Texas On-Site Insights
Information about On-Site Wastewater Treatment Systems in Texas

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Regulators, Industry Professionals, Cooperate to Fix Failing System in East Texas, Build a Mound

When an elderly East Texas woman on a fixed income was faced with a failing septic tank and drainfield, a local regulator, a county judge, and a team of industry professionals stepped in and offered assistance.

Introduction

In 1999, an elderly woman in Liberty City (a small town near Longview) noticed that partially treated wastewater was flowing off the site into a bar ditch. Her existing system consisted of a 55-gallon drum and a small drainfield. Complicating matters, her site suffered from seasonally high shallow groundwater (only 18 inches from the surface) and is surrounded by nearby neighbors, thus limiting the possibilities to dispose of treated effluent.

The situation was brought to the attention of Jerry Pierce of the Gregg County Health Department and Gregg County Judge Mickey Smith. Smith and Pierce then made contacts with industry professionals to determine what types of assistance may be available.

"Judge Smith has been very concerned about individuals who have failing systems and may not have the resources to repair them," Pierce said. "He asked me if I could find out if there were any resources that we could provide for people who are truly in need, so I began looking for those who may be willing to lend a hand."

Initially, Pierce contacted companies that are active in the on-site wastewater treatment industry. For example, Pierce had heard about a program by Zabel Environmental

Technology called "Helping Hands" which has provided some assistance nationally. He also began working with local professionals to determine if they were interested.

As a result, a team of volunteers was developed for this project that contributed a range of services involving system design and installation, needed parts, and landscaping.

Installing the System

Once Pierce evaluated the site, the project team decided that a mound system was the best strategy. Although mounds are not common in Texas, this technology was chosen because of the limited area at the site and the high groundwater table. Planning for the project began in August 1999 and the new mound system was installed in October 1999.

The site was built up with Class 2 sandy loam soils that had to be imported to the site. These soils were compacted with a vibratory packer to a depth of 1'. Compacting the soil ensures that the mound can accept wastewaters while maintaining its structure. The mound covers an area that measures 20' x 40' and rises 2.5' above the ground and sites on top of a bed of soil. The bed of soil is elevated 1' above the ground.

Effluent is treated by three tanks in sequence — two conventional septic tanks and a pump tank. The second septic tank is equipped with a Zabel filter on the outlet side. Treated wastewater is pumped 3' uphill along a 40' distribution line and flows to a 20' PVC header, which diffuses the water pressure. Effluent is then directed to a series of Infiltrator EQ 36 leaching chambers that measure 8.3' long x 22" wide x 13" high. Each panel can hold 70 gallons of effluent.

One of the remarkable aspects of this project is that several people came together to design and install the new system. The system was designed by Steve Murdock of Infiltrator Systems and was evaluated by Gary Boles. It was installed by Billye Holzek of Boomtown Industries. Mike Smotherman donated sod and did the landscaping. Judge Smith provided the sand. Tyler Products donated three 500-gallon septic tanks. Shea Kent of MKM Sales provided control panels, pumps, and high water alarms. Zabel Systems supplied a septic tank effluent filter and risers. Infiltrator Systems donated leaching chambers and end plates.

Results from the Project

According to Pierce, the mound system is working very well and is producing treated effluent that meets regulatory water quality standards. Pierce notes, however, that individuals using these systems must take care to avoid placing materials in the system that could clog the trash tank.

One of the other great benefits from this project, Pierce said, is that it provided industry professionals and regulators with hands-on experience about a relatively uncommon technology. "This project should open the minds of many people to the idea that there are many different technologies that can work well in the area. Maybe professionals will be more willing to install mounds and other alternative systems as a result of this project."

The cost of this mound system would have been slightly more than a traditional septic tank and drainfield, if the materials had not been donated. Standard systems in the region average about $3,000. However, Pierce believes that the cost of mounds will likely go down in Texas in the future as more of these systems are installed and professionals become more acquainted with them.

Note: Pierce at (903) 237-2621 or jerry.pierce@co.gregg.tx.us, and Murdock at (512) 260-0321 or smurdock@infiltratorsystems.net.

Meetings and Conferences

The Texas Engineering Extension Service (TEEX) offers many excellent continuing education classes related to on-site wastewater treatment. The Installer I class will be taught May 8–9 in Amarillo, and July 17–20 in Houston. The Installer II class will be offered May 22–24 in Mesquite, June 26–28 in Corpus Christi, and July 31–August 2 in Austin. The Designated Representative class will be taught May 29–June 1 in Victoria, and July 17–20 in Houston. Operation and Maintenance of Surface Irrigation Systems with Aerobic Treatment will meet June 4 in Austin, June 5 in Houston, July 10 in Mesquite, July 12 in San Antonio, July 25 in Longview, and July 26 in Bryan. For more details about TEEX on-site wastewater training, visit their web site at http://teexweb.tamu.edu, or call them at (877) 833-9638.

The WWW site of the Texas Natural Resource Conservation Commission (TNRCC) contains an extensive list of resources describing opportunities for training and continuing education (CE). The WWW site lists approved providers for education relating to on-site sewerage facilities (OSSF), including educational institutions, governmental entities, and private companies. Dates and places classes are offered, course codes, and the number of CE units available for participants are listed. The WWW site address is http://www.tnrcc.state.tx.us/enforcement/csd/ics/ossf_ceu.html. The phone number for the TNRCC OSSF Section is (512) 239-4799.

The National Small Flows Clearinghouse (NSFC) is a tremendous resource for all kinds of information regarding on-site wastewater treatment and disposal. Free products available from NSFC include magazines, newsletters, and fact sheets. In addition, NSFC has published many special reports on specific topics relating to this field. For more details, visit them at http://www.nsfc.wvu.edu, or call (800) 624-8301.

The Texas Onsite Wastewater Association (TOWA) provides continuing education programs for installers and designated representatives. Their classes help people obtain continuing education credits required by the Texas Natural Resource Conservation Commission (TNRCC). To learn more about these training programs, contact TOWA at (512) 494-1125 or visit them on the WWW at http://txowa.org.

The Past, Present, and Future of Licensing Issues of OSSF Systems in Texas

A recent talk by Robert Brach of the Texas Natural Resource Conservation Commission (TNRCC) provided an overview of the history of the agency's On-Site Sewage Facility (OSSF) licensing program as well as a look at what is occurring now and what may take place in the future.

Licensing Issues

Before 1987, there was no licensing of people constructing, installing, extending, altering, modifying, or repairing an OSSF in Texas. Some counties required training for installers, but predominately no experience or training was required to install on-site wastewater treatment systems (OSSFs).

In 1987, the 70th Texas Legislature passed House Bill (HB) 1875, which allowed registration of OSSF installers by the State or by local programs. Installers needed only to complete training. Designed representatives had to finish training classes and demonstrate competency. In 1989, the 71st Texas Legislature enacted HB 2136. This bill created the Texas Health and Safety Code and said that only the State could develop the registration process for installers.

Senate Bill (SB) 1042, passed by the 73rd Texas Legislature in 1993, allowed the state to craft a registration process for designated representatives. Major rules revisions affecting licensing took effect in 1998. They created a new license level, designated representatives, as well as two groups classes of installers, and an apprentice registration level.

Proposed rules changes will significantly affect apprentices and both classes of installers. For example, apprentices could work under the supervision of licensed installers for at least two years in order to meet the experience requirement needed to become an Installer II.

Number of OSSF professionals in Texas

In August 1990, there were 2,310 registered installers in Texas. By August 1997, a year before the new experience and training requirements were to take effect, there was significant growth. The TNRCC recorded 4,233 Installer I's, 35 Installer II's, and 54 apprentices in Texas.

The growth in the number of OSSF professionals in Texas peaked in August 1999, when there were 2,244 Installer I's, 1,841 Installer II's, 1,061 apprentices, and 531 designated representatives working in Texas.

Currently, the TNRCC estimates there are 1,014 installer I's, 1,859 installer II's, 1,082 apprentices, and 575 designated representatives. The drop in the number of class I installers is believed to come as a result two items: the requirement for eight hours of continuing education, and the more stringent requirements needed to obtain the class I license.

Enforcement Issues

Originally, the legal basis and authority to take enforcement actions against OSSF professionals was contained in HB 1875 and HB 2136. These bills also set limits for fines ($50 to $500).

In 1993, HB 1550 was passed by the 73rd Texas Legislature. It redefined OSSF infractions as Class C criminal misdemeanors and gave the TNRCC administrative penalty authority. While this bill was in force from 1993 to 1997, the TNRCC handled 138 complaints, two persons served jail time, and seven licenses were revoked.

Things changed significantly with the passage of SB 1876, which was passed by the 75th Texas Legislature in 1997. This bill removed most of the local authority to take action on enforcement issues. In 1999, the 76th Texas Legislature passed HB 1654, which restored all local enforcement authority, and passed SB 1307, which allowed authorized agents to pursue civil suits.

From 1997 to 2001, when enforcement was transferred within the TNRCC from the Compliance Support Division to the Enforcement Division, 566 complaints were received by the program. Actions taken by the agency resulted in four licenses being revoked and another being suspended. Many of these complaints are pending or under investigation.

In the future, the TNRCC will emphasize enforcement at the local level. Based upon a certain number of convictions obtained at the local level, the TNRCC will be able to suspend or revoke a license.

Grounds for suspension of installers will include failure to provide maintenance and not submitting maintenance reports. Designated representatives can be suspended if they fail to verify people are properly licensed before inspecting a system or not investigating complaints in a timely fashion.

Similarly, the licenses of installers can be revoked if they construct an OSSF system that is not in compliance with TNRCC regulations or if they begin building an on-site system before a permit is issued. The licenses of designated representatives can be revoked if they work as an installer, apprentice, or a representative of a maintenance company in their service area, or if they approve an OSSF system that does not comply with state rules.

Other Future Changes

In addition to what has already been discussed, several other rules revisions will affect installers, apprentices and designated representatives. Installers will have to notify permitting authorities when they start work on a system (which has always been required under statute), and will have to stop construction if soil or other site conditions differ from approved plans. Designated representatives will need to do a better job in documentation. Apprentices will only be allowed to work on a site where construction has commenced.

Maintenance of aerobic units and several other technologies will also be affected. Training courses developed by manufacturers will now have to be approved by the TNRCC. Maintenance contracts will have to specify individuals responsible for maintaining major components of the OSSF covered by each contract, including who will be responsible for maintaining the disinfection unit, and the amount of time that maintenance companies have to respond to consumer complaints.

Note: Brach is a staff member in the TNRCC OSSF Section and works with licensing issues. He presented this talk at the 2001 Conference of the Texas On-Site Wastewater Treatment Research Council (TOWTRC) in Waco. Brach can be contacted at (512) 239-2150 or rbrach@tnrcc.state.tx.us. You can learn more about the TNRCC OSSF program on the WWW at http://www.tnrcc.state.tx.us/enforcement/csd/ics/ossf.html.

Texas A&M Scientists Evaluate Drip Tubing as Disposal Option for OSSF Effluents

Can the use of drip tubing be an effective way to dispose of effluents from on-site wastewater treatment systems in soils with slowly permeable clay horizons? That was the focus of a recent investigation by Texas A&M University researchers. The project was conducted by researchers Richard Weaver and Kevin McInnes and graduate student Jason Franti of the Soil and Crop Sciences Department, and student work Cody Cook.

Introduction

Drip tubing systems apply filtered or treated domestic wastewater to soils through the use of plastic or polyethylene tubing that is buried 6” to 24” beneath the surface. The drip tubing features evenly-spaced holes, also know as emitters, to distribute effluents into the soil.

“The use of drip tubing has considerable appeal since it has the potential to evenly and uniformly distribute wastewater throughout a site, to remove bacteria, and to prevent untreated effluents from reaching the surface,” Weaver said. “The use of this technology has not been thoroughly evaluated in controlled research studies, but this needs to be done to assess how well it may work in field use.”

In Texas, drip tubing can be utilized in most sites, as long as there is at least 12” of unsaturated soil between the drip tube lines and groundwaters. Interestingly, Weaver believes that drip tubing may work very well in clay soils, which are often problematic for several types of septic systems. This is because drip tubing distributes effluents over a large area, thus overcoming problems associated with soils that have low permeability.

Research Methods

Experiments were conducted on two plots at two sites in College Station, TX, to evaluate the removal of bacteria by the soil. Soils at one site consisted of a fine sandy loam with a clay-textured horizon 7” below the surface. The other site was a loam with a clay horizon 11” beneath the surface.

At each site, drip tubing systems had been in use for roughly three years. The existing systems were installed at depths of 6” and 12”. In addition, new drip tubing systems were recently installed at both locations using a static plow at depths of 6” and 12”. Pressure-compensated emitters were evenly spaced at intervals of 24.” They were designed to apply effluents at flows at 0.6 gallons per hour when the pressure ranged from 7 to 60 pounds per square inch (psi) were used. Each emitter was intended to distribute effluents over an area of 4 square feet. Soil column laboratory studies were carried out to determine how effluents and bacteria would flow through these soils, if preferential flow paths did not exist. Preferential or bypass flows often result when channels are formed in the soil by plant roots or when the soils break down and forms fissure or macropores.

Packed soil columns were inoculated with fecal coliform cells, and membrane filtration was used to measure whether fecal coliforms had leached through the bottom of the soil column.

Wastewater, fecal coliforms, and blue dye were applied through drip emitters, and were used to observe and follow the distribution and movement of effluents. Fecal coliforms (E. coli) were isolated from domestic wastewater.

Drip emitters that had previously been installed were excavated to determine whether surfacing wastewater had been caused by emitters that dosed too much water.

The infiltration rate was measured at both sites at the soil surface as well as from depths of 6”, 12”, and 24”. Infiltration was measured through the use of infiltrometers.

Results

The soil column studies showed that nearly all the bacteria that was applied remained in the soils and was not leached. This suggests that soils at the research sites have the potential to significantly lower pathogen levels, if bypass problems can be overcome.

Investigations of the existing drip tubing revealed that wastewater was surfacing above several emitters. Dosing larger amounts of wastewater in a single application increased the likelihood that effluents would surface. There was also evidence that preferential flow paths had developed in the soils where existing drip tubes had been operating. Bacteria removal rates were less than 20% from these systems.

Studies of the systems that were installed for this project show that burying to a depth of 12" eliminated the surfacing of effluents, as long as high volumes of wastewater were not applied at one time. For example, the research team initially dosed the site with a flow rate of 0.2 gallons per day, far greater than recommended rates. As a result, effluents surfaced. The depth at which drip tubing was buried also strongly influenced system performance. For example, wastewater seldom surfaced when tubing was buried at a depth of 12", but surfaced much more often when the tubing was buried only 6" deep.

The volume and dose of wastewater applied to the drip fields appeared to have little influence on either the frequency that effluents flowed to the surface, or on fecal coliform levels in treated wastewaters. However, when the researchers simulated the unintentional disposal of large volumes of water, this dramatically increased the surfacing of effluents.

Most of the wastewater that reached the soil surface did so through preferential or bypass flows.

Summary

"For drip tubing to become a viable method of disposing of on-site wastewater in clay soils, it is essential that the surfacing of effluents be restricted as much as possible," Weaver said. "We have to find the best ways to both treat fecal coliforms to the maximum extent possible, but to do this we have to prevent the development of bypass flow pathways that are often present in clay soils."

Installing drip tubing at deeper depths of at least 12" prevented effluents from surfacing at one study site, and greatly reduced the likelihood of surfacing at another. The ideal condition that would prevent effluent surfacing would be to deeply bury drip tubing in more suitable soils.

Another proposed management strategy that may make sense would be to apply more frequent applications of wastewater at lower doses during each application. This research suggests that, once preferential flow paths developed, there was little correlation between dosing rates and the chance that surfacing would occur.

"The best management practices that emerge from this study are to bury the drip tubing at a proper depth for the properties of specific soils on individual sites. This would ensure that excessive amounts of effluent are not applied," Weaver said. "This would help these systems function most effectively."

Note: A paper about this project was presented at the 2001 Conference of the Texas On-Site Wastewater Treatment Research Council. For details, contact Weaver at (979) 845-5323 or rw-weaver@tamu.edu, or McInnes at (979) 845-5986 or k-mcinnes@tamu.edu.

History and Future of OSSF Industry, Regulations, Discussed at 2001 TOWTRC Annual Conference

Industry professionals, regulators, and interested citizens from across Texas gathered in Waco in February for the 2001 annual conference of the Texas On-Site Wastewater Treatment Research Council (TOWTRC).

"This conference was extremely successful and attracted our largest turnout ever," said TOWTRC Executive Secretary Warren Samuelson. "We had 1,166 people attend and 72 exhibitor spaces were filled. One of the reasons for this success is the opportunity for participants to earn continuing education credits."

A number of timely topics related to regulatory, technical, and education issues that pertain to onsite wastewater treatment systems (OSSFs) were discussed at the conference. For example, some of the regulatory presentations featured issues related to certification, developing cases for enforcement, and Texas Natural Resource Conservation Commission (TNRCC) rules revisions. Talks that focused on technical matters described designs for low pressure dosing systems, the use of modern grease traps to treat high strength waste, combining soil absorption and evaporation data to size drainfields, and the installation of drip irrigation systems. Discussions related to education and training described TOWTRC communications programs, the extent to which on-site systems may be malfunctioning in Texas, and a common sense approach to understanding soils.

This conference was unique in that talks described the past, present, and future of issues facing designated representatives and industry professionals. Historical data and future trends related to certification and training were also presented.

A 287-page conference proceedings was published that summarizes several of the talks that were given at this meeting. This proceedings will soon be available on the Council's WWW site, http://twri.tamu.edu.

To learn more about the conference, contact TOWTRC Executive Secretary Warren Samuelson at (512) 239-4799 or wsamuels@tnrcc.state.tx.us.

Texas A&M–Kingsville Evaluates Performance of Subsurface Drip for On-Site Wastewater Systems

By Ric Jensen Editor, Texas On-Site Insights

Evaluating the performance of subsurface drip irrigation systems used for on-site wastewater disposal is the focus of a recent research project conducted by researchers and graduate students at Texas A&M University–Kingsville (TAMUK).

"The use of subsurface drip irrigation is increasingly being discussed as a disposal option for on-site wastewater systems along the Texas coast," Ernest said. "In several counties near the Texas coast, clay soils are often present that percolate slowly and make it difficult to properly treat wastewater. We need to learn more about how soil texture influences the performance of on-site systems."

Project leaders were researchers Andrew Ernest of the Environmental Engineering Department and Duane Gardiner of the Agronomy and Resource Sciences Department, and graduate students Krishna Pavanadan and Alondra Barnes. The project was funded by the Texas On-Site Wastewater Treatment Research Council (TOWTRC).

Study Design and Methodology

The project was conducted during the summer of 1999. Background information about the performance of subsurface drip systems was gathered by interviewing staff members of the Texas Natural Resource Conservation Commission (TNRCC), county health departments, registered sanitarians, other permitting authorities, industry professionals, and residential and business users of these systems.

A primary goal of the project was to determine the extent to which subsurface drip irrigation systems perform adequately or fail in treating and disposing of effluents from on-site wastewater treatment systems. In order to determine if systems were failing, the research team first developed a specific definition of exactly what constitutes failure. For the purposes of this study, failure was characterized as the presence of standing or ponding sewage in landscapes, yards, and ditches, as well as a significant decline in groundwater quality.

The researchers selected 18 study sites in Orange, Tyler, Hardin, Jasper and Fort Bend counties where on-site wastewater treatment (OSSF) systems were functioning. Roughly half the systems had been in place for four to eight years, while another 25% had been functioning one to four years. A vast majority of these systems (83%) treated domestic wastes, although units treating wastewater at a post office and service stations were also studied.

Water quality samples were analyzed for chemical oxygen demand (COD), five-day biochemical oxygen demand (BOD-5), total suspended solids (TSS), total phosphorus, total Kjeldahl nitrogen (TKN), nitrite, and levels of fecal coliform bacteria. Because the researchers were collecting data at distant sites they were often not near laboratories. Therefore, it was problematic to analyze samples for BOD concentrations. It is recommended that BOD levels should be measured within six hours of data collection. As an alternative, COD values were calculated and used to estimate BOD levels.

The hydraulic conductivity of soils at each site was determined through permeability tests using a constant-head permeamter. Raw wastewater samples were taken from the pump tanks of these systems. Samples of treated effluents were collected from a lysimeter that was placed in a 6” diameter borehole 6’ beneath the surface.

Soil samples were collected from depths of 1’, 2’, and 3’ using a hand auger. Soils were analyzed for soil type and texture, the shrink-swell characteristics of clay soils, bulk density, and soil moisture.

Data were analyzed using multi-regression analyses to determine possible relationships between system performance and failure and such factors as organic and hydraulic loading rates, and soil types (with an emphasis on clay content).

Results

The research generated comprehensive data about the soil and wastewater characteristics of the study sites.

For example, the clay content of soils averaged 15%. The mean value of the tendency of soils to shrink and swell was 6%. Hydraulic conductivity averaged 6 millimeters per minute.

The mean pH value of effluents was 7. Concentrations of total phosphorus averaged 6 mg/L in raw wastewaters and 1 mg/L in treated effluents. TKN concentrations were measured at an average of 14 mg/L in raw wastewaters and only 1 mg/L in treated effluents. The COD concentration of raw effluents averaged 63 milligrams per liter (mg/L). COD levels in treated wastewaters averaged 29 mg/L. Estimated average BOD levels (adapted from COD data) were 25 mg/L in raw wastewaters and 18 mg/L in treated effluents. Nitrate concentrations averaged 0.11 mg/L in raw wastewaters and 0.01 mg/L in treated effluents. Populations of fecal coliform bacteria showed a mean value of 23 most probable numbers (MPN) per 100 mL in raw sewage and 10 MPN per 100 mL in treated wastewater. The mean TSS values were 28 mg/L in raw wastewater and 2 mg/L in treated effluents.

After the data were analyzed using multiple regression methods, the research team examined which factor may most influence treatment in these subsurface drip systems. The research suggests that COD loading rates may be more important in determining system performance than either the clay content of soils or their shrink swell characteristics.

Ernest also developed an equation that may be used to estimate COD concentrations in finished effluents if data on the COD loadings and the clay content of soils can be provided as inputs. This model was used to predict the COD levels that should be present in the treated effluents from these systems.

"One of the most important aspects of this work is that we assembled data on the attributes and performance of drip systems used for on-site wastewater treatment along the Texas coast," Ernest said. "Another significant result is that we were able to use this data to develop hypotheses that allow us to better understand what is occurring in the treatment process."

Summary

Ernest notes that a very important factor that needs to be considered when analyzing the performance of onsite systems is the tremendous variability that occurs, both within the type and configuration of systems, site specific conditions, and system management. Still, thorough analyses of system performance in the field can produce needed insights about whether specific OSSF methods are performing properly or failing.

As a result of this project, Ernest suggests that adding pretreatment filters to septic tanks is a way to better system performance in many cases. Also, this study reemphasizes the need to conduct careful soil evaluations and environmental assessments at each site before selecting the appropriate OSSF technology.

Note: A report describing this project has been developed and presented to the Council. It will soon be published on the TOWTRC WWW site, http://towtrc.tamu.edu. If you email Ric Jensen at rjensen@tamu.edu, I will send you a copy of the full report. Ernest can be contacted at (361) 593-3041 or a-ernest@tamu.edu, or Gardiner at 361) 593-3691 or duane.gardiner@tamuk.edu.

Proceedings of 2001 ASAE Conference Includes Several Texas Presentations

The On-Site Wastewater Treatment "Proceedings of the Ninth National Symposium on Individual and Small Community Sewage Systems" includes several papers developed by Texas authors. The conference was sponsored by the American Society of Agricultural Engineers (ASAE) and met March 11-14, 2001, in Fort Worth.

Major themes presented at the Conference covered such broad issues as soils, technological advances, systems management, drip irrigation, the use of constructed wetlands, policies and standards, and the evaluation of these systems.

Papers that were written or coauthored by Texas authors include the following:

- "Soil Clogging in a Subsurface Drip Drain Field," by Ihab Jnad, Bruce Lesikar, George Sabbagh, and Ann Kenimer;
- "Sizing of a Subsurface Flow Constructed Wetland for Onsite Domestic Wastewater Treatment," by Matthew Stecher, Rick Weaver, and Kevin McInnes;
- "How and Why to be in Business For Yourself," by Frank Aguirre; and
- "Design Principles for Drip Irrigation Disposal of Highly Treated On-Site Wastewater Effluent," by Dudley Burton, F.H. Harned, Bruce Lesikar, Jim Prochaska, and Ron Suchecki.

For more information on these articles contact ASAE at (616) 429-0300 or visit them on the WWW at http://www.asae.org.

NEHA 2001 Conference Meets in Atlanta

The annual conference of the National Environmental Health Association (NEHA) will feature a session devoted to on-site wastewater treatment.

The conference meets June 28–July 3 in Atlanta.

Several presentations at the conference will discuss issues related to on-site wastewater treatment. Some these talks will focus on such issues as on-site assessment procedures, educating owners on the proper use and care of systems, and providing inventories of financial assistance. Other presentations will discuss established site acceptance criteria for advanced systems, how to administer programs to track whether required maintenance has been performed, and procedures for establishing performance-based designs.

In addition, there will also be a review course for registered environmental health specialists and registered sanitarians, as well as a work shop describing presentation skills for environmental health professionals.

For more details, visit the NEHA WWW site at http://www.neha.org, or contact them at (303) 756-9090.