planning and construction funding. A panel discussion will highlight several challenges and opportunities to this unique approach to TA for rural and underserved communities. Some of these challenges include the lack of digital data or asset inventory in rural communities, developing interlocal agreements, navigating hyperlocal political dynamics, and overcoming specific limitations with federal funding. Direct community engagement in

collaboration with local partners and TA providers driven at the federal level is novel and developing a pilot project has allowed for a greater understanding of the work needed to achieve clean water and sanitation in rural communities.

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Gary MacConnell, MacConnell & Associates, P.C.

On-Site Community Wastewater Systems Offer an Environmentally Friendly Alternative to POTWs

Presentation, 25 minutes

Abstract:

Community on-site wastewater systems have been the preferred method of wastewater treatment and disposal, when access to publicly owned treatment works (POTW) are not available. Community systems can provide the benefits of a POTW without some of the concerns of individual onsite systems. Technologies available today can produce re-use quality water which can be beneficially used within the community. This provides for an environmentally friendly option for wastewater treatment, and results in the effluent being a valuable resource. Case studies are presented to illustrate how community systems can provide for an environmentally conscious development using current treatment and disposal" options. Cost-effective design options for collection systems are also discussed. Ownership and management alternatives of the wastewater system are discussed along with possible financing mechanisms. This presentation is designed to give a general overview of community systems, along with site specific features.

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Lola Maratita, USDA Rural Development

Rural Decentralized Water Systems Program

Presentation, 25 minutes

Abstract:

The Rural Decentralize Water Systems (DWS) is one of many programs under Rural Utilities Service's, Water and Environmental Programs (WEP). DWS provides grants to qualified nonprofits to create loans revolving loan funds to increase access to safe and reliable drinking water and helps improve sanitary conditions caused by inadequate septic systems for eligible individuals in rural areas with populations of 50,000 or less. With 30% of US population living on decentralized systems, all rural residents deserve the long-term public health, environmental and economic benefits to adequate decentralized water and wastewater systems. This paper will provide an overview of WEP funding programs, discuss eligibility and the application process.

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Jillian Maxcy-Brown, University of Alabama

Analyzing the Affordability of Wastewater Management for Onsite Wastewater Treatment Systems and Sewer Networks in Alabama

Presentation, 25 minutes

Abstract:

Wastewater affordability has become a pressing concern in the U.S. as the cost of collecting and treating wastewater continues to rise rapidly and reports have revealed that millions of residents are currently experiencing a lack of access to proper wastewater management. Affordability discussions have typically focused on monthly billing, an approach that does not incorporate the 25% of households in the U.S. that are not connected to networked sewer systems. Such decentralized users are responsible for managing their wastewater with onsite wastewater treatment systems, including both the ongoing costs for maintaining the system as well as the associated capital cost of the system, the latter of which is typically "hidden" in mortgage or rent payments. While previous affordability studies have focused on capturing wastewater affordability at the national scale or through the use of indirect data and exclusion of households not connected to networked systems, to the best of our knowledge, this study will be the first to develop state-level wastewater affordability maps that account for both networked and onsite wastewater systems. This study develops wastewater affordability maps for Alabama based on EPA's affordability guidelines using data from the Alabama Department of Environmental Management (ADEM), local utilities, the Alabama Department of Public Health (ADPH), and the U.S. Census Bureau. This study also looks beyond the EPA's use of MHI (50% of households have a lower income) and proposes a methodology that accounts for income inequalities by using census-tract level household income data to quantify the households across the income brackets that have unaffordable wastewater access.

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Dominic Mercier, NOWRA

Challenges and Misconceptions of Gravity Distribution

Presentation, 25 minutes

Abstract:

All soil-based system are designed based on soil permeability and hydraulic loading rates. This implicitly takes for granted that the effluent is uniformly distributed over the receiving soil or filtration media. This is far from reality and often distribution of effluent is inadequate and uneven from day 1 or rapidly become uneven from soil settling, freeze/thaw cycles, etc. This may lead to several adverse effects such as premature clogging, reduced life expectancy and underground water contamination. This presentation will shed light on this topic, discuss limitations of some of the most common techniques for effluent distribution and give tips how to make distribution more efficient.

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Stephen Moeller and Gig Drewery, RioVation

A Perspective on Treatment in the Soil vs Treatment in the Tank

Presentation, 25 minutes

Abstract:

Collectively, onsite systems in the US generate more than 4 billion gallons of septic effluent daily. This is likely a conservative estimate! This presentation looks back in history beginning with the Biblical injunction found at Deuteronomy 23:12, 13 which states: “A private place should be designated for use outside the camp, and there is where you should go. A peg should be part of your equipment. When you squat outside, you should dig a hole with it and then cover your excrement” to where we are today in the onsite wastewater industry. We look at modern history to get an understanding on what has and has not been working with soil-based treatment of septic effluent. While Soil is an Excellent Medium for Wastewater Treatment less than 1/2 of the soils making up the United States are suitable for Wastewater Treatment according to most estimates. Additionally, we are facing increasing challenges from climate change which is compounding the issues of environmental degradation resulting from incomplete septic effluent treatment in the soil. These and other issues come with various quantifiable costs. We explore the options of more advanced treatment in the tank while allowing the soil to provide final treatment and polishing of the effluent. The advantages of both suspended growth and attached growth biofilm technologies are considered along with the costs associated with advanced treatment.

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Janie Moore and Anish Jantrania, Texas A&M AgriLife Research

Evaluating Student Learning and Knowledge Gain During an Undergraduate Summer Reuse Water Research Experience

Presentation, 25 minutes

Abstract:

A survey was administered to undergraduate students participating in a summer research experience at Texas A&M University to assess their knowledge gains, self-evaluation of skills, and attitudes toward the research area. Participating students spent five weeks working on a reuse water system in conjunction with classroom reinforcement and interaction with agricultural extension personnel. Over the course of four years, 40 students from 15 universities provided survey responses. From the start to the end of the summer research program, students' knowledge gains and self-evaluation of skills almost always increased. The students' enthusiasm, interest, and willingness to pursue a career in reuse water decreased from the beginning to the conclusion of the summer program during the year immediately following COVID-19. Despite this decline, there have been enough successes for us to conclude that the experience is facilitating the transition of students into extension positions. This research was performed under a USDA-NIFA REEU “Integrated High Impact Extension, Research, and Education Program for Undergraduate Students in Water Quality projects” using onsite wastewater treatment systems.

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A. Robert Rubin and Joelle Wirth

Is There a Reinvented Toilet in Your Future

Presentation, 50 minutes

Abstract:

This presentation and the update on the Reinvented Toilet adoption process. Efforts continue worldwide in getting these toilets to production. The presentation offers an overview of -- the Reinvented Toilet, "a factory-built product that provides complete treatment of human waste on site, without connection to a sewer network or septic tank, and meets all performance requirements of ISO 30500 and identical US and Canadian national standards."

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Larry Oxenham, American Society for Asset Protection

Don't Kill Your Golden Goose- Protect your Business & Save Thousands in Taxes

Presentation, 50 minutes

Abstract:

Is your financial house in order? Discover the tools you can use to become invincible to lawsuits, save thousands in taxes, and achieve financial peace of mind. By the end of the presentation, you will know how to: 1) Protect 100% of your assets from lawsuits. You will learn how to make yourself so unattractive to a plaintiff attorney that they will never pursue a lawsuit against you. 2) Save thousands of dollars each year in taxes. You will learn five tax reduction strategies most people fail to utilize, which could save you more than $10,000 each year in taxes. 3) Avoid probate and eliminate all estate taxes. You will be taken through a checklist of items that are important to every estate and business succession plan. You will learn what you should be doing now to prepare for successful business and estate succession. “It takes a lifetime to accumulate your assets. Take the time to protect them.”

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Sushama Pradhan, NC DHHS

Clean Watersheds Needs Survey: How Much Do We Need?

Poster

Clean Watersheds Needs Survey (CWNS) is the only national survey of needed wastewater infrastructure improvements in the country. The survey is a comprehensive assessment of capital investment necessary to meet the water quality and water quality-related public health goals of the CWA. The EPA approved State Specific Approach was used to estimate decentralized wastewater treatment systems (DWTS) needs in the state over a 20-year period from 2022 to 2042. DWTSs are an important part of North Carolina’s wastewater infrastructure, especially in rural and remote areas. There are over four million occupied homes in North Carolina and approximately 50% of those homes utilize DWTSs. Only DWTSs with subsurface dispersal were included in this survey. DWTSs needs have been under-reported for North Carolina and nationally. In 2008, only 26 states reported their DWTS needs. The total DWTS needs reported in 2008 were $23.9 billion, including North Carolina’s $6 million. In 2012, only 27 states reported their needs, and those reported needs were 19% lower than what was reported in 2008. The EPA continues to experience challenges documenting DWTS needs. North Carolina’s estimated needs reported in the 2022 survey is $4.3 billion. DWTSs can provide underserved and economically challenged communities with viable, more economical/cost-effective options for wastewater collection, treatment,

and disposal. Such systems may be the solution for those unable to afford expansion of the sewer lines, connection costs, and associated usage fees in areas with no centralized wastewater treatment facilities.

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Sushama Pradhan, NC DHHS

Environmental Justice: Water and Wastewater Infrastructure in HMCs

Presentation, 25 minutes

Abstract:

Proper disposal of wastewater and a supply of safe drinking water are basic needs of all human beings. Approximately half of the population in North Carolina utilizes on-site wastewater systems (aka septic systems) and many communities that rely on these systems also utilize private groundwater wells for their drinking water. After the installation of a septic system, it is the owner's responsibility to ensure their system is properly maintained and functioning to keep the public and the environment safe. Water from private wells is not routinely tested unless the property owner arranges for sample collection and pays for the sample analysis. Such proactive water quality assessments may be cost-prohibitive for individuals and families in impoverished communities. This inability to properly assess the drinking water may be a contributing factor to some health disparities experienced in North Carolina. To examine potential contributing factors, wastewater and well water samples were collected and analyzed for total dissolved nitrogen, nitrate-nitrogen (NO3-N), E. coli, total coliform and per- and polyfluoroalkyl substances (PFAS) from 18 sites with both septic systems and private wells. These sites are located within a 15-mile radius of the Chemours Fayetteville Works Facility which has been identified as a major source of PFAS found in the Cape Fear River. The mean nitrogen and E. coli concentrations in wastewater were 66 mg/L and 89,478 MPN/100mL respectively. However, none of the drinking water samples contained E. coli and the NO3-N concentrations were all below the maximum concentration level of 10 mg/L indicating that groundwater (with regards to nitrogen and E. coli) sampled from the water supply wells was not influenced by wastewater discharges from the septic systems.

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Emmy Radich, Infiltrator Water Technologies

The Role of Onsite Wastewater Recycling in Sustainable Community Development

Presentation, 50 minutes

Abstract:

As onsite wastewater treatment and recycling technologies continue to evolve, the next generation of treatment systems must continue to capitalize on opportunities to reduce cost and footprint while increasing robustness, reliability, and performance. In particular regulatory agencies are moving more and more to protect water resources through rules requiring systems to meet ever-increasing effluent criteria. This presentation unveils new opportunities toward the development of next generation technologies that address coming needs of the water recycling industry while showcasing potential avenues that offer the potential for value-add through various pathways of waste utilization and water recycling. A broader view of sustainability as it pertains to the community-scale is necessary as various

disparate, heterogeneous industries seek to achieve needed gains in this area. Simultaneously closing the loop on the circular water and energy economies will drive society toward sustainability synergistically since both of these critical resources are essential components of sustainable community development.

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Danna Revis, VOWRA

Repair Basics

Presentation, 50 minutes

Abstract:

A malfunctioning onsite sewage system is a homeowner's worst nightmare as well as a threat to public health. While there are some onsite sewage system problems that can be solved without replacing the system, replacement is often the best option.

With an anxious homeowner looking over our shoulder, developing a repair strategy is the ultimate challenge for the onsite professional. First, determine and document the cause of the current failure: water use, soil, component failure, etc., by observing system components and interviewing the homeowner.

Knowing the cause of the failure, we can move forward with plans to repair. Component replacements are straightforward to design. If a system replacement is necessary, identifying a suitable site and treatment level is the next challenge. While we can break some rules for repairs, we must be sure that the result will be a reliable fully functional system for the homeowner and that the solution protects public health. This presentation will cover these steps and the corresponding decisions in developing a repair strategy.

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Kaitlin Rinke, NSF

What Does an NSF Certification Mean - How to Obtain and Maintain an NSF Certification

Presentation, 25 minutes

Abstract:

At the conclusion of the presentation the attendees will be able to: Discuss what the NSF is and their history. They will be able to explain NSFs purpose within the onsite industry and how they came to be recognized as the leader for setting standards for sanitation in the country. Identify what steps are taken by the NSF to review, evaluate and certify OWTS products that are on the market. They will be able to describe the protocol that is in place to ensure that the product meets certain sanitary and regulatory requirements before it receives the NSF seal. Explain what it means to a product to receive the NSF certification. The attendees will be able to discuss how this certification sets it apart from non-certified products and this certification raises the bar for manufacturers within the OWTS industry as a whole. Describe the importance of maintaining the NSF certification for a product and why this is not a one and done process. Products must continue to perform at a prescribed level to maintain their certification.

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James Roberts, WaiHome LLC

Hawaiian Hotspot: The Case for Hawaiian Innovation in Onsite Wastewater Treatment

Presentation, 25 minutes

Abstract:

In Hawaii, murky bacteria-rich beach conditions follow regular storm events as a result of an outdated stock of overflowing coastal septic systems and cesspools that serve 38% of the population. Hawaii's inland septic systems and cesspools also pose a risk as they're situated above drinking water aquifers that provide 99% of the island state's drinking water. This has led to a statewide ban on cesspools and a partial ban on septic systems that will trigger 88,000 upgrades over the next 30 years. Unfortunately, a state economic review has shown that at an average replacement cost of $23k per household, 97% of Hawaiian homeowners won't be able to afford this upgrade. Even fewer in areas where poor performing septic tanks are not permitted. Further, many Hawaiian cesspool owners live in areas where long-term infrastructure investments inherently don't make sense - 10% in sea-level rise affected areas and 20% in volcanic high hazard areas. The constraints for onsite wastewater treatment in an island State like Hawaii aren't unique, they're just emphasized. Underground systems on the mainland require expensive excavation and are inflexible to evolving needs and conditions. Underground systems in Hawaii require excavation through up to eight feet of volcanic basalt and may be buried by the next lava flow. Septic systems and cesspools may affect well water quality for some rural residents. Septic systems and cesspools in Hawaii are situated over the island's only fresh water supply and regularly pollute the coasts to the point that surfers get sick. Treatment technologies and practices that respond to the exaggerated constraints of an island market will make for more sustainable and affordable long-term water management practices beyond. WaiHome is a small Hawaii based research and development firm focused on the next generation of compact, aboveground treatment and disposal methods.

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Gregory Rouland, Master's Student at Michigan State University

Meat Wastewater Characterization and Decentralized Wastewater Treatment Technologies

Presentation, 25 minutes

Abstract:

Meat processing industry wastewater contains high amounts of organic matter [chemical oxygen demand (COD) and biochemical oxygen demand (BOD)], total phosphorus (TP), total suspended solids (TSS), total nitrogen (TN), and fats, oil, and grease (FOG)]. However, little data exists characterizing the amount and concentration of these constituents in the wastewater and the best decentralized treatment approach. Further, there is great variability among meat processing facilities dependent upon processing functions (i.e., slaughter, non-slaughter, curing and smoking), species of the animals being processed, and treatment practices. In Michigan, past permits have required annual testing, which only provides a snapshot of the system that may not be representative of the land-applied wastewater. Because these systems are highly variable, developing a site-specific sampling protocol for each facility is

essential. As part of this research, wastewater produced by 6 representative, small-scale meat processors that use detention lagoons were collected 6 times to assess the characteristics and variability of the wastewater and determine which meat processing and treatment practices most impact wastewater composition. Data will also be used to drive experimentation regarding the use of coagulation/flocculation systems as well as membrane filtration for onsite treatment. The ultimate goal of this project is to establish a decision-support tool that can be used by the industry to determine what needs to be done to meet regulations.

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Nicole Sandberg, Virginia Dept. of Health

Funding Installations: Virginia's Septic and Well Assistance Program (SWAP)

Presentation, 50 minutes

Abstract:

The Commonwealth’s wastewater infrastructure policy articulated in Â§ 62.1-223.1 states that it is the policy of the Commonwealth to prioritize universal access to wastewater treatment that protects public health and the environment and supports local economic growth and stability. Over half of the approximately 1.2 million onsite sewage systems in Virginia are reaching the end of their usable lifespan, and the majority of the over 700,000 private wells are not regularly tested for water quality. Based on a recent onsite wastewater needs assessment, it is estimated that nearly $5.5 billion (or $252.5 million/year) will be needed over the next 20 year to correct failing septic systems or connecting septic systems to public sewer systems. The Virginia Septic and Well Assistance Program (SWAP), established in January 2022, had a goal of utilizing $9.6 million in funding to assist low-income homeowners to fix their failing septic systems and inadequate private drinking water wells. Originally slated to take 4 years to complete, in less than 8 months, without any publicity, over $8.8 million in requests for assistance was received and the program is on track to complete the installation of nearly 300 projects in less than 2 years; having already installed nearly 140 projects as of May 2023. The success of the SWAP initiative will be discussed, including highlighting the critical dependence on its local partners, environmental health specialists and area onsite wastewater and well driller professionals (for design and installation).

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Kevin Sherman, SeptiTech, Inc.

Understanding the Microbes Responsible for Nitrogen Transformations

Presentation, 50 minutes

Abstract:

When pondering the numerous chemical transformations of nitrogen, it may surprise some that the majority of those nitrogen transformations occur exclusively inside living cells. Those wishing to better understand the details of the transformations of nitrogen must develop at least a basic understanding of taxonomy (the classification system of living things), the circumstances that microorganisms face on a minute-by-minute basis, and how they react to the presence of oxygen in their environment. Diatomic nitrogen gas (N2) is the most abundant free element in the Earth’s atmosphere and makes up about

78% of it. Nitrogen is also prevalent in living things, as it is part of various vital components of organisms, including proteins, amino acids, DNA, RNA and in the energy currency of the cell, ATP. The chemistry of the nitrogen atom is unique and the range of nitrogen containing chemicals have properties from inert to explosive in nature. The nitrogen cycle is the biogeochemical cycle by which nitrogen is converted into multiple chemical forms as it circulates among atmospheric, terrestrial, and marine ecosystems. In general, the nitrogen cycle has five steps: Nitrogen fixation (N2 to NH3/ NH4+ or NO3-) Nitrification (NH3 to NO3-) Assimilation (Incorporation of NH3 and NO3- into biological tissues) Ammonification (organic nitrogen and any chemical in which NH 2 groups are converted into ammonia or its ionic form, ammonium (NH 4 +) as an end product. Biological nitrogen reduction is, ironically, unfathomable until one comes to understand the organisms involved in the process and the microbial ecology of the nitrogen cycle.

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Larry Stephens, Stephens Consulting Services PC

The Case for Narrow Trenches in Soil Dispersal Systems

Presentation, 50 minutes

Abstract:

Back in the 1960's substantial research was conducted at the Sanitary Engineering Research Laboratory, College of Engineering at the University of California, Berkley. The researchers for this project were P.H. McGauhey and John H. Winneberger, and the research seems to be part of the body of work that formed a basis for the original Manual of Septic-Tank Practice published by the U.S. Department of Health, Education and Welfare, Public Health Service (HUD). The "Manual" was printed in 1957, revised in 1967 with the final printing in 1969. The Manual of Septic Tank Practice was the most comprehensive reference document for onsite septic tank and soil absorption system construction of that early era. Several papers were published as a part of this research during that time period. One of the most comprehensive was called "Summary Report on CAUSES AND PREVENTION OF FAILURE OF SEPTIC-TANK PERCOLATION SYSTEMS" by McGauhey and Winneberger in May of 1963. This work appears to be the most comprehensive summary of the state-of-the-art of the emerging onsite wastewater industry of the 1960's. To this day, the conclusions and recommendations of this research have had a lasting impression on this designer. One of the most striking facts of the onsite wastewater industry is that many of the conclusions and recommendations of this comprehensive research have been ignored or gone unnoticed by most practitioners in the onsite industry for half a century now. Most notably among the findings is the importance of sidewall infiltration to the longevity of soil infiltration systems. In fact, one of the "Criterion" suggested in this document is that: "The leaching system should provide a maximum of sidewall surface per unit of volume of effluent, and a minimum of bottom surface." The case for this principle will be discussed in this presentation.

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Mike Stidham, EZ Treat

Design Challenges with Liquid Effluent Collection

Presentation, 50 minutes

Abstract:

This presentation addresses frequently experienced design problems with liquid effluent collection systems that may be overcome with additional planning and consideration of the long-term operation and maintenance. The liquid effluent collection is prevalent in the Eastern States; however, this is a new topic for the Southwestern region of the US. The current rules are basically gravity fed collections that often result in the system being 12' to 15' in the ground before reaching the treatment plant. It also forces the engineer to employ very large septic tanks of 30,000 to 50,000 gallons making them impossible to maintain. The audience will take away the differences in the types of collection systems available and the pros and cons associated with each approach.

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Robert F. Sweeney, REHS, Environmental Management Systems, Inc.

Role of Consensus in Science, Public Policy and Problem Solving

Presentation, 50 minutes

Abstract:

Consensus plays a crucial role in science, public policy, and problem-solving processes. In the context of science, consensus is the collective agreement among experts in a field regarding a particular theory, hypothesis, or experimental result. Through peer-reviewed research and rigorous scrutiny, consensus emerges when the majority of scientists have examined the evidence and reached similar conclusions. Consensus provides a foundation for scientific progress, as it helps distinguish well-established ideas from speculative or unsupported claims.

Use, Abuse, Biases and Propaganda leads to diminished public trust in all of our institutions. This is highly relevant to various environmental practitioners, including regulators, designers, installers, engineers, and academics. This presentation addresses several key points:

1. Scientific Method: Environmental practitioners can strengthen their understanding of how to conduct reliable research, collect accurate data, and draw robust conclusions. This is paramount for regulators, designers, and engineers who rely on scientific evidence to make informed decisions and develop sustainable solutions.
2. Problem Solving for Engineering and Technology: Environmental practitioners often face complex challenges, requiring effective problem-solving skills. This presentation explores approaches specific to engineering and technology fields, enhancing their ability to address environmental concerns.
3. Diminished Public Trust in Science and Institutions: The presentation delves into the factors that contribute to diminished public trust in science and various institutions. Environmental practitioners must be aware of these factors to address public concerns, communicate science effectively, and rebuild trust, essential for all professionals working in the field, as public cooperation is crucial for implementing environmental policies and projects successfully.

By understanding these concepts and their implications, environmental practitioners can enhance their proficiency in research, problem-solving, and communication, ultimately leading to better outcomes in environmental science and engineering.

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Robert F. Sweeney, REHS, Environmental Management Systems, Inc.

Wastewater Recycling & Reuse: Not a Prescriptive Formula

Presentation with paper, 50 minutes

Abstract:

Modern Onsite Wastewater Treatment and Recycling Systems have all the capability of public systems, with heavy reliance on the natural environment for the final tertiary treatment. These systems do not follow cook-book approaches, but require a deeper understanding of wastewater characteristics, quantity and quality, the treatment technologies, and the interaction of effluent with the receiving ecosystem. This presentation compares and contracts performance-based recycling systems with common practices using tried and true enforceable traditional prescriptive code disposal technology.

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Tammy Trantham, Missouri Smallflows Organization

Panel: State Association Management and Membership Growth

Presentation, 50 minutes

Abstract:

Members are the backbone of any association. This session will look at how associations can recruit and retain members. Panelists will discuss what has worked and not worked in the state associations to drive membership. Panelists are from different sized organizations which will provide varying viewpoints for your membership drive. Discussion with the audience will also be included to discuss ideas and potential plans to build our industry.

The success of any state-wide association requires some work. Associations approach this in different ways whether with a Board of Director Management style or hiring an Executive Director. Many times, this is dependent on the size of the association and budget constraints. This session will have panelists from both perspectives to discuss what works and what doesn't work to build the association.

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Steven Thomas, VA Dept of Health

Ksat of High Shrink Swell Soil Horizons

Presentation, 50 minutes

Abstract:

The need: The Commonwealth of Virginia Sewage handling and Disposal Regulations (12VAC5-610-10 et seq.) specifies designs of septic systems utilizing soils with soil horizons having estimated percolation rates between 1 and 120 minutes per inch. New regulations allow the use of soils with higher percolation rate when designed under an engineer. The professional onsite community typically is not

well versed in estimation of percolation rates above 120 minutes per inch, and there is an economic push in the Northern Virginia area to use soils that have generally been outside of the allowed range of permeability for design of onsite sewage systems. The Virginia Regulations for Alternative Onsite Sewage Systems (12VAC5-613-10 et seq.) also require water mounding calculations where permeability limiting features exist within 18 inches of the ground surface or from the treatment works disposal point in soils proposed for onsite soil absorption systems (12VAC5-613-80.12.a.iii) Better estimates of hydraulic conductivities of these types of soils are needed. The research: Saturated hydraulic conductivity testing was conducted in soils mapped by USDA Natural Resources Conservation Service (NRCS) as Jackland soil series, having high shrink swell horizons denoted by the "ss" suffix in soil profile descriptions. The research was conducted in March and September of 2016 utilizing Compact Constant Head Permeameters and Johnson Permeameters. The results: Soils as mapped by NRCS as Jackland having "Btss" horizon designations were tested, and the resulting geometric mean was 0.572 cm/day (estimated at 1212 minutes per inch). Average Ksat was 0.220 cm/day (estimated at 4053 minutes per inch). Using these more accurate permeability rates when conducting water mounding calculation results in better estimation of the mounding potential and often result in design modifications.

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Kevin White, University of South Alabama

Seeking Sustainable and Replicable Wastewater Solutions for Rural, Underserved Communities in the 16-County Alabama Black Belt

Poster

Abstract:

The Consortium for Alabama Rural Water and Wastewater Management (CARWW) was formed in 2018 to foster collaboration amongst academic institutions, regulators, private industry, elected officials, and citizens to find wastewater infrastructure solutions. Soils in this region are impermeable (traditional drain fields don't work) and low population density and poverty have prevented appropriate wastewater infrastructure implementation. The combination of insufficient infrastructure and failing onsite wastewater systems puts the area at a high risk for public health and environmental health hazards. This group created a regional plan for upgrading existing small town sewer systems, identifying clusters of 100+ homes within a 5-mile radius for sewering, and secured funding for begin the installation of onsite systems for residents not served by municipal sewer or clusters. Consortium members have partnered with Columbia World Projects (CWP), USDA, and has recently received ARPA funds from the state of Alabama to begin plan implementation, including a decentralized wastewater demonstration in the Black Belt. The goal of this demonstration is to show how utilizing appropriate decentralized collection, treatment, and disposal infrastructure typologies can minimize capital costs as well as long term operation and maintenance costs. With the current American Rescue Plan Act (ARPA) and Bipartisan Infrastructure Law (BIL), capital funds are available to communities--this is a once in a generation opportunity to get wastewater infrastructure established in underserved rural areas without (in many cases) the need for capital cost recovery. Opportunities such as these are invaluable for economic development of impoverished communities in the Alabama Black Belt. Details of this project are made available to the public via the consortium website at http://ruralwastewater.southalabama.edu/.

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Daniel Wickham, SludgeHammer Group Ltd.

Protecting Lake Water Quality with Biology

Presentation, 50 minutes

Abstract:

We love lakes because of their biology, but it can be a two-edged sword. Oligotrophic Lakes with low nutrient concentration produce such a low level of biological production that organic matter does not accumulate, and water clarity is pronounced. This makes them very fragile because it takes miniscule amounts of nutrients such as phosphate to tip them into a higher level of production. This shows up as increased algae production causing an accumulation of organic matter in the water. Over time this accumulation can create a vicious cycle leading to massive deterioration of lake water quality. The biology now becomes the problem. But we have seen that biology can also be the solution if applied correctly. This presentation will discuss nutrient cycling in lakes, sources of nutrients around lakes, and innovative management techniques that can reverse many of these impacts to bring waters back to their earlier state.

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Sara Wigginton, Massachusetts Alternative Septic System Technology Center

Shubael Pond Project:

Poster

Abstract:

Through a partnership among The Massachusetts Alternative Septic System Technology Center, The U.S. Environmental Protection Agency's Office of Research and Development, and the Barnstable Clean Water Coalition, enhanced Innovative/Alternative septic systems have been deployed, monitored, and maintained at a neighborhood-scale in Barnstable County, Massachusetts. In 2021 and 2022, 13 such systems were installed in close proximity in an area of high unsewered housing density immediately west of Shubael Pond in Barnstable, Massachusetts. Each installed I/A system is being monitored monthly for nitrogen, phosphorus, and standard performance indicators and being inspected at least quarterly. Measures were made on influent, effluent, and system flow to estimate load reduction and final loads discharged to the subsurface. This poster will provide initial monitoring results for the first eighteen months of monitoring and maintenance as well as lessons learned in neighborhood scale I/A deployment.

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Hillary Yonce, Tetra Tech

Decentralized Wastewater Management Planning in Nags Head, NC

Presentation, 25 minutes

Abstract:

Many coastal communities rely on private onsite wastewater treatment or septic systems. These systems are increasingly threatened by sea level rise, ocean over wash, high-intensity short-duration storms, hurricanes, nor'easters, and increasing groundwater table elevations. These challenges can impact septic systems causing a short-term failure or the need for a full replacement. In some cases, the challenges are so great that a property is no longer viable for residential usage and a buy-out is necessary. Additionally, Hazard Mitigation Plans may not include or identify septic systems as part of the communities' critical infrastructure leaving a gap for potential funding sources. The Town of Nags Head Decentralized Wastewater Management Plan (DWMP) update was led by Tetra Tech with collaboration by East Carolina University Coastal Studies Institute to collect groundwater table elevation data. The groundwater collection data was used to determine depth of groundwater table elevations and potential risk to septic systems. Additionally, Tetra Tech reviewed the entire Todd D. Krafft Septic Health Initiative (SHI), water quality data, and developed future conditions planning. The identified risk data will then be used by the Town to increase education and outreach, conduct additional groundwater and water quality sampling, and consider advanced treatment or cluster systems to ensure viability of residential homes. This presentation will detail the proactive changes the Town of Nags Head is making to the DWMP and SHI to ensure the long-term viability of coastal onsite wastewater treatment systems and future community resiliency.

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Mohammed Tamim Zaki, West Virginia University

A Framework for Informing County-scale Sustainable Organic Waste Management in Rural Farming Regions of the United States

Poster

Abstract:

Domestic septic sludge in rural farming regions of the United States is conventionally managed by landfilling and/or land applying in croplands with other organic waste such as sewage sludge, municipal solid waste, and animal manure. Conventional management of organic waste can degrade environmental and human health. Opportunities exist to mitigate such negative impacts by recovering valuable resources from organic wastes at the County level. However, assessing such opportunities at the county-scale can be challenging due to lack of data, limited economic resources, and inadequate policy support to meet community needs. Therefore, we developed a framework utilizing open-source data and methods informed by community engagement to assist stakeholders in rural farming regions in considering strategies to recover resources from organic waste at the county-scale. The framework was applied in Hardy County (one of the largest farming regions in rural West Virginia) to compare the sustainability of current management practices (landfilling of sludge and municipal solid waste, land application of sludge and poultry litter, and transportation of poultry litter out of watershed) with different anaerobic digestion scenarios. The sustainability analysis included environmental (global warming and eutrophication potential), economic (net cost), and social (potential to benefit vulnerable households) factors under multiple weighting scenarios. The results indicated that co-digesting sludge, municipal solid waste, and alum-treated poultry litter would result in the most sustainable organic

waste management under greater weighting of environmental and social factors. However, under greater economic weighting, the highest sustainability would be achieved by co-digesting sludge, municipal solid waste, and poultry litter (without alum treatment). Overall, the framework can be a useful tool for rural farming regions in the United States to promote county-scale organic waste management.

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Fanjian Zeng, Stony Brook University

Attenuation and Mobilization of Phosphorus in Nitrogen Removing Biofilters Treating Domestic Onsite Wastewater

Presentation, 25 minutes

Abstract:

The discharge of phosphorus (P) from decentralized domestic wastewater was considered one of the major contributors to P contamination in fresh water. Among current available onsite wastewater treatment systems (OWTSs), Nitrogen removing biofilter (NRB) is a passive soil-based OWTS composed of a sandy nitrification layer overlying a lignocellulose-amended carbon-rich denitrification layer, with an optional liner surrounding the lower layer to ensure it remains water-saturated. Long-term monitoring (18 months) of the TP levels in NRBs in Suffolk County, New York showed a variety of TP retention efficiency (50.4% - 96.5%) in NRBs with various configurations. To investigate the retention and mobilization of phosphorus in the passive NRBs, bench-scale sand columns were constructed using aged sand (from a 5-year-old lined NRB) and fresh C33 sand. The mobilization potential of P during (i) STE treatment and (ii) natural events (e.g., floods/heavy rains) at various pH levels and loading rates were investigated in both new and aged filters. The result showed that the maximum TP retention rate was 66% in aged sand columns and 94% in new sand columns when septic tank effluent was introduced at 1.2 gallons/(d1Â·ft2). However, > 99% of TP attenuated in both aged and new columns was leached out after 72 hours of leaching experiment at heavy rainfall scenario. This study concludes that P attenuation in sand filters is reversible and the OWTSs installed close to water bodies will pose a risk for significant P leaching. The analysis of TP retention and mobilization in the lignocellulose-amended denitrification layer is currently underway.