



Online Learning Academy

May 2021

Mega-Modules Course Overview

NOWRA has developed 12 courses from the proceedings of the 2020 Onsite Wastewater Virtual 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 course 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 (21 hours) based on how many hours they need or their interest. The hours assigned for each section are based on the time it took others 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 Mega Module curriculum is made up of the following courses which are to be taken as individual courses.

1. Planning for Sustainability (1 hr.): <https://www.pathlms.com/nowra/courses/28434/>
2. Assessments and Solutions (2 hr.): <https://www.pathlms.com/nowra/courses/28440/>
3. Virginia Updates (2 hr.): <https://www.pathlms.com/nowra/courses/28887/>
4. COVID-19 (3.5 hr.): <https://www.pathlms.com/nowra/courses/28892/>
5. Research Updates (1 hr.): <https://www.pathlms.com/nowra/courses/28893/>
6. Reuse (2 hr.): <https://www.pathlms.com/nowra/courses/28894/>
7. Alcohol and Beer Wastewater Treatment (2 hr.):
<https://www.pathlms.com/nowra/courses/28874/>
8. Nitrogen Balance (1 hr.): <https://www.pathlms.com/nowra/courses/28886/>
9. Reinvented Toilets and Urine Diversion (2 hr.):
<https://www.pathlms.com/nowra/courses/28442/>
10. Tank Buoyancy and Watertightness (2 hr.):
<https://www.pathlms.com/nowra/courses/28445/>
11. Commercial Driving License (CDL) and DOT (1 hr.):
<https://www.pathlms.com/nowra/courses/29176/>
12. Wastewater Treatment Myths & Toilet Paper (1.5 hr.):
<https://www.pathlms.com/nowra/courses/28470/>

Course Agenda

The details of each course are outlined below.

Course 1 – Planning for Sustainability (1 hr.)

1. Reading – Paper and Presentation Slides
2. One Presentation (50 minutes)

Planning for Sustainability: Case Studies for Improved Wastewater Decision-Making

As communities shift their water quality protection efforts to focus on non-point sources of pollutants, sewerage of properties on septic systems 'septic-to-sewer programs' are increasing in frequency and magnitude. At the same time, decentralized water practitioners continue to develop approaches and technologies that address real and perceived shortcomings of septic systems, and mainstream water professionals espouse decentralized 'One Water' approaches, including building-scale water reuse systems in urban areas. Clearly, onsite wastewater management can be reliable, sustainable and cost-effective in a variety of geographies and contexts. This paper will demonstrate robust processes for wastewater management decision-making using case studies. The Delaware Department of Natural Resources and Environmental Conservation sponsored an analysis that compared costs of centralized and decentralized alternatives for water and sewer in select underserved areas. Maryland Department of Environment completed a data mining, management and analysis effort that rated potential upgrades to campground and mobile home park wastewater systems to help comply with Chesapeake Bay Watershed Plan Implementation. In Puerto Rico, a coalition of entities is inventorying existing wastewater infrastructure with an eye toward improved management. In North Carolina, small area plans have been developed for improving wastewater service and protecting water quality in both rural and developed areas.

3. Assessment: Three questions per presentation with 67% passing rate required.
4. Course Instructor: Victor D'Amato is a registered professional engineer with over 26 years of water quality engineering, wastewater process design, and applied environmental research experience. He has a BS in Civil Engineering from Penn State and an MS in Environmental Engineering from the University of North Carolina at Chapel Hill. Vic has extensive experience with decentralized water infrastructure planning and implementation. He routinely works with public and private sector clients to develop wastewater management plans and programs, design systems and provide ongoing operational support. He has experience reducing nutrient pollution at multiple scales ranging from individual sites to large watersheds, including the Chesapeake Bay watershed.

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Course 2 – Assessments & Solutions (2 hours)

1. Reading – Papers and Presentation Slides
2. Three Presentations (2 hours)

In-situ Liquid Storage Capacity Measurement of Subsurface Wastewater Absorption System Products, Phillip Brown (25 minutes)

A method is presented for measuring in-situ liquid storage capacity of subsurface wastewater infiltration system (SWIS) products. These products vary in composition, geometry, and porosity, but all function as a conduit for effluent flow from the septic tank to and through a trench allowing infiltration into the soil. SWIS's also provide temporary liquid storage; necessary when discharge exceeds infiltration rate, and important during periods of soil saturation. Many regulations pertaining to storage volume are based on traditional gravel-pipe systems. Storage comparisons between alternative products and gravel have been difficult as no standard method exists. Some products have been evaluated under field conditions; others under theoretical or ideal conditions. Protocols developed in this study could serve as a common, accurate basis for comparisons. A 3 ft deep trench was excavated and leveled. Markers were attached to products indicating invert and full-volume. Products were enclosed in plastic, put in a trench, and covered with soil. A pipe extended to the surface allowing metered water additions and determination of system capacity. Four plastic chambers, three expanded polystyrene (ESP) products, two multipipe systems, and a gravel-pipe system were evaluated. Three plastic chambers stored 100-130%, multipipe systems held 80-90%, and ESP bundles held 75% of the standard. These differences illustrate the need for a standard protocol for measuring storage volume.

National Assessment of Onsite Wastewater Treatment Systems (2015-2018), Cory Yarrington, (25 minutes)

Onsite wastewater treatment systems (OWTS) have been and will continue to be a viable option for the treatment of wastewater in areas not served by centralized wastewater treatment systems. Every state in the nation has a population served by decentralized wastewater systems. However, wastewater treatment funding opportunities are frequently passed up due to the inability to provide data to establish a need. To address this lack of data, the National Environmental Science Center (NESC) conducted a national assessment of OWTS and new housing permits at the state and county level over the period of four years (2015-2018). The data compiled allows permit data to be analyzed by a) size: residential and commercial; and b) type: new and repair/replace. This study led to the concept development of Onsite System Utilization Rate (OSUR), a measure to calculate the percentage of new residential housing built with OWTS permits. With the data collected, the report shows national OSURs were estimated to be 31%, 34%, 38%, and 32% for 2015, 2016, 2017, and 2018; respectively. Knowledge of trends with existing OWTSs provides agencies with necessary information to appropriately allocate resources to ensure OWTSs are providing necessary environmental and human health protections. This study exemplifies widespread reliance upon decentralized wastewater treatment across the United States, and the need to leverage appropriate resources to ensure continued environmental and public health.

Wastewater Islands and Onsite O&M, Danna Revis, (50 minutes)

The phrase "wastewater island" refers to an area where sewer is not available and there are additional challenges for homeowners who need options for sewage disposal. In addition to finding funding for new systems, many systems installed in these areas require advanced operation and maintenance to function reliably. How can we bridge the gap among low-income homeowners, private maintenance providers and regulatory requirements for maintenance? The answer is funding, but how can we provide the funding and assure it goes to the proper purpose?

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

4. Course Instructors:
 - a. **Philip Brown** is the Extension Specialist in Soil Science and Septic System Education at Virginia Tech. He obtained a PhD in soil physics from Clemson University, specializing in water movement in porous media. He also has an MS from Clemson University and a BSc from The University of Bradford in the UK.
 - b. **Cory Yarrington** graduated with a B.S. in Physical Sciences at Bethany College, WV. He co-authored a published journal, "The American Society for Mechanical Engineers" after his work at the National Energy Technology Lab in Morgantown. He has been working on his M.S. and PhD at West Virginia University in the Civil & Environmental Engineering Department in areas of linear and nonlinear modeling to forecast univariate patterns. A team, composed of Dr. Lian-Shin Lin, Cory Yarrington and Chris Anderson, has been working with Jennifer Hause at National Environmental Science Center to complete an assessment on onsite wastewater treatment systems. The objective was to conduct a national assessment of onsite wastewater system installations at the state and local levels over the period of four years (2015-2018). The data was utilized to determine trends in onsite wastewater system infrastructure installation with relation to new housing as well as onsite system maintenance across the U.S.
 - c. **Danna Revis** began working in the onsite wastewater in Virginia in 1983 as a private soil consultant. She worked for the Virginia Department of Health for 30 years as an Environmental Health Specialist and as Training Coordinator for Environmental Health. She retired in 2018 and went back to the private sector. She currently works for Old Dominion Onsite, Inc. as an onsite soil evaluator and operator. She has a bachelor's degree in geology from the College of William and Mary and a masters in learning technologies from Pepperdine University.

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Course 3 – Virginia Updates (2 hours)

1. Reading – Presentation Slides
2. Four Presentations (2 hours)

Transitioning of Design Services - Virginia's Experience, Lance Gregory (25 minutes)

The purpose of this presentation is to share Virginia's experience in transitioning onsite sewage system evaluation and design services from local health department to the private sector. The presentation will cover Virginia's 20+ year history on the topic, how it started, Virginia Strategic Vision, and where we go from here.

Identifying Wastewater Infrastructure Needs for the Commonwealth, Lance Gregory (25 minutes)

The purpose of this presentation is to share information on the Virginia Department of Health's work with Wastewater Infrastructure Workgroup to identify community and individual wastewater needs throughout the Commonwealth. This includes work with the Virginia Institute of Marine Science to develop unique tools to model the location of suspected areas with wastewater infrastructure needs.

Virginia Onsite Sewage System Professionals Licensing Updates, Trisha Henshaw (25 minutes)

The Virginia Board for Waterworks and Wastewater Works Operators and Onsite Sewage System Professionals licenses onsite soil evaluators, onsite septic system inspectors, and onsite septic system operators. The proposed presentation would provide important licensing and examination updates, information regarding recent Board and agency guidance affecting licensees, as well as an overview on expected future actions impacting licensees.

A Tour of SWIFT: Sustainable Water Initiative for Tomorrow, Ryder Bunce (40 minutes)

The Hampton Roads Sanitation District (HRSD) Sustainable Water Initiative for Tomorrow (SWIFT) will add multiple advanced water treatment processes to select HRSD wastewater treatment facilities to produce a highly treated water (SWIFT Water) that meets drinking water standards and is chemically compatible with the receiving aquifer. Secondary effluent from up to seven of HRSD's existing treatment facilities will be treated at SWIFT facilities and the finished SWIFT Water will be recharged into the Potomac Aquifer System (PAS) to help restore the depleting aquifer. At full-scale, HRSD intends to recharge over 100 million gallons per day (mgd) of SWIFT Water. This will significantly reduce the nutrient load to the sensitive Chesapeake Bay and benefit the region by limiting saltwater intrusion, reducing land subsidence, and providing a sustainable source of groundwater, a necessity for continued economic expansion in the region.

Join Ryder as he provides the history that led to this project; the overview of the project; permitting issues, and the technology. A brief video will lead the participant through the full-scale research facility that has been injecting treated wastewater since May 2018. There will be time to ask questions.

3. Assessment: Three questions per presentation with 67% passing rate required.
4. Course Instructors:

- a. **Lance Gregory** is the Director for the Division of Onsite Sewage and Water Services, Environmental Engineering, and Marina Programs. His 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. Lance has worked in a variety of positions within VDH’s onsite sewage and water programs at the local, district, and central office level providing a useful perspective of the programs impacts at an individual, community, and statewide level. Lance is a graduate of Radford University and a Virginia Natural Resources Leadership Institute alumnus.
- b. **Trisha Henshaw** has two decades of regulatory experience, most of it obtained at the Department of Professional and Occupational Regulation. She has served as an Executive Director for DPOR since 2008. In this role, Trisha provides administrative, regulatory, and operational management for the Common Interest Community Board; Board for Waterworks and Wastewater Works Operators and Onsite Sewage System Professionals; and the Board for Asbestos, Lead, and Home Inspectors. Trisha is actively involved in the legislative process for legislation impacting the programs under her purview. Trisha has worked in nearly every role at the Department of Professional and Occupational Regulation related to board and licensing operations. Prior to her current responsibilities, Trisha administered the tradesmen education program and the licensing aspects of the Board for Contractors as well as a number of other boards.
- c. **Ryder Bunce** is a Technical Services Engineer for the Virginia Department of Health where he oversees Hampton Roads Sanitation District’s Sustainable Water Initiative for Tomorrow project, a program that injects highly treated wastewater into the Potomac Aquifer. Previously, he worked as a Class I water plant operator for Chesterfield County and as a principal engineer with Hazen and Sawyer. Ryder is a licensed professional engineer with an MS in Environmental Engineering from Old Dominion University.

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Course 4 – COVID-19 (3.5 hours)

- 1. Reading – Presentation Slides
- 2. Three Presentations (3.5 hours)

Impacts of COVID-19 on the Decentralized Industry, Sara Heger (50 minutes)

The current global coronavirus crisis caused by SARS-CoV2, or COVID-19 has highlighted the interconnectedness of our planet in ways that were underappreciated by the average American until recently. There are numerous issues that have arisen related to septic systems in relation to COVID-19. The first relates to worker safety. As the epidemic began there was concern for those working around wastewater and access to appropriate personal protective equipment. Question arose to the treatment of COVID-19 through large to small wastewater treatment systems. Another large issue that arose related to the financial impact to small business across our industry. Then there was the shifting of wastewater production as sheltering in place spread across the United States many people shifted towards using home offices, home schooling and generally spent much more time at home and increased their load to their system. At the same time the use of sanitary wipes and other sanitizing products increased due to heightened safety concerns. This presentation will discuss the short- and long-term potential impacts of these issues.

Septic System Installation Permitting and Inspector During a Pandemic, Chris LeClair (50 minutes)

Maintaining normal permitting and inspections is crucial during this pandemic to make sure that the economy continues. This discussion will detail the subtle changes that were made in a small, northern Minnesota county during the COVID-19 pandemic to ensure that septic systems continued being permitted and inspected while at the same time ensuring the health and safety of county staff and contractors

Panel Discussion: Just One More Worry – Perspectives on Dealing with COVID on the Job, Cindy Tiemann (100 minutes)

The wastewater industry is no stranger to dealing with issues that affect how their businesses operate. This year the continent is not only being hit with horrible storms and fires but the world has also been hit with a Pandemic that is turning 2020 into the year that many businesses may end up calling their last year in business. Its yet one more worry. For this session we have gathered a group of 12 wastewater owner/operators from across the US and Canada to discuss all of the issues they dealt with and continue to encounter during this Pandemic. We will discuss their thoughts on being termed "Essential Workers" for the first time ever. What were their initial and ongoing thoughts and fears as they made decisions for their companies? Did they change course, and if so, were they due to state or requirements or were they proactive on creating their own precautions for their business? Zoom with us as we listen to these wastewater operators from all over this vast continent talk to each other about their thoughts, decisions and plans as they relate to their concerns about this pandemic and the wastewater industry and profession as a whole. From this conversation you will be able to see just how different each part of this continent is from their perspective and how people really do think and act differently in each part of it.....OR do they?

Panelists:

Cindy Tiemann – Fiedler Your Pumping Specialists, Inc- Royalton, Minnesota;
Morgan McAtee – McAtee Company, Inc – New Gloucester, Maine;
Thomas Van Wart – A-1 Porta Pots and Septic Service – St. David, Arizona;
Chris Aitkin - Rankins Septic Tank Pumping & Environmental Services, Waterdown, Ontario Canada;
Ronnie Tamez – First Call Septic, Battleground, Washington;
Jesus Juice Rosales – Juices Septic & Grease Pumping, San Saba, Texas;
Doug McAtee – McAtee Company, Inc-New Gloucester, Maine;
Charlie Peloni – Peloni Pumping and Portable Toilets, Lake City Florida;
Stacy Creech – Cheech’s Plumbing - Wilson, North Carolina;
Chris Scott – Scotts Septic Tank Service, LLC - Christiana, Tennessee;
Stefan Pappas – Pappas Pumping and Septic Services- Hailey, Idaho; and
Clayton Foster – Acreage Development Solutions, Ltd -Millerville, Alberta, Canada.

3. Assessment: Three questions per presentation with 67% passing rate required.
4. Course Instructors:
 - a. **Dr. Sara Heger** is an engineer, 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 onsite wastewater treatment. 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-elect of the National Onsite Wastewater Recycling Association. Sara serves on the NSF International Committee on Wastewater Treatment Systems. She has BS in Biosystems & Agricultural Engineering and a MS and a PhD in Water Resource Science.

- b. **Chris LeClair** is the Director of the Land & Resource Management office in Otter Tail County, Minnesota. After graduating from the University of Minnesota with a degree in Natural Resources, Chris began his career with the Washington County Department of Public Health as an Environmental Health Specialist, duties included restaurant inspections, lodging and pool inspections and managing the county's radon laboratory. In 2002, he was moved to the county's septic program. Since then, Chris has become a certified Advanced Inspector, served on the Minnesota Onsite Wastewater Association Board of Directors and the state's septic advisory committee. In 2018, Chris moved up to northern Minnesota to head the office that regulates septic systems, where he finds himself today.
- c. **Cindy Tiemann** is CEO / Business Manager of Fiedler Your Pumping Specialists, Inc. Fiedler's has provided septic maintenance to residential and commercial customers in Central Minnesota since 1953. Cindy and her husband Jeff Purchased the company in 2010 and currently have 11 employees on staff serving a 5-county area. Prior to her current role in the wastewater industry, Cindy worked as a Registered Nurse for over 30 years. She holds a master's degree in nursing education and is MPCA certified as a Type 4 wastewater operator, Maintainer and Service Provider. She currently serves on the MOWA Board and the MPCA SSTS Advisory Committee. Cindy and her husband Jeff also own and operate a crop farm where they also raise poultry for Pilgrim's Pride. In her spare time, she enjoys camping and spending time with family, especially her 3 grandchildren.

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Course 5 – Research Updates (1 hour)

- 1. Reading – Presentation Slides
- 2. Two Presentations (1 hour)

Using Macroinvertebrates as Indicators of Septic System Density - An Initial Review, Gary Hawkins (25 minutes)

The Mulberry River watershed is a large network of streams that spans across Jackson and Barrow counties in Northeast Georgia. The area that the watershed is located has very diverse land usage and features many areas where on-site sewage management systems are found in great density. This watershed appeared to be ideal for a study in which macroinvertebrate communities and water quality could be monitored in relation to areas of high, medium, low, and no septic system density. Eight first order streams, ranging from 1,500 to 5,000 acres and located in different areas of septic tank density were selected for monitoring. Grab samples of water are taken and analyzed for nitrates, conductivity, and a variety of other parameters. Macroinvertebrates are monitored using

an adapted sub-sampling procedure. These samples were then quantified using three different biological indexes (Hilsenhoff, EPT, and Margalef's richness). In addition, a dosage trial was run to test the effects of nitrates on mayflies (Maccaffertium). The dosage trial data indicates that nitrates can possibly affect mayfly populations if found in high concentrations. This study is scheduled to collect water samples twice monthly and sample macroinvertebrates quarterly to evaluate both water quality changes and seasonal macroinvertebrate diversity. The results of this experiment are showing slight trends in the relationship between water quality, the density of septic systems, and macroinvertebrate indices.

In-situ Liquid Storage Capacity Measurement of Subsurface Wastewater Absorption System Products, Phillip Brown (25 minutes)

A method is presented for measuring in-situ liquid storage capacity of subsurface wastewater infiltration system (SWIS) products. These products vary in composition, geometry, and porosity, but all function as a conduit for effluent flow from the septic tank to and through a trench allowing infiltration into the soil. SWIS's also provide temporary liquid storage; necessary when discharge exceeds infiltration rate, and important during periods of soil saturation. Many regulations pertaining to storage volume are based on traditional gravel-pipe systems. Storage comparisons between alternative products and gravel have been difficult as no standard method exists. Some products have been evaluated under field conditions; others under theoretical or ideal conditions. Protocols developed in this study could serve as a common, accurate basis for comparisons. A 3 ft deep trench was excavated and leveled. Markers were attached to products indicating invert and full-volume. Products were enclosed in plastic, put in a trench, and covered with soil. A pipe extended to the surface allowing metered water additions and determination of system capacity. Four plastic chambers, three expanded polystyrene (ESP) products, two multipipe systems, and a gravel-pipe system were evaluated. Three plastic chambers stored 100-130%, multipipe systems held 80-90%, and ESP bundles held 75% of the standard. These differences illustrate the need for a standard protocol for measuring storage volume.

3. Assessment: Three questions per presentation with 67% passing rate required.
4. Course Instructors:
 - a. **Gary L. Hawkins**, Ph.D., is an assistant professor and extension specialist in Water Resource Management at the University of Georgia. He graduated from Clemson University and Auburn University with degrees in Agricultural Engineering. Hawkins earned his Ph.D. from The University of Tennessee in Biosystems Engineering. Hawkins' extension and research programs focus on water quality and quantity in the areas of on-site waste management, stormwater and water conservation.
 - b. **Philip Brown** is the Extension Specialist in Soil Science and Septic System Education at Virginia Tech. He obtained a PhD in soil physics from Clemson University, specializing in water movement in porous media. He also has an MS from Clemson University and a BSc from The University of Bradford in the UK.

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Course 6 – Reuse (2 hours)

1. Reading – Paper and Presentation Slides
2. Two Presentations (2 hours)

Fenner Nature Center Wastewater Treatment and Re-Use Project, Larry Stephens (50 minutes)

The average person in the U.S. spends much of their lifetime away from home using public restrooms. We know from experience that about 80% of the water used in public restrooms is used to flush wastes. We typically treat all of our water to potable water standards to be used for all purposes. If wastewater is captured and treated at or near the point of use, that water can be re-used for flushing toilets and urinals saving significant infrastructure and energy costs.

Manufacturers of onsite wastewater treatment products today have developed almost an endless list of treatment technologies that can be used to highly treat wastewater to be clear and odorless resembling potable water. Fenner Nature Center in Lansing, MI was building a new environmental education building and needed an onsite wastewater system. The nature center has thousands of visitors every year, including 12,000+ school-age children. The construction of the new building gave our onsite industry a chance to create a wastewater treatment and reuse system that could be incorporated into the environmental education goals of the Nature Center. Onsite system manufacturers, local contractors and MOWRA members donated most of the materials and labor to construct the system. The system came online in Dec. 2019.

Reuse Comes to On-Site Systems, Gary MacConnell (50 minutes)

Reuse wastewater systems have been common for municipal and larger community systems. However, reuse systems for small systems including single family homes have been less common. With advancement in technologies, it is now possible for small systems to be permitted, installed, and operated successfully. One single family on-site system in North Carolina was modified using a recirculating media filter to meet State regulatory requirements for re-use. The challenges, design modifications, operation and success of the system are presented in detail as a case study.

3. Assessment: Three questions per presentation with 67% passing rate required.
4. Course Instructors:
 - a. **Larry Stephens** has spent over 50 years now in the onsite wastewater treatment industry, beginning as a state regulator for 12 years and then as the owner of Stephens Consulting Services, PC for the last 40 years. Stephens Consulting Services is a design engineering company located in Haslett, MI. Onsite wastewater treatment systems, both large and small, have become his focus and specialty. Larry is also a partner with Michael Stephens in a second company, SCS Systems LLC, a 20 year old company that provides contract operations and maintenance services for onsite systems. Larry holds a B.S. in Civil Engineering from Michigan State University and a Masters of Engineering from the University of Florida. He is a registered professional engineer in Michigan and Ohio. Larry is active and has held leadership positions in both the Michigan Onsite Wastewater Recycling Association and NOWRA.
 - b. **Gary MacConnell** has over thirty years of experience in environmental and civil engineering, during which he has served in project manager and project engineer

capacities. He has played a major role in projects that include wastewater, water, and industrial waste treatment. Other types of projects have included: solid waste, hazardous and toxic wastes, environmental issues, stormwater, water resources, site work, irrigation, project financing, and economic and financial analyses. Examples of tasks that Mr. MacConnell has performed include planning, preliminary design, final design, permitting, grant/loan related work, financing, and construction administration. Mr. MacConnell started his career as a regulator in the State of Florida. He then worked for international firms in Florida, California, and North Carolina. Since starting MacConnell & Associates, P.C., Mr. MacConnell's technical expertise and innovative designs helped the company win projects."

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Course 7 – Alcohol and Beer Wastewater Treatment (2 hours)

1. Reading – Presentation Slides
2. Two Presentations (2 hours)

Wastewater in Brewing, Jim King (50 minutes)

This presentation focuses on the methods used to design a septic system for the varying waste strength from different brewing operations. The presenter will examine the concerns attached with specific results (BOD, TSS, Nitrogen, pH, etc.) from testing and where these concerns arise in the brewing process. The environmental impact of each identified result will be examined, specifically focusing on disposal concerns. The presentation will end with a discussion on methods used to manage the wastewater and will include an examination of treatment options, standards that exist to address the concerns of the industry and considerations on pump and haul.

Identifying Challenges of Alcohol Processing Wastewater, Lorna Withrow (50 minutes)

When discharging wastewater effluent to a subsurface dispersal wastewater system, the last thing one wants to do is to compromise the system or contaminate soil, groundwater or surface water. It would be so much easier if all wastewater was created equal. However, that is not the case. There are industries that produce wastewater containing constituents or having constituent concentrations at levels that discharges of untreated or undertreated wastewater may pose potential threats to the environment and public health. Characteristics of the wastewater produced are the result of the raw products and processes utilized in production. Differences in raw products or processes can result in distinct and dramatic differences in wastewater generated by facilities producing equivalent end products. The alcohol production for human consumption (e.g., beer, liquor, wine) industry is an example of such wastewater generation. The wide range of parameter levels and constituent concentrations in alcohol production generated wastewaters present challenges when it comes to treatment, especially when utilizing soil as the last phase of the treatment process. Failure to reduce constituent concentrations can create multiple issues. For instance, while mass loading of BOD positively correlated with development of a clogging layer in dispersal areas, high sodium concentrations can cause dispersion of clay particles in the soil reducing the permeability.

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

4. Course Instructors:

- a. **Jim King** is the President for Eljen Corporation. He finished his engineering degree at the University of Connecticut and joined the military. Mr. King was a Captain in the US Army, serving two deployments to Iraq. After his military career, he returned to Connecticut where he finished his MBA at the University of Connecticut and found a home at Eljen. During his time at Eljen, Jim brought the company to new regions around the world by working with the local and state health departments. His work at Eljen focuses new technologies innovation and development. Based in Windsor, CT, Eljen produces products which are installed throughout the world. In 2019 they were awarded the Federal HireVETs Small Business Platinum Award. Eljen is celebrating over 50 years of innovation and success and look forward to being a part of your future septic projects.
- b. **Lorna Withrow** is an engineer with the On-Site Water Protection (OSWP) Branch of the North Carolina Department of Health and Human Services (NCDHHS) and has worked for the State of North Carolina in the environmental field for over 25 years. Her experience covers numerous environmental areas including radiological waste disposal, drinking water compliance, assessment and analysis, enforcement, and guidance generation. Lorna is a licensed North Carolina Professional Engineer, holds a B.S. degree in Applied Mathematics with a Nuclear Engineering concentration and an M.C.E. degree in Environmental Engineering, both earned at North Carolina State University.

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Course 8 – Nitrogen Balance (1 hour)

1. Reading – Presentation Slides
2. One Presentation (1 hour)

The Art (and maybe Science) of Creating a Nitrogen Mass Balance, John Buchanan (50 minutes)

A mass balance is a fundamental engineering principle. You define a system boundary, measure how much of a constituent moves into and out of the boundary, and the balance is still within the system. Thus, for the land application of wastewater, a mass balance approach should be the ideal means of estimating how much nitrogen will enter the groundwater. However, it hard to measure what you cannot see. As nitrogen-containing wastewater moves through the soil, the nitrogenous compounds can be converted to ammonia (ammonification), to nitrite/nitrate (nitrification), to protein (organic nitrogen), or to nitrogen gas (denitrification). The biotransformation of these nitrogenous compounds requires certain conditions to exist (i.e., certain electron acceptors/donors, bioavailable carbon). Further, the transformation rate is dependent on environmental factors such as temperature and moisture. Lastly, each of the nitrogenous forms have unique means of crossing the system boundary. Scientists and engineers understand these processes. However, these processes take place in subsurface environment where it is difficult to take measurements. So, if we cannot quantify all the transformations and fates of nitrogen in the soil, is creating a nitrogen mass balance an art form rather than a science? If so, should wastewater professionals focus on nitrogen removal before the effluent is applied to the soil and/or nitrogen removal via the cover crop and pretend like the soil provides no nitrogen removal.

3. Assessment: Three questions per presentation with 67% passing rate required.
4. Course Instructor: **Dr. John R. Buchanan** is an Associate Professor and is on the faculty of the Biosystems Engineering and Soil Science Department at the University of Tennessee. He has 30 years of teaching, research, and outreach experience in the areas of onsite and decentralized wastewater management, water supply, water quality and storm water engineering. Dr. Buchanan has B.S. and M.S. degrees in Agricultural Engineering and a Ph.D. in Civil Engineering, all from The University of Tennessee. John is a member of the Water Environment Federation, Soil and Water Conservation Society, NOWRA, and the American Society of Agricultural and Biological Engineers. He is a registered professional engineer in Tennessee.

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Course 9 – Reinvented Toilets and Urine Diversion (2 hours)

1. Reading – Paper and Presentation Slides
2. Two Presentations (2 hours)

Urine Diversion for Onsite Removal of Nitrogen and Pharmaceuticals, Abraham Noe-Hays (50 minutes)

Urine diversion is an alternative to advanced onsite treatment that can remove nutrients and pharmaceuticals with lower cost, less site disruption, and lower electricity consumption, while producing a valuable fertilizer. Rather than combining all domestic wastes into one stream and then treating the entire dilute volume, the source separation of urine eliminates the great majority of nutrients and about half the pharmaceuticals before they even enter the mix. The urine is collected using commercially-available urinals or urine-diverting toilets, which are plumbed to onsite storage tanks. In existing pilot installations, urine is then collected twice a year by pumper truck, treated at a central facility, and delivered to farms for use as fertilizer. Researchers at the Rich Earth Institute and the University of Michigan are currently testing an onsite treatment system that uses freeze concentration and pasteurization to produce a small volume of sanitized fertilizer that is suitable for direct use without further treatment. This innovation will enable urine diversion systems to be installed and operated independently of any larger processing infrastructure. This ongoing project is conducted using two real-world test platforms: public restrooms at the University of Michigan with urine-diverting fixtures connected to an experimental processing facility, and the Rich Earth Institute's community-scale Urine Nutrient Reclamation Program in Vermont.

Turning Human Waste into Fuel and Disinfected Water, Ed Osann (50 minutes)

Non-Sewered Sanitation Devices - A new ISO Standard for a Reinvented Toilet Delegates from Canada, the US, and some 30 other countries have been collaborating for the last two years to develop a new ISO standard for non-sewered sanitation devices. Intended to meet critical public health needs in developing countries with limited water and wastewater infrastructure, this new standard also carries important implications for water and wastewater management in North America. From national parks to suburban shopping malls, high-tech toilets meeting the new ISO standard could upend our approach to sanitation and our expectations about future water demands and water-related infrastructure. This presentation will consist of three parts: a) a brief discussion

of the vision behind a “reinvented” toilet; (b) an outline of the forthcoming ISO Standard 30500, including scope, performance requirements, and test procedures; and (c) an overview of some of the technologies and approaches that are currently in development and field testing. Participants will be challenged to consider where, in their own community, sanitation devices that require no permanent connection to water and sewer lines would fill a useful purpose.

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

4. Course Instructors:

- a. **Abraham Noe-Hays** is the Research Director of the Rich Earth Institute, which operates the nation's first community-scale urine recycling program, converting human urine into fertilizer for use on local farms. This initiative saves water, prevents pollution, and supports sustainable agriculture by turning a universal waste product into a valuable resource. Abraham coordinates a multidisciplinary research and demonstration effort involving farmers, scientists, planners, and volunteer participants (aka urine donors"), with the goal of developing tools to allow other communities to start recycling urine. A lifelong resident of Vermont, he has used alternative sanitation systems since 1976, and has been academically and professionally involved in their development since 2000. He holds a BA in Human Ecology from the College of the Atlantic.
- b. **Ed Osann** is a Senior Water Policy Analyst with NRDC's Healthy Communities Program. Since 2009 he has led NRDC's work on water efficiency through building codes, product standards, utility programs, and conservation pricing. From 1993 to 1996, he served as Director of Policy and External Affairs for the US Bureau of Reclamation. Ed holds a master's degree in Urban and Regional Planning from George Washington University and a BS in International Relations from Georgetown University. From 2013-16, Ed served on the 7-member Independent Technical Panel on Urban Conservation for the California Department of Water Resources. In 2016, Ed joined ISO Project Committee 305 to develop a product standard for Sustainable Non-Sewered Sanitation Systems, serving as head of the US delegation to this committee.

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Course 10 – Tank Buoyancy and Watertightness (2 hours)

- 1. Reading – Presentation Slides
- 2. Two Presentations (2 hours)

Understanding Tank Buoyancy, Kayla Hanson (50 minutes)

There are many forces at work on underground wastewater treatment structures. Buoyancy is one of those forces, and can be significant enough to lift a tank out of the ground. Buoyancy is an essential consideration of underground tank design. During this presentation, we will first explore the concept of buoyancy to understand how it works. We will demonstrate the calculation of buoyant forces on a typical precast concrete septic tank under different conditions. We will then talk about countermeasures that can be taken to ensure the buoyant force never exceeds the downward

forces. This is essential information for those who design, manufacture, install, regulate, and inspect underground wastewater structures.

Keeping What's In, In and What's Out, Out, Kayla Hanson (50 minutes)

Strong, durable, watertight tanks are an essential component of every onsite wastewater system. To achieve effective, efficient, and reliable treatment, tanks must be designed to excel in the conditions they'll be exposed to during their service life. Watertightness is a characteristic that depends on the quality of the concrete, the tank's joints and sealants, the pipe connections, and the riser sections. During this session we will examine each of these crucial areas and discuss what goes into making precast concrete tanks watertight. We will also review what mistakes could lead to leaking and what manufacturers and installers are doing, or should be doing, to avoid these issues. We will also touch on some basics of concrete, including its ingredients, how and why concrete hardens, and how it behaves over time. Lastly, we will discuss watertightness testing by the hydrostatic method and the vacuum method.

3. Assessment: Three questions per presentation with 67% 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 11 – Commercial Driving License (CDL) and DOT (1 hour)

1. Reading – Presentation Slides
2. One Presentation (1 hour)

CDL and DOT Requirements for Pre-/Post-Trip Inspection, Fred Yuhasz, Kimberly Seipp (50 minutes)

This session will discuss the changes in CDL regulations with regard to completing pre-/post-trip inspections. What the business owner needs to know about the process and any liability issues with these inspections. It will also discuss what a new or applicant CDL individual will need to know to be able to pass the CDL exam. In addition, the topic of how to deal with roadside inspections will be discussed.

3. Assessment: Three questions per presentation with 67% passing rate required.
4. Course Instructor: **Fred Yuhasz** spent the first 30 years of his career driving trucks. He grew a very successful vehicle towing and salvage business from the bottom up, eventually selling that business to his unsuspecting (of the work involved!!!) younger brother. Along the way, he has put thousands of miles under his belt hauling heavy equipment. Currently, and for the past 10 years, Fred is putting

these years of experience to good use as a CDL Instructor/Examiner certified by the Commonwealth of Pennsylvania. Fred can be found at the North Montco Tech Career Center in Lansdale, Pennsylvania either in the classroom or out in the field examining another new CDL candidate.

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Course 12 – Wastewater Treatment Myths & Toilet Paper (1.5 hours)

1. Reading – Presentation Slides
2. Two Presentations (1.5 hours)

Wastewater Treatment Myths, Allison Blodig (50 minutes)

Some of the mistakes that are made in designing treatment systems are based on a few common misconceptions or myths about wastewater treatment. This presentation will discuss these misconceptions or myths and how they can make the difference in a system's long-term performance.

Degradation of Commercial Hygienic Paper in a Septic Tank Environment, Barbara Siembida-Losch, Dominic Mercier (25 minutes)

Septic users are encouraged to use 'septic-friendly' hygienic paper that is generally thinner than traditional paper and quickly dissolved in contact with water. Specialized companies performing septic system pump outs as well as septic system service providers have observed that some toilet papers can cause important accumulation resulting in premature pump-outs or major blockage, this even if they advertise to be 'septic-friendly'. While we would expect that septic-friendly hygienic paper rapidly dissolve in water to settle to the bottom of the tank in small flaky particles, it appears that in some cases, the paper clusters entering the primary tank retain their structural integrity and either accumulate rapidly at the bottom of the tank or in the floating zone of the primary treatment tank. This results in a higher risk of blockage, more frequent need for pumping and potential washouts to the downstream treatment system. Inevitably, operational and maintenance cost of such systems significantly increase. This study has evaluated the behavior of popular brands of hygienic paper in term of degradation in water and potential for blockage. Tests have been performed in clear water as well as in primary effluent environment. Findings of this study may help in better guiding septic system owners in regards to wiser choices or at least inform them more accurately on potential risks and impacts on maintenance frequency and costs.

3. Assessment: Three questions per presentation with 67% passing rate required.
4. Course Instructors:
 - a. **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 vice-president of the association.

- b. Dominic Mercier** is a Civil and Environmental Engineer with 24 years of experience in technology development and design of onsite and decentralized wastewater treatment systems. Mr. Mercier owns Enviro Neptune, a company dedicated in the research and development of onsite and decentralized technologies as well as Enviro-STEP Technologies a company manufacturing and distributing Onsite solutions. With offices in Quebec, Manitoba and Nova Scotia, Mr. Mercier was involved in hundreds of projects and had presented several workshops and technical talks in various Canadian and American conferences.

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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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