Online Learning Academy

November 2023

2023 Tech Sessions Overview

NOWRA has developed twelve (12) **NEW** courses from recorded presentations of NOWRA experts given at education sessions at the 2021 and 2022 Onsite Wastewater Mega-Conference. These courses cover a wide variety of topics and were selected due to their continued relevancy to the decentralized industry.

This national training program with many different instructors includes various formats including video guided PowerPoint presentations, videos, technical documents, and internet links to associated materials. The students set their own pace for training and take any, or all, of the 12 courses (16.5 hours) based on how many hours they need or their interest. The hours assigned for each section are based on the time it took those who piloted the material to complete the course, and the theoretical time it should take to go through the materials. Even though everyone learns at a different pace, it should always take participants the amount of credit hours offered and may take longer.

The 2023 Tech Session Overview curriculum is made up of the following courses which are to be taken as individual courses.

1. TSS and Flow EQ (1.5 hrs.) - https://www.pathlms.com/nowra/courses/51407#
2. High Strength Waste (1 hr.) - https://www.pathlms.com/nowra/courses/51408#
3. Reuse and RV Wastewater (2 hrs.) - https://www.pathlms.com/nowra/courses/51409#
4. Concrete Tank Inspections (1 hr.) - https://www.pathlms.com/nowra/courses/51414#
5. Challenging Waste Streams (1 hr.) - https://www.pathlms.com/nowra/courses/51412#
6. Resilient Wastewater and Pumping Tanks (1.5 hrs.) - https://www.pathlms.com/nowra/courses/51413#
7. Nutrient Removal (1.5 hrs.) - https://www.pathlms.com/nowra/courses/51415#
8. Microbial Inoculator (1 hr.) - https://www.pathlms.com/nowra/courses/51416#
9. Myths, Forgotten Factors and Pump Sizing (2 hrs.)- https://www.pathlms.com/nowra/courses/51417#
10. Concrete Tank Manufacturing (1 hr.) - https://www.pathlms.com/nowra/courses/51418#
11. Remote Monitoring, Automation and Wifi (2 hrs.) - https://www.pathlms.com/nowra/courses/51419#
12. Sludge Release (1 hr.) - https://www.pathlms.com/nowra/courses/51420#

Course Agenda

The details of each course are outlined below.

Course 1 – TSS and Flow EQ (1.5 hr.)

1. Reading – Presentation Slides
2. One Presentation (95 minutes)

   TSS - Sources and Solutions and Flow Equalization

   Presentation #1: Total suspended solids (TSS) is found in all wastewater in varying amounts. The type of facility and activities influence the levels in the raw wastewater. This presentation will provide an overview of methods of quantifying solids in wastewater and typical levels in raw wastewater. The sizing of our primary treatment in septic tanks and the use of screens/filters will be discussed. The reduction of TSS in secondary treatment units such as aerobic units and media filters is another variable impacting TSS. If the levels are elevated it can impact the clogging of filters/screens, media filters, and soil treatment system. This presentation will discuss use, design, and management options to reduce the impacts of TSS on system performance and longevity.

   Presentation #2: Flow equalization tanks are an effective tool for improving the performance of onsite wastewater treatment systems. Flow equalization tanks are typically placed in the treatment train after the first septic/trash tank. Water from the source is collected and time dosed to downstream treatment components. The first tanks are designed for the greatest peak flow rate, but downstream components can treat the water at an averaged flow rate. This averaged flow allows the downstream components to perform more effectively. The presentation will describe the purpose and function of the flow equalization tanks. The selection of the tank will be discussed and key components are identified. The tank components are discussed from a perspective of improving system performance and the associated operation and maintenance requirements. Buoyancy considerations are presented due to the risk of tank flotation. An extremely important part of the flow equalization tank system is the time dosed pump settings. The timer settings are presented. An example is presented on how to determine the timer settings for pump operation. The critical considerations when choosing the timer set points are presented and discussed.

3. **Assessment:** Seven questions with 70% passing rate required.

4. **Instructors**:
   Dr. Sara Heger is a researcher and instructor in the Onsite Sewage Treatment Program in the Water Resources Center and is an Adjunct Assistant Professor in the Bioproducts and Biosystems Engineering Department. For over 20 years, she has been providing education and technical assistance to homeowners, small communities, onsite professionals, and local units of government regarding onsite wastewater treatment. She leads the research program at the UMN currently serving as the principal investigator on grants evaluating groundwater mounding and chemicals of emerging concern. She presents at many local and national training events regarding the design, installation, and management of septic systems and related research. Sara is the Past-President of the National Onsite Wastewater Recycling Association and has also served on the board of the Minnesota Onsite Wastewater Association. Sara serves on the NSF International Committee on

Wastewater Treatment Systems. She is also the chair of the Minnesota State Advisory Committee on Decentralized Systems. She has BS in Biosystems & Agricultural Engineering and a MS and a PhD in Water Resource Science.

Bruce Lesikar is presently a Filtration Application Engineer for United Rentals. Bruce develops rental water treatment systems for industrial customers. The treatment systems provide physical, chemical and adsorption of contaminants. Prior to United Rentals, Bruce was a Professor and Regents Fellow for Texas AgriLife Extension Service within the Texas A&M University System. He has a BS.MS from Texas A&M University and a Ph.D. from the University of Illinois.

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Course Agenda

The details of each course are outlined below.

Course 2 – High Strength Waste (1 hr.)

1. Reading – Presentation Slides
2. One Presentation (56 minutes)

High Strength Waste

High Strength Wastewater (HSW) is generated by numerous types of facilities such as restaurants, RV Parks, Rest Areas, and numerous other facility types. The decentralized wastewater industry must be in a position to serve these types of facilities. There is the design, construction, and maintenance of the wastewater treatment system. This presentation will focus upon the design considerations as required and provide an example and/or case study. In many states for the smaller flow systems codes do not address high strength waste and allow the usage of soil loading rates based upon residential strength waste. This leads to very short design life of HSW facilities. The shortcomings of that design rationale will be reviewed, and a discussion of best practices will be presented.

3. **Assessment**: Four questions with 70% passing rate required.

4. **Course Instructor**:

Dennis Hallahan has thirty years of experience with the design and construction of on-site wastewater treatment systems. He has authored several articles for on-site industry magazines and has given numerous presentations nationally on the science and fundamentals of on-site wastewater treatment systems. Dennis also is responsible for product research and testing at universities, test centers and private consultants. His department develops system sizing charts for national and international approvals and assists customers and field representatives in the planning and review of large commercial decentralized systems. Many of these systems are in excess of a million gallons per day. He received his MS in civil engineering from the University of Connecticut and his BS in civil engineering from the University of Vermont. Dennis is a registered professional engineer in Connecticut. He has been with Infiltrator Water Technologies for 19 years and holds the current position as Technical Director. Dennis also holds patents for on-site wastewater products

and is a member of the Water Environment Federation and of the National Onsite Wastewater Recycling Association.

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Course Agenda

The details of each course are outlined below.

Course 3 – Reuse and RV Wastewater (2 hr.)

1. Reading – Presentation Slides
2. One Presentation (112 minutes)

   Reuse and RV Wastewater **Reuse of Wastewater and RV and Camper Wastewater**

   Presentation #1: Water reuse is an important approach to meeting our long-term water needs. Onsite wastewater reuse systems provide a valuable source of water to meet the landscape irrigation needs. Onsite water management will be implemented on residential and commercial properties to effectively utilize all available water sources. Landscape irrigation with wastewater facilitates property owners to have a conventional landscape even when facing landscape water use restrictions. Site water management is critical when designing a system utilizing all water sources on the property. All water sources are 9 identified and discussed with respect to meeting the customer's water needs. Each Design, installation, operation and maintenance features are discussed for site water. The A water balance will be discussed regarding the water available for meeting landscaping needs for residential and commercial system. An outline is presented for designing onsite wastewater treatment systems utilizing a landscaping water balance approach. The landscaping water needs on an annual basis is reviewed in comparison to water usage in a facility. System features that facilitate easy operation and maintenances actions for system long-term operation are defined.

   Presentation #2: RV parks produce a unique high strength wastewater stream with water conservation playing a large part in producing the concentrated wastewater. This presentation reviews the structure and function of the water and wastewater system in and RV and what it takes to break down the wastewater.

3. **Assessment:** Seven questions with 70% passing rate required.

4. **Instructors**:
   Allison Blodig has been in the onsite wastewater treatment industry since 1997, first as a regulatory official and then in the wastewater treatment manufacturing industry participating in sales, regulatory affairs, design reviews, and training for a national treatment system manufacturer. Currently she is an Engineered Systems Specialist with Infiltrator Water Technologies, a leading developer of decentralized wastewater treatment technology. Along with a degree in Biology from Benedictine College in Atchison, KS, she has been a Registered Environmental Health Specialist and member of the National Environmental Health Association since 1996. She is also very active with the National Onsite Wastewater Recycling Association (NOWRA) and is the current President.

Bruce Lesikar is presently a Filtration Application Engineer for United Rentals. Bruce develops rental water treatment systems for industrial customers. The treatment systems provide physical, chemical and adsorption of contaminants. Prior to United Rentals, Bruce was a Professor and Regents Fellow for Texas AgriLife Extension Service within the Texas A&M University System. He has a BS.MS from Texas A&M University and a Ph.D. from the University of Illinois.

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Course Agenda

The details of each course are outlined below.

Course 4 – Concrete Tank Inspections (1 hr.)

1. Reading – Paper and Presentation Slides
2. One Presentation (55 minutes)

Precast Concrete Inspections: **Concrete Tank Inspections**

Strong, durable, high-quality precast concrete wastewater structures are important components for long lasting and efficient onsite treatment systems. Routine inspections of onsite wastewater tanks – as they arrive on site, after installation, and while they are in service – play a significant role in the long-term performance of the tank and the system as a whole. During this session we will review requirements for tank design and construction and discuss ways you can verify these requirements on site. We will also identify key inspection points – what to look for prior to tank installation, how to conduct an inspection prior to backfill, and how to assess a tank that's in service. We will also discuss crucial steps during installation that could impact watertightness, durability, and safety. This session share tips and examples that are beneficial for contractors, service providers and regulators.

3. **Assessment:** Four questions with 70% passing rate required.

4. **Course Instructor**:

Kayla Hanson graduated from Purdue University in 2013 with a B.S. in Civil Engineering and emphasis in structures. Kayla is NPCA's Director of Technical Services and has been with the association for nearly 7 years. Kayla serves as the staff liaison to NPCA's Wastewater Treatment Product Committee and Grease Interceptor Task Force, and works with these groups to address challenges and opportunities in the onsite wastewater industry. Kayla serves as the Vice Chairman of ASTM Committee C27 on Precast Concrete Products and is actively involved in creating and updating precast-specific wastewater structure standards.

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Course Agenda

The details of each course are outlined below.

Course 5 – Challenging Waste Streams (1 hr.)

1. Reading – Presentation Slides

2. One Presentation (58 minutes)

   Challenging Waste Streams
   Septic systems are being negatively impacted by the use and disposal of varying chemicals, cleaners, medicines, and anti-bacterial products. This presentation will discuss challenges related to RV parks, convenience stores, home breweries, salons, dog grooming, medications in-home health care, and others. Data from related studies will be included and potential solutions offered.

3. **Assessment:** Four questions with 70% passing rate required.

4. **Course Instructor**:
   Dr. Sara Heger is a researcher and instructor at the University of Minnesota in the Onsite Sewage Treatment Program in the Water Resources Center and is an Adjunct Assistant Professor in the Bioproducts and Biosystems Engineering Department. For over 20 years, she has been conducting research and providing education and technical assistance to homeowners, small communities, onsite professionals, and local units of government regarding decentralized onsite wastewater treatment. Sara coordinates the research program at the U of MN focusing on issues related to decentralized wastewater, chlorides, and milk house process water. She has presented in over 30 different states and provinces in North America regarding the science of wastewater treatment including design, installation, and management. Sara is the president of the National Onsite Wastewater Recycling Association, serves on the NSF International Committee on Wastewater Treatment Systems and chairs Minnesota's SSTS Advisory Committee. She has a BS in Biosystems & Agricultural Engineering and a MS and PhD in Water Resource Science.

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Course Agenda

The details of each course are outlined below.

Course 6 – Resilient Wastewater and Pumping Tanks (1.5 hrs.)

1. Reading – Presentation Slides
2. One Presentation (104 minutes)

   Resilient Wastewater and Pumping Tanks
   Presentation #1: Our nation's aging infrastructure is a common theme in the news. We hear about deteriorating roads, high-risk dams, and old and undersized treatment plants. Wastewater infrastructure is critical to society's daily functions, health, and safety, yet it is one of the lowest-rated aspects of our country's framework. Improving wastewater infrastructure involves billions of dollars of repair, rehabilitation, and new construction work. A key to long-term success is to select quality and resilient construction solutions. During this session we will investigate what resilience is and why resilient construction has become a focal point in both centralized and decentralized wastewater projects across the country. We will discuss what factors contribute to resilience and how resilient construction is changing the way wastewater solutions are developed. We will also investigate how resilient decentralized wastewater solutions can improve safety, reduce construction time, reduce costs, and extend service life.

Presentation #2: Pump tanks are used in most secondary treatment systems to collect the treated water and then distribute reuse water into the landscaping around a facility. The pump tank can provide critical information facilitating communication about system performance. Operation and maintenance professionals can use the information gained through evaluating the data gained from these components to inform the customer about the need to perform maintenance activities. Evaluation of pump tanks provides valuable information on the system performance. The water quality in a pump tank following secondary treatment components can indicate to the customer that solids need to be removed from the system. Hydraulic and organic overloading of the treatment system can result in material accumulation in the pump tank. Operational data collected from cycle event counters and elapsed time meters and associated pump performance data can present information regarding the average daily water usage. Comparing the data from the cycle event counter and the elapsed time meter can communicate the need to perform maintenance on the downstream components. The critical components facilitating the collection of the data and how to interpret the data will be described. Data interpretation to communicate maintenance needs will be discussed using example scenarios.

3. **Assessment:** Seven questions with 70% passing rate required.

4. **Instructors**:
   Kayla Hanson graduated from Purdue University in 2013 with a B.S. in Civil Engineering and emphasis in structures. Kayla is NPCA's Director of Technical Services and has been with the association for nearly 7 years. Kayla serves as the staff liaison to NPCA's Wastewater Treatment Product Committee and Grease Interceptor Task Force, and works with these groups to address challenges and opportunities in the onsite wastewater industry. Kayla serves as the Vice Chairman of ASTM Committee C27 on Precast Concrete Products and is actively involved in creating and updating precast-specific wastewater structure standards.

   Bruce Lesikar is presently a Filtration Application Engineer for United Rentals. Bruce develops rental water treatment systems for industrial customers. The treatment systems provide physical, chemical and adsorption of contaminants. Prior to United Rentals, Bruce was a Professor and Regents Fellow for Texas AgriLife Extension Service within the Texas A&M University System. He has a BS.MS from Texas A&M University and a Ph.D. from the University of Illinois.

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Course Agenda

The details of each course are outlined below.

Course 7 – Nutrient Removal (1.5 hrs.)

1. Reading – Paper and Presentation Slides
2. One Presentation (98 minutes)

Nutrient Removal: **Case Study and Research**

Presentation #1: Owasco Lake, located in Cayuga County is one of the New York Finger Lakes and encompasses an area of approximately 6,660 acres. The lake serves as the primary source of drinking water for the City of Auburn and the Town of Owasco. The lake is also a popular spot for fishing and recreational activities. Owasco Lake is on the NYS impaired waterbodies list due to high bacteria counts along the north shore and a recent surge of blue-green algae blooms (cyanobacteria) which are fueled by non-point source nutrient pollution from runoff, wildlife, agriculture, and lakefront septic systems. Historically the algal blooms have been limited to nearshore areas. However, in 2020, although the overall phosphorus loading seemingly decreased, data has shown an increase of cyanobacteria in open water. Coastal Wastewater Solutions, LLC was contracted by The Nature Conservancy to provide a review of the current state of phosphorus removal and loading associated with septic systems and develop and implement phosphorus and nitrogen reducing septic system demonstration program to assist in the advancement of these initiatives.

Presentation #2: Incomplete treatment of wastewater is a source of anthropogenic nitrogen pollution that has adverse effects on water bodies, aquatic life, and public health. In addition, freshwater resources continue to become overstressed by growing human needs, prompting some communities to utilize seawater for toilet flushing instead of potable water. This research investigates constraints and solutions towards construction of robust and sustainable onsite wastewater treatment systems (OWTS) with biological nitrogen removal for systems that use salt water for toilet flushing. Keeping sustainability in mind, a laboratory scale OWTS was designed to make use of passive treatment options, meaning limited to no inputs of energy and chemicals. The system treated domestic wastewater with added salts to bring the salinity to 1.5% and 3.0% to mimic different OWTS seawater flushing scenarios. No salt added wastewater was used as a control. Trickling columns achieved 76% conversion of ammonia to oxidized nitrogen (NOx) under non-saline conditions and 72% conversion at 1.5% and 3.0% salinity. Microcosms were constructed to evaluate different industrial and agricultural waste stream electron donors for denitrification at 3.0% salinity with freshwater controls. Electron donors used were sulfur pellets, sugar cane bagasse, banana stem, and pine chips, with pine chips and banana stem showing the best nitrogen removal rates. Results show biological nitrogen removal as a viable sustainable option.

3. **Assessment:** Six questions with 67% passing rate required.

4. **Instructors**:
   Justin Jobin started Coastal Wastewater Solutions after leaving his position as Environmental Projects Coordinator with the Suffolk County Department of Health Services in March of 2021. Justin is a soil scientist and wastewater management expert with over 20 years of experience with Innovative and Alternative Onsite Wastewater Treatment Systems (I/A OWTS). Coastal Wastewater Solutions was founded to further Justin's commitment to advancing I/A OWTS to address the region's nitrogen pollution crisis. Justin ran several pilot programs in Rhode Island and on Long Island evaluating onsite treatment system viability and performance. Justin previously served 13 years as the Wastewater Management District & GIS Coordinator for the Town of Jamestown, RI, a small island community designated by EPA as a sole-source aquifer, where nutrients from septic systems pollutes ground and surface water just as it has similarly affected Long Island waters. Justin

has also authored several publications on wastewater management and developed curriculum for the New England Onsite Wastewater Training Program at the University of Rhode Island.

Leopold Dobelle with The Hoffmann lab is harnessing emerging technology and science in our explorations of environmental science. In the area of water treatment technology, the group is continuing to explore the use of ultrasonic irradiation, semiconductor phototcatalysis, semiconductor electrochemistry, and combinations of approaches utilizing ozone as a supplemental oxidant in order to eliminate chemical contaminants from water. Leopold is focusing his research on the utilization of advanced oxidation processes for residential on-site wastewater treatment. More specifically, the study of Ultron, a new alternative electro-generating H2O2 on-site coupled to a O3 assistance, very efficient for oxidation of pollutants in graywater. Thanks to his mechanical engineering background, he is assisting research projects on the fabrication of bench prototypes and other testing devices for different wastewater technologies.

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Course Agenda

The details of each course are outlined below.

Course 8– Microbial Inoculator (1 hr.)

1. Reading – Presentation Slides
2. One Presentation (64 minutes)

Microbial Inoculator: **Research on a Microbial Inoculator for Nutrient Removal**
The project is a full-size pilot onsite system that is designed to remove BOD, TSS, TN, and TP. As of this writing the system has been installed and sampling and testing will begin shortly. Project Goals and Objectives: 1. Assess the phosphorus and nitrogen removal effectiveness of a Microbial Inoculator Generator (MIG) onsite wastewater treatment system, 2. Determine the phosphorus removal capabilities of a phosphorus adsorption media, 3. Identify the maximum loading rates and flow rates to the MIG system while achieving groundwater discharge limits. Pilot Anticipated Outcomes: 1. Enhanced nutrient removal capabilities of small-scale onsite wastewater treatment systems, 2. Increased availability of low maintenance phosphorus removal technology.

3. **Assessment:** Three questions with 67% passing rate required.

4. **Instructors**:
Douglas Nelson, PE is an associate professor in the Civil and Architectural Engineering and Construction Management Department at MSOE. He teaches courses in all three programs within the department. His experience with onsite wastewater systems dates back to the mid 1980s when he started teaching and then designing systems. He started and was the charter director of the New York State Onsite Training Network. His memberships include WEF, CSWEA, ASPE, and WOWRA/NOWRA. He has been a certified inspector, maintainer, and soil tester in Wisconsin.

Alexis Countryman is a Masters Candidate in Civil Engineering with a specialization in Water and Wastewater Treatment at the Milwaukee School of Engineering (MSOE.) She has spent the past 4

years focusing her studies on wastewater treatment systems. She is very active in student organizations including Engineers Without Borders (EWB) and Central States Water Environment Association (CSWEA.)In EWB she has been on design teams and travelled to Guatemala pre pandemic and will travel again in July 2022.

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Course Agenda

The details of each course are outlined below.

Course 9 – Myths, Forgotten Factors and Pump Sizing (2 hr.)

1. Reading – Presentation Slides
2. One Presentation (124 minutes)

Myths, Forgotten Factors and Pump Sizing: **Industry Myths, Forgotten Factors in Design and Pump Sizing**

Presentation #1: There are common industry misconceptions in the life cycle of an active wastewater treatment system. This presentation will address these misconceptions through design examples in an audience-interactive format. Addressing these myths can help industry professionals properly design, install, and maintain active treatment systems for optimal system performance and longevity. Some of the myths that will be addressed include misconceptions about septic system odors, the NSF certification (residential vs. commercial applications) and NSF testing specifications, advanced treatment unit performance, septic system sizing (hydraulic loading vs. organic loading), and advanced treatment system startup best practices. Septic system odors could depend on a number of factors including venting, plumbing (overall system design), and influent wastewater characteristics. With NSF-certified advanced treatment system design, it's critical to understand how the treatment systems were tested and what they're certified to. This allows the designer to specify the appropriate treatment technology based on required effluent concentrations. There's also a misconception within the industry on system sizing based on hydraulic loading versus organic loading for advanced treatment systems. In what situations would a designer choose to incorporate organic loading into system sizing versus hydraulic loading alone. Lastly, this presentation will analyze the many myths regarding system startup.

Presentation #2: Climate and altitude have an effect on how the biology reacts in a wastewater treatment system but they are often times not included when sending a system out in the field. They also affect how mechanical parts work and perform in the field. This presentation will review how these factors influence the system performance with specific examples.

Presentation #3: Presentation discussing the difference between Sump, Sewage, Effluent, and Grinder pumps. Going over the SSPMA (Sump and Sewage Pumps Manufacturing Association) information on sizing a pump for the right application, what information is needed to size a pump system, explaining the concept of friction loss in different diameter pipes and determining TDH (total dynamic head), reviewing pump curves, reviewing the filters and screens used in pump applications focusing on drip irrigation systems and the explaining the different filters used on pumps, and on supply lines for drip systems (spin filters vs disk filters). When to use zones for drip

systems, talking about size of zones and how the correct pump is needed to supply the zone sizing and why zoning is used in larger systems tying in the discussion on how zones allow the soils to rest between each pump cycle.

3. **Assessment:** Nine questions with 67% passing rate required.

4. **Instructors**:
   Allison Blodig has been in the onsite wastewater treatment industry since 1997, first as a regulatory official and then in the wastewater treatment manufacturing industry participating in sales, regulatory affairs, design reviews, and training for a national treatment system manufacturer. Currently she is an Engineered Systems Specialist with Infiltrator Water Technologies, a leading developer of decentralized wastewater treatment technology. Along with a degree in Biology from Benedictine College in Atchison, KS, she has been a Registered Environmental Health Specialist and member of the National Environmental Health Association since 1996. She is also very active with the National Onsite Wastewater Recycling Association (NOWRA) and is the current President-Elect. Ashley Donnelly has a passion for building relationships within the onsite wastewater treatment industry through training and technical education. Ashley entered the industry over 19 years ago and works to preserve the environment through sound wastewater treatment solutions. In her position at Infiltrator Water Technologies (IWT), she manages the Inside Sales Team and is responsible for maintaining and building customer relationships. This involves assisting engineers, contractors and regulators with technical and design information, training, installation, and operation & maintenance. In 2020, she launched IWT's webinar program, which is currently accredited in over 10 states and has trained over 2,000 attendees on various contemporary industry topics. She serves on several industry committees, including AzOWRA, TOWA and NOWRA Emerging Professionals. Ashley holds a Bachelor of Arts in communications from Central Connecticut State University. Ashley resides in Connecticut with her husband and their three children. In her free time, she enjoys spending time with family, the outdoors, and volunteering.

   Jonathan Kaiser joined Infiltrator Water Technologies in 2016 as a Project Engineer after graduating with his B.S. in Environmental Engineering from the University of Vermont. At Infiltrator, Jon works with on the design and construction of decentralized wastewater treatment systems. He also works on product regulation and research and development initiatives. Jon is currently perusing a Masters of Engineering at the University of Connecticut with a concentration in Environmental Engineering.

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Course Agenda

The details of each course are outlined below.

Course 10 – Concrete Tank Manufacturing (1 hr.)

1. Reading – Presentation Slides
2. One Presentation (78 minutes)

Concrete Tank Manufacturing

This presentation will address how concrete is manufactured and what is done during that manufacturing to enhance durability of precast concrete tanks. We will examine raw material such as aggregates. Why are certain sizes and types of aggregates selected? How are they tested, and how aggregate moisture is determined for mix design adjustments. We will talk about cements. What types of portland cement are used and why. What supplementary cementitious materials are used and how do they contribute to tank watertightness and durability. We will discuss admixtures, what they do, and why certain ones may be needed for septic tanks. We will examine how mix designs are developed and why one mix design does not work for all precast applications. We will use videos to show how ingredients are batched and mixed in precise sequence and quantities. We will also talk about tank reinforcing. Why do we use rebar or welded wire fabric and determine placement. We will discuss fibers and their potential uses in precast concrete wastewater tanks. We will use video to demonstrate placement of concrete in tank forms. We will talk about proper curing of precast concrete tanks and discuss how they are stripped from the forms, inspected and made ready to deliver. A thorough and insightful look inside concrete that will help manufacturers, designers, contractors and inspectors better understand the process of delivering a product that contributes to treatment system resiliency.

3. **Assessment:** Three questions with 67% passing rate required.

4. **Course Instructor**:
   Claude Goguen has more than 28 years of experience in the precast concrete and construction industry. He holds a degree in Civil Engineering and is a licensed P.E. in Indiana. Prior to his role in technical services with NPCA, Claude was an operations manager at a precast concrete manufacturing plant. Since starting with NPCA, Claude has focused on the onsite wastewater industry and has served as the staff liaison to the NPCA Water and Wastewater Structures Committee. Claude also serves on NAWT and NOWRA education and technical committees and on IOWPA and NOWRA Board of directors. He has presented courses and seminars relating to precast concrete wastewater systems at various federal, state, and regional onsite wastewater meetings over the last 14 years.

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Course Agenda

The details of each course are outlined below.

Course 11 – Remote Monitoring, Automation and WIFI (2 hr.)

1. Reading – Paper and Presentation Slides
2. One Presentation (129 minutes)

Remote Monitoring, Automation, and WIFI Applications with Septic Systems

Presentation #1: In recent years modern wastewater control system technology has diversified to offer everything from very sophisticated monitoring, command and & control, and on-board intelligence to very accessible remote alarm notification. This progress has reached the point where there are four main tiers of capability that have developed in the market. All this functionality has prompted many operators and system owners to ask how they can best leverage these

technologies. Matching control system capabilities to the needs of system owners, operators, and service companies can help create opportunities for improved system operation, greater O&M efficiency, and operational flexibility. This presentation will highlight five aspects of remote monitoring technology. One, it will help operators determine which tier of remote monitoring capability may best suit their clients, business, or management model needs. Two, it will share information on how the four primary tiers of remote monitoring technology may apply to large deployments of systems. Three, it will illustrate how remote monitoring technology can be used to optimize O&M management. Four, it will show how remote monitoring technology and data can be used to optimize individual system operation. Five, the presentation will review the operational considerations of currently available sensors and the underlying onsite wastewater collection and treatment equipment.

Presentation #2: Centralized wastewater treatment facilities have greatly benefited from the adoption of advanced control systems and sensors in their treatment trains. Automation in these facilities has made biological processes more efficient by reducing expensive chemical inputs, aeration costs, and direct operator supervision. These benefits outweigh the additional cost of installing and maintaining more complex controls and sensors. The onsite treatment sector has been slower to incorporate automation schemes despite an exponential drop in the cost of computing power, sensors, and the increased interconnectivity of household devices and appliances. As regulations across the nation are becoming more stringent towards onsite treatment, and as the desire for onsite water recycling increases, better process control and failure detection is needed in the onsite sector. This presentation proposes a classification system for defining onsite treatment systems based on the level of system automation. The system taxonomy includes five categories: no control, manual control, open-loop control, closed-loop control, and interconnected systems. These categories cover most of the existing onsite systems and lay a framework for the future of more interconnected onsite systems. Products common to the industry, including septic tanks, aerobic treatment units, and membrane bioreactors will be presented as case studies for the classification system. The presentation will also highlight existing sensor technologies and their potential applications to onsite system automation.

Presentation #3: Wi-Fi and Cellular enabled devices are becoming prevalent in today's market. As a septic installer, your customers either are now or will be requesting them. This session will provide you the knowledge and tools to you need to know to be able to successfully define scope, quote, and execute projects containing wireless devices. Learning Objectives: 1--Identify if a customer’s site is suitable for Wi-Fi enabled devices, 2--Wireless signal strength: How to test for it, and what to do if it’s not there, 3--Wireless and non-wireless solutions in power loss situations, 4--Wi-Fi versus Cellular Technology: Which one to choose, 5--How to define and communicate your scope on a Wireless Installation, 6--Ways to use wireless technology as a business development opportunity.

3. **Assessment:** Nine questions with 67% passing rate required.

4. **Instructors**:

Cory Lyon is an Account Manager for Orenco Systems, Inc., a wastewater equipment manufacturing firm. In this role, he helps customers grow and improve their business by providing information about Orenco products, product applications, and day-to-day business operations. He also introduces new products, supervises system startups, and performs program audits. A skilled presenter, Cory regularly gives trainings to diverse groups, including regulators, engineers, installers, service providers, electricians, and distributors. Cory holds an Associate of Applied Science degree in civil engineering technology from Umpqua Community College.

Robert Bair is a Senior Development Engineer in the Civil and Environmental Engineering Department at the University of South Florida. He specializes in anaerobic membrane bioreactors for decentralized wastewater treatment. He has extensive experience in designing pilot skids for experimental testing and validation. His passion lies in seeing technological advancements serve the needs of marginalized communities. During his PhD, he served as the inventor, designer, builder, and operator of the NEWgenerator, a containerized wastewater treatment system designed to treat waste streams from informal settlements. He holds three patents on various reactor designs and has published over 12 peer-reviewed publications on topics spanning algal biofuel production, food waste digestion, bioaugmentation of anaerobic digestion, and anaerobic membrane bioreactor operation.

Scott Steiger is one of the founders of Sump Alarm Inc. Sump Alarm put the first Wi-Fi Septic Alarms onto the market in 2016 and has continued to be a front runner in outdoor Wireless Technologies for the Sump Pump and Septic sectors. Scott is an Electrical Engineering graduate from Missouri S&T and oversees new product development and engineering for Sump Alarms various product lines. He has 25 years in industry and enjoys presenting on this technology.

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Course Agenda

The details of each course are outlined below.

Course 12 – Sludge Release (1 hr.)

1. Reading – Presentation Slides
2. One Presentation (54 minutes)

Sludge Release **from ATUs and Post Filtration**

Over the last 20-plus years, it has been largely documented that some OWT technologies are more prone to sporadically release sludge into the environment, contributing over time to the premature clogging of the drain field. Indeed, performance results from both testing on controlled platforms and in-situ, reported in many studies, suggest that biofiltration technologies are more robust and fit than ATUs to support on-site pollutants and hydraulic load fluctuations. Deficient operation and lack of regular maintenance were pointed out as the main contributing factors to these poor performances. Nevertheless, ATU performances are not as stable and consistent, and present a lower reliability level in case of malfunction or abuse than media filters that are inherently fail-safe. A fail-safe mechanism prevents partially or untreated effluent, or sludges produced and accumulated within the system from short-circuiting the treatment process and reaching the drain field. But still, it is difficult to evaluate and quantify the real impacts of these events over time on

drain field performance and dispersal capacity. Based on its extensive expertise in biofiltration and physical barrier to retain and treat pollutants, PTWE conducted a study to further document these cumulative impacts to develop a compact post-filtration system ensuring the protection of the drain field from sludge surges and any fluctuation in the effluent quality. Preliminary results and observation will be presented.

3. **Assessment:** Three questions per presentation with 67% passing rate required.

4. **Course Instructor:** Kyle Dierolf is a Product Manager with Premier Tech Water & Environment. Kyle's experience in the onsite septic industry began in regulation in Pennsylvania where he is a certified Sewage Enforcement Officer. In this role he performed site and soil evaluations for onsite septic systems, design reviews, regulatory compliance, and installation inspections. In addition to working with septic systems Kyle was also a Building Code Official. With Premier Tech Kyle started as a Regional Supervisor working with residential applications of the Ecoflo Biofilter. Kyle has worked with onsite wastewater projects in various states. Kyle has served as a member of the Board of Directors for the Maryland Onsite Wastewater Professionals Association.

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Assessments

Within each course there is a pre-test where the learner must affirm and attest that they are the individual registered to take this course and that they will not seek out, nor accept, any assistance in the completion of this course. At the end of each presentation there is a quiz the participant must pass with a score of 67% or better to obtain credit. If the student passes, they may move on. If they do not pass, they have the opportunity to review materials and take the quiz as many times as they need to pass. The presentations must be watched start to finish (no fast forwarding) and the student must complete the sections in sequential order.

Course Completion

Upon completion, the student is provided a certificate of completion (example shown below).

Contact Information

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