



# Onsite Wastewater Training in Rhode Island

## Hands-On Experience

At a blind inspection visit that NRI conducts for the conventional septic system inspection class, participants get real life, hands-on experience.

**By Natalie Eddy**  
NESC STAFF WRITER

PHOTOS BY David Kalen  
DESIGN BY Julie Black

An average day at the New England Onsite Wastewater Training Center (OWTC) might involve answering telephone calls from a homeowner who says he has a failing septic system in a critical resource area and is looking for a new technology to treat wastewater.

It also might be spent reviewing a community's wastewater maintenance ordinance for technical proficiency or developing a PowerPoint presentation for a new class on site evaluation and suitability.

Or it might include going out in the field to sample onsite wastewater treatment systems in some of the center's demonstration projects.

In short, "average" is a relative term. It would seem that there is no average day for the professionals at the OWTC, located at the University of Rhode Island (URI) Peckham Farm in

Kingston, Rhode Island, and the accomplishments of the center seem to be anything but average.

To date, the center, the second one created in the country, has installed 56 onsite wastewater treatment systems in communities throughout Rhode Island that provide important information on emerging water quality research technologies.

Simply stated, the OWTC's mission is to deliver information about conventional and alternative systems in wastewater management. The program offers classroom and field training experience for wastewater professionals, regulators, municipal and state officials, watershed groups, and homeowners.

"We do a whole bunch of different things," said George Loomis, OWTC research and extension soil scientist. "Our group provides three basic functions. We collect research-based information, conduct some onsite wastewater research of our own, and we do outreach education to our various clientele groups. We deal with just about everybody and their brother and their sister who have a need to know about onsite wastewater, beginning with homeowners, real estate agents, school-aged students, state regulatory agencies, engineers, land surveyors, installers who do design work, operation and maintenance professionals, and communities."



Founded in 1993, the center was built with sweat equity, according to Loomis, who said various members of a local contractor organization, the Rhode Island Independent Contractors and Associates, donated their time to physically construct the center along with URI staff. Some small amounts of funding came from the U.S. Environmental Protection Agency (EPA), Rhode Island Department of Environmental Management, and URI Cooperative Extension.

The program advanced in 1996 with a \$100,000 grant from the National Environmental Services Center (NESC) National Onsite Demonstration Project Phase II (NODP II), which helped to develop innovative wastewater technology by providing valuable information on emerging water quality research technologies.

NODP Phase II, which was headed by Clement Solomon of NESC and ended in 2001, involved replacing seven failed onsite systems in Rhode Island's Green Hill Pond Watershed with innovative and alternative (I&A) technologies. Phase II targeted environmentally sensitive areas, adding more emphasis on education and training.

Loomis said, "The NODP II project was very helpful because it provided some much-needed seed money to replace seven failed septic systems in the Green Hill Pond watershed with new innovative systems. These early systems helped focus community and state attention on wastewater treatment issues in this area. We later leveraged other state and federal funds to install 13 more advanced wastewater treatment systems in the Green Hill Pond watershed and evaluate their treatment performance."

Solomon characterized NESC's partnership with OWTC as "mutually beneficial," adding that like the center, NESC collects research-based information, conducts onsite wastewater research, and provides outreach education to the public. Solomon said, "The funding from NODP II enhanced the center's capabilities of demonstrating innovative and alternative technologies, serving as a catalyst for research in the industry. Demonstration projects have become a very cost-effective way to spend money on innovative technologies in a controlled environment with the oversight of experts."

The goal of the demonstration project was to test and support new types of wastewater treatment technologies and to pass the knowledge on to wastewater industry professionals and communities.

The OWTC has participated in five state or federally funded onsite wastewater demonstration projects since 1996. Today, the OWTC uses both classroom and field training classes to cover all aspects of septic system siting, design, installation, inspection, operation, and maintenance. The center has numerous I&A and conventional septic system design technologies, all installed above-ground for hands-on learning.

"We've gotten several Section 319 Clean Water Act grants," said Loomis. "We are currently finishing up a \$3 million EPA grant, and we get small grants to do particular kinds of work that might be specific to a particular kind of task. We are largely a soft-money program funded by outside grants and by revenue that comes in from our workshops."

Loomis said they charge fees for workshops tailored to their professional wastewater practitioner audiences. "In contrast, we charge homeowners a very minimal amount of money because we have found that if we do free workshops, free is of no value to people," said Loomis. "If they don't make a small monetary commitment, they find something else to do that day, especially if it's a nice day. Instead

of coming to a workshop, they will go to the beach or something like that. When there is money involved, it seems to create a psychological commitment on their part. We started off with no fee and then moved to a \$5 fee, then \$10 fee, and eventually to a \$15 fee. It seems like when we hit that \$15 fee, they make a threshold commitment, and the homeowners always find the information of direct value to them."

The fact that there is no average day for Loomis and his staff at the center is directly linked to the funding process. "When you have a soft-money funded program, you have to be flexible. That's why we wear a lot of different hats, and we constantly change those hats," said Loomis.

### Green Hill Pond

Rhode Island's high water table and topography is consistent with many coastal communities. Failing and marginally functioning septic systems caused nonpoint source pollution of sensitive shellfish areas.

Although the NODP Phase II funding ended in 2001, the Green Hill Pond Block Island project is still ongoing with new funding, and the systems installed there are being monitored today. Those systems include:

- two, three-bedroom homes with septic tanks and recirculating trickling filters;
- a three-bedroom home with a septic tank, a drip irrigation system, and sand-lined trenches;
- a three-bedroom home with a septic tank, single-pass sand filter, and a shallow, narrow drainfield;
- a two-bedroom home with a septic tank, a recirculating textile filter, and a shallow, narrow drainfield;
- a three-bedroom home with a septic tank peat filter, UV disinfection unit, and a shallow, narrow drainfield; and
- a three-bedroom home with a fixed-film bioreactor treatment unit and a shallow, narrow drainfield.

NODP II ultimately promoted the public's awareness of the need for proper onsite system maintenance programs to ensure the continuing success of onsite wastewater treatment systems.

As a result, in 2000, the center wrote a \$3 million EPA grant to help manage water quality for the towns of New Shoreham, Charlestown, and South Kingstown. Green Hill Pond is located along Rhode Island's southern coastline in the communities of South Kingstown and Charlestown.

The increasing human population, combined with small lot sizes served mostly by cesspools or failed, antiquated systems, had caused extensive contamination in this sensitive environment.

"I think the project has been very successful," said Loomis, adding that it has been a large project. "Working with communities is always interesting. Trying to get new things going in a community is sometimes a difficult task because the decisions that a community makes have to be socially and politically acceptable for residents.

"I think, in general, it has been a very good experience for the communities, and I know it has been a good experience for us. There have been a lot of interesting findings [concerning how the systems perform]. Information that has come out of that particular project has been shared all over the country. I think it's difficult for us to gage just how effective this particular project has been for other communities in helping them, but I know that we have worked with and talked with many other folks as a result of the work that we're doing



## URI Training Center

Observing at-grade demo systems at the URI Training Center located at Peckham Farm, Kingston, Rhode Island.



on this project. Locally, it has had a great deal of significance in Rhode Island. It's had regional significance, and it's had some national significance, as well."

Loomis said the success measured in terms of water quality for Green Hill Pond may have to wait several years to be fully realized. "Historically, there have been 30 years of land-use practices that have impacted Green Hill Pond's water quality. We removed from the landscape 20 failed systems and put in some alternative systems [listed above plus others on the EPA-funded project] that produce much better and higher-quality wastewater," said Loomis.

"Are we going to see a silver bullet from those 20 systems reversing 30 years of land-use inputs into that pond? I don't think so. It's going to take a much longer time period for us to realize water quality improvement in that ecosystem. Many other private sector septic system repairs and new installations have also occurred in the Green Hill Pond Watershed, and with enough new technologies being used, water quality may begin to improve."

Groundwater tests in the area have shown some high concentrations of nitrogen. Loomis said that groundwater is moving slowly toward discharge into the coastal pond. In addition to the nitrogen inputs, there is also a bacterial problem in the coastal pond.

"It's going to take some time for us to incrementally change the water quality in Green Hill Pond. I think there have been some significant improvements in the way that we deal with onsite wastewater in that watershed," said Loomis.

He added that statewide, 25 to 30 percent of all applications today are for I&A systems, an increase from 1 to 2 percent previously. "That is a huge, dramatic switch from the conventional technology method in these critical resource areas to advanced innovative and alternative treatment systems. That in itself is a success," he said.

Ray Nickerson, environmental planner for South Kingstown, who participates in the project, agreed the project has been a success. He added, "I think one of the keys is that the overall inspection compliance rate is in the high 90 percentile, which is encouraging. I think that the rather aggressive education outreach program we instituted had a lot to do with the success of both the program and compliance from individual homeowners."

Nickerson said many educational meetings were held with the towns. "We actually went down to the neighborhood level, met with neighborhood associations, had probably a half-dozen forums at the town halls, and spent considerable monies in the development of education mate-

rials that were made available to the citizens through direct mailings or depositories, such as the local libraries and town halls," he said.

"One of the keys to success was the cooperative effort between the state government, local governments, and the academic community. I think without that kind of cooperation, it probably would not have been nearly as successful [in terms of information about I&A systems] as it has been to date."

### **Chepachet Project**

Another demonstration project, called the Chepachet Village Decentralized Wastewater Demonstration Project, was completed early last year.

Located in Glocester, Rhode Island, Chepachet Village is an historic mill village that was built on a tributary of the Blackstone River to harness waterpower energy. Weaving looms that once provided textiles to the colonies during the Industrial Revolution are silent now, but the mills have been renovated as antique shops and cafes to attract weekend visitors.

One part of its history, however, was not quite as charming. The village had been plagued with failing septic systems since the turn of the last century.

The problem came to a head in 1999 when the Rhode Island Department of Environmental Management (RIDEM) performed a shoreline inspection and shut down one property directly discharging untreated sewage to the Chepachet River. The homeowner shut down the cistern that was causing the problem, but later it was found that several other properties had been tied into this same cistern. This was an old drinking water cistern that had been converted to hold wastewater, essentially a cesspool. Untreated sewage started seeping in other places in the village.

Town officials sought help from the OWTC and the Non-point Education for Municipal Officials (NEMO) Program at the University of Rhode Island Cooperative Extension, and the Chepachet Village Decentralized Wastewater Demonstration Project was born.

In addition to fixing septic system problems, the village's top goal was to protect groundwater, since all of the homes and businesses in Glocester rely on groundwater to supply drinking water.

As part of the demonstration project, five alternative systems were installed in Chepachet Village. The systems served a restaurant, a large apartment building duplex, a multifamily house and garden shop, a first-floor retail shop with apartments above, and first-floor office building with apartments above.

"The systems that we installed on that project are definitely still operating and functioning well today," said Loomis. "The Chepachet project was a success."

In addition to fixing the immediate failure problems, the demonstration project had two main goals: to evaluate pollution risks to groundwater supplies from onsite systems and to determine the suitability of the onsite systems to meet long-term treatment needs.

The URI NEMO group conducted a Geographic Information Systems (GIS) study of groundwater supplies and found that despite the previous failing systems, water quality in the town's 22 public wells was good. A study of the remaining private wells was a little murkier. Private wells that are shallow and located less than 100 feet from onsite systems were at greatest risk for contamination.

In addition, surface waters were found to be at risk from polluted runoff in areas with high water tables.

An in-depth NEMO map analysis showed that 50 percent of the residential lots were suitable for conventional systems. Another 40 percent with environmental concerns due to close proximity to public wells, surface waters, or wetlands were found to need advanced treatment systems in addition to drainfields to ensure proper treatment. The remaining 10 percent of lots required advanced treatment technologies using either onsite or offsite cluster systems due to poor leachfield function. (See the Chepachet Village Decentralized Wastewater Demonstration Project, NSFC product #WW-BLCS26 for additional information.)

The demonstration project also set the following recommendations for the village:

- ensure basic septic system maintenance,
- phase-out cesspools,
- establish siting standards for new construction,
- ensure standards for advanced wastewater treatment,
- prevent pollution from land-use activities,
- promote private well care,
- control underground storage tank and hazardous material usage,
- manage and control stormwater runoff,
- protect wetland buffers, and
- expand public education programs.

"That community has moved to a wastewater management ordinance and program. Everything seems to be going fine for them," said Loomis. "They operate their onsite wastewater management program with a lay board of individuals."

Loomis added that the OWT Center, URI Home-A-Syst, and NEMO did extensive community outreach. "We did a lot of workshops in the evenings and then out in the field showing the alternative systems that were put in the ground to help folks understand what the issues were and how they could solve some of their wastewater problems in that historic mill village area, said Loomis.

"I think that was very useful. I know that there have been a lot of alternative systems [textile filters] that have been installed in the town of Glocester, both in the mill village area and throughout the town's borders. I think that particular demonstration project helped to facilitate a lot of that. People were able to see first-hand how you could integrate all these alternative systems in difficult sites."

### **Management Programs**

In Rhode Island, Section 319 Clean Water Act funds are available to communities to develop wastewater management programs. Because of this, the center has worked with a number of communities to help set up management programs.

Through the Rhode Island Clean Water Finance Agency, communities are eligible for low-interest loans to homeowners for septic system repair and replacement. Typically, if a community has a wastewater management plan, it is eligible for a line of credit from \$200,000 to \$400,000.

"We have done numerous outreach activities in different communities to help them understand what is going on with the wastewater management programs, how to develop



them, and basically help them understand the issues and needs to help them move forward," said Loomis.

### Contractor's Point of View

David R. Burnham, president of the Rhode Island Independent Contractors and Associates (RIICA), was personally involved in all 56 of the onsite systems installed by the OWTC. The organization is made up of mostly excavators who perform onsite installations.

"I think for years, those of us in the construction industry and the septic industry have been challenged by many site conditions, soils, high water tables—things like that. We were looking for more tools in our toolbox to be able to remedy situations," said Burnham, explaining why he and the other associates were willing to take less money and be involved constructing demonstration systems in the various projects.

"I focus personally on a lot of repair situations, so this gave us a tremendous amount of options besides the conventional in areas where we didn't think conventional systems would work. It also gave options for new developments where soils were questionable and water tables were high, so I was excited about participating. I thought we should be on the ground floor learning how not only to install them, but also how the systems work."

Burnham said textile filter systems have been particularly helpful to the Rhode Island area. "I think that textile filters with bottomless sand filters or pressure-dosed shallow, narrow drainfields are the most popular that we do," he said.

"Not all the systems we put in have been viewed by the state as acceptable technology. And that was the purpose—to see how they worked and what the issues were with them."

Burnham added that the most common technologies that are being installed privately are textile filters and peat filters with different components to the drainfield proportions.

Burnham is a member of the OWTC's steering committee and does instruction at workshops four or five times a year. He said the training center has been a great asset to the area.

"The OWT Center has courses for not only designers and installers, but also state regulators and out-of-state folks. We also provide a valuable service for municipals folks, people on zoning boards and planning commissions, and town councils and conservation commissions. They learn about the technology so that if a proposal comes before them, they understand how it works and how it should perform. So it's a great tool, and I think we're getting quite a bit of recognition regionally in New England," he said.

"The biggest challenge for the training center, and something that we've been dealing with for the last several years, is maintaining interest and providing new opportunities for training. We're adding new courses and challenging designers and installers a little more each year. I think that's good. We're doing some hands-on things. Textbook stuff is great,



"Our mission is to educate the public and wastewater practitioners on septic system issues and advance the use of innovative and alternative technologies to improve water quality in the region."

and looking at various components is great, but actually building something with them in front of people and showing them how it's done, I think, is widely accepted as a valuation component of the training center."

### Defining Success

Loomis modestly affirms the center's success. "I think that [the research] we've done has been very helpful and effective for our state and the communities in our state. Maybe we've even been able to help out some other folks elsewhere," he said. "OWTC staff has delivered countless talks throughout the country about the success of the Rhode Island onsite wastewater program. We've used the over 50 demonstration systems as the basis for this research-based outreach education. We've learned a great

deal over the past 10 years, and we've tried hard to get that information out to audiences. Over the past 10 years, we have assisted onsite wastewater management efforts in many locations. We've tried to make a difference by example. For me and the rest of the OWTC staff it has been an exciting period working with federal and state partners to showcase all the Rhode Island accomplishments."

But for that success, Loomis said many factors have come together. "We've been absolutely blessed with an extremely capable and competent staff, David Kalen and Holly Meehan, OWTC program manager and training coordinator, respectively, and former staff members James Boy, Justin Jobin, and David Dow, deserve a lot of credit. You could not hope for better people to work with. We also have a very progressive regulatory agency [Rhode Island Department of Environmental Management] that has certainly helped a lot. Without their proactive partnership in all the demonstration system projects and without RIICA and Dave Burnham's help, we would be nowhere," he said. "We've got very progressive, professional groups here who want to learn new tools, and we've had water quality issues in many of our critical resource areas that have created a very dramatic need for change. I think all of these things coming together have created a kind of synergistic effect that has really pushed things forward for us."

He added, "I think our training program does a very good job at what we do. We are good at educating people. I think an educated clientele base is able to make good, informed decisions that help protect public health and the environment."

For more information, contact Loomis at (401) 874-4558; David Kalen, OWTC program manager, at (401) 874-5950; or visit the OWTC Web site at [www.uri.edu/ce/wq/](http://www.uri.edu/ce/wq/). A complete analysis of how the seven Rhode Island NODP II systems performed is available from the National Environmental Services Center NODP Summary Report: Phase II by calling (800) 624-8301.

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