Texas On-Site Insights
Information about On-Site Wastewater Treatment Systems in Texas
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Clearing Up Some of the Confusion About Who Really Needs Continuing Education Credits

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There seems to be a good deal of confusion about which individuals need continuing education (CE) credits. The question everyone is asking is whether they are required to take a CE class in order to renew professional licenses by August 1999.

Who is required to earn Continuing Education (CE) Credits?
Everyone must take a CE course to renew their license. The TEEX licensing courses for Installer I and II, Site Evaluator, and Designated Representative are approved for meeting the CE requirement. Therefore, everyone who took a TEEX licensing course between September 1, 1997 and August 31, 1999 has met the CE requirement for renewal of their license in August, 1999. The main group of people who are required to take a CE course are the grandfathered Installer I's and a few Installer II's who participated in a licensing course prior to September 1, 1997.

What courses are approved to meet the CE Credits?
Each courses must be approved by the Texas Natural Resource Conservation Commission (TNRCC), which reviews the course content and approves the number of CE hours each class will earn. Licensing courses taught by the Texas Engineering Extension Service (TEEX) such as Installer I, Installer II, Site Evaluator, and Designated Representative are approved to meet the CE requirement. TAEX courses are approved for CE credit, as are classes provided by the Texas Onsite Wastewater Association (TOWA). Other providers are applying to have courses approved.

A list of approved classes is on the Texas Natural Resource Conservation Commission (TNRCC) World Wide Web site, which is located at http://www.tnrcc.state.tx.us/enforcement/csd/ics/ossf_ceu.html.

How many hours of CE credits are required?
Eight contact hours are required for meeting the CE requirement needed to renew your license.

Do extra hours carry over from year-to-year?
No. If you take extra courses in a year, the hours do not carry over to meet the next year's requirements. You must have eight contact hours of CE between September 1 and August 31 to renew your license for the following year.

What are the contact hours for the TAEX Courses?
The courses meet from 8 a.m. to 5 p.m. with an hour break for lunch. This meets the requirement for eight hours of CE.

How do you sign-up for a course offered by TAEX?
Contact Jacque Hand at the TAMU Special Events Center at (409) 845-8904 or jhand@uc.tamu.edu.

How do I get a new license or sign-up for a TEEX CE course?
TEEX offers the courses to obtain a license as an Installer I, Installer II, Site Evaluator, or Designated Representative, as well as CE courses. For details, contact Gregory Lewis at (409) 862-6697 or psglewis@teexnet.tamu.edu.

NOTE: Lesikar can be contacted at (409) 845-7453 or b-lesikar@tamu.edu.

Council Funds Research Projects at Texas Tech University, Trinity River Authority

The Texas On-Site Wastewater Treatment Research Council recently funded two research projects. One study will investigate the effects of combining absorbic and evaporative disposal methods on drainfield sizing in arid and semi-arid areas, while the other effort will evaluate the field performance of chlorinators used with aerobic treatment units near Lake Livingston.

In one project, Lloyd Urban of the Texas Tech University (TTU) Water Resources Center and Heyward Ramsey of the TTU Civil Engineering Department will lead efforts to evaluate an evapotranspiration absorptive (ETA) system, which incorporates absorption and evapotranspiration (ET) data into drainfield sizing. This method could result in the need for smaller drainfields, compared to those which are developed when absorption or ET were used separately. For some time, regulators and installers in West Texas have suggested that minimum standards for absorptive and ET systems, listed in Section 30 of the Texas Administrative Code, Chapter 285, have resulted in oversized systems.

As part of this research, TTU will install three replicates of an absorption system, an ET system, and an ETA system that will use artificial wastewater, as well as three replicates of the same three systems which will use "clean" groundwater. The systems will be

operated for two years to observe if seasonal changes occur in the operation, due to weather and vegetation conditions. The purpose of the study is to determine if the current Texas Natural Resource Conservation Commission (TNRCC) design guidelines given in the rules for absorption and ET systems for on-site wastewater disposal are too conservative for arid and semi-arid soil and climate conditions.

In the future, results from this project could be useful in developing guidelines and rules for the use of ETA techniques to determine drainfield sizing. This project started on February 15, 1999, and will be completed on July 15, 2001.

In another project, Richard Gerard of the Trinity River Authority (TRA) will lead a study of the performance of chlorinators used with aerobic treatment systems around Lake Livingston.

TRA staff have been monitoring the performance of aerobic treatment systems around Lake Livingston since 1991. Since 1994, every permitted aerobic treatment unit has been inspected with samples taken and analyzed every year. Although the overall performance of aerobic treatment systems has been excellent, TRA staff has consistently found that coliform values in more than 25% of the treatment systems exceed acceptable TNRCC limits. Inspection reports indicate that the cause of these failures is often faulty chlorinators, the poor performance or non-use of chlorine tablets, or a lack of maintenance.

As a result, TRA proposed a comprehensive study of chlorinators to determine the most common cause of failure or malfunction and to provide information to regulators which may then be used to draft suitable construction and testing standards. The study will include inspecting 600 chlorinators, taking samples, and testing for fecal coliform. Additional information that will be recorded includes the types of chlorinators and chlorine tablets which are used near the lake, the condition of tablets, the presence of chlorine alarms, whether homeowners have current maintenance contracts, and the status of testing and reporting. This project will begin on June 1, 1999, and will be completed on August 31, 1999.

For more details about the TTU project, contact Urban at (806) 742-3449 or lurban@coe.ttu.edu. For more information about the TRA study, contact Gerard at (409) 365-2292. Additional information about the Council can be obtained by contacting Warren Samuelson of the TNRCC at (512) 239-4799 or wsamuels@tnrcc.state.tx.us.

Record Crowd Gathers in Waco for Annual Council Conference

A record crowd of more than 1,000 participants gathered in Waco in February to participate in the annual conference of the Texas On-Site Wastewater Treatment Research Council (TOWTRC). The meeting was a success, according to organizers, because many professionals in the field wanted to keep up with the latest trends in the field and earn valuable continuing education credits. The meeting was also popular

because Waco is centrally located, thus making it easy for participants from much of Texas to take part.

The conference featured presentations on many issues, including the field performance of aerobic and low-pressure dosing systems, activities by the Texas Natural Resource Conservation Commission (TNRCC) to enforce, review, and revise on-site wastewater regulations; managing systems with effluent filters; and factors to consider when designing on-site systems for restaurants and sites which generate high strength waste. Talks at the conference provided updates on Council-funded training centers, a discussion of a report the Council sponsored to investigate the cost of installing systems under old and new regulations, an explanation of Baylor University's program to test aerobic treatment units, pump selection and maintenance, and safety issues relating to the operation of backhoes and electrical installation.

A popular event was a panel discussion in which industry professionals and regulators could ask questions to TNRCC staff and industry professionals about problems encountered by designated representatives and installers. Many attendees said this gave them a needed chance to clarify a critical issue or to make sure TNRCC representatives and their colleagues knew how they felt about key concerns. Another valuable part of the conference was the exhibit area, in which participants could observe many technologies first-hand and obtain information about them, as well as learn about data management systems, innovative methods to finance systems, and TNRCC regulatory programs.

NOTE: Limited copies of the Conference proceedings were printed. To inquire about obtaining a copy, contact Warren Samuelson of the TNRCC at (512) 239-4799.

Nolan Creek Project Aims to Educate Central Texas Residents About On-Site Wastewater Treatment Options

A new initiative from the Texas A&M University (TAMU) System and other cooperators aims to educate and demonstrate how innovative on-site wastewater treatment systems can help protect water quality in Central Texas.

The project is a team effort of researchers and extension specialists at the TAMU Blackland Research Center (BRC) in Temple, the TAMU Agricultural Engineering Department, the Bell County Health Department (BCHD), and the Texas State Soil and Water Conservation Board (TSSWCB). It was funded by TSSWCB through the U.S. Environmental Protection Agency's Clean Water Act (CWA) 319 (h) program. Key participants in this program include Kevin Canfield of TSSWCB (who administers this program at the state level), Donna Long and Dennis Hoffman of BRC, Bruce Lesikar and Russell Persyn of TAMU, and Michael Jahns of the BCHD. Faculty and students from colleges in the region will be involved, including Darrell Watson of the University of Mary Hardin Baylor in Belton and Mac McBryde of Central Texas College in Killeen.

Background Information

On-site wastewater issues are only one aspect of this CWA grant, which also addresses other water quality concerns in the Nolan Creek watershed. The watershed encompasses Fort Hood, Killeen, Belton, and Harker Heights. The reason for the project is that population growth is expanding rapidly in the region. As a result, roughly 600 permits for new on-site wastewater systems are processed in the area each year. Problem soils in the area include Blackland and silty clays, fractured rock, and limestone, all of which make it difficult for traditional septic tanks and drainfields to function properly. High levels of fecal coliform bacteria have been found in some rural creeks, near sites where on-site wastewater systems are situated.

"The problem homeowners are facing now," says Jahns, "is that standard systems, in many cases, cannot be allowed at problem sites under the 1997 Texas Natural Resource Conservation Commission on-site wastewater rules. People were used to being able to install a conventional system wherever they wanted to, but now they realize they may need to explore non-standard methods of on-site wastewater treatment."

Education Efforts

As a result, Long and Hoffman developed the concept for a demonstration program which would be geared towards informing new homeowners about which choices were available for on-site wastewater treatment, in the event standard systems could not be allowed because of site limitations. This includes making new homebuyers more aware of on-site regulations before they design or buy a residence and helping them realize that many options may exist which may function well in meeting their on-site wastewater needs. The project is also targeted towards teaching existing homeowners how they can better maintain their systems to prevent pollution.

"Unfortunately," Hoffman says, "we are learning that a lot of people who recently purchased an existing home may not even know what type of system they have, let alone how to take care of it, until something goes wrong."

"We have found many instances in which people build a home in rural parts of this area and find out they can't use a septic tank and drainfield," Long explains. "When this

happens, they often don't know what to do in order to choose the on-site wastewater system which is right for them. There's a big need for education that we hope to address."

To address these concerns, the team developed a wide-ranging educational program which includes seminars for installers, realtors, and the public, the distribution of fact sheets developed by Lesikar as well as those developed by BRC for the "TEX*A*Syst" water pollution prevention program, and the creation of a World Wide Web (WWW) site which includes diagrams of a variety of on-site wastewater treatment technologies.

Another objective is to provide technical information about new technologies to local designated representatives and regulators. "It used to be that troubleshooting an on-site system was fairly easy because so many of the systems were standard septic tanks and drainfields," Jahns says. "But as new and innovative systems become more widespread, our five-person staff needs to be brought up to speed about how these new strategies will perform in difficult situations and how to fix them if they fail."

Demonstration Projects

In addition to providing increased education, another goal of this effort is to install innovative systems throughout the region so that the public can actually see how well they work and determine if they want to use them. The demonstrations will provide needed data on how well these technologies perform in the area.

As part of this thrust, Persyn and Lesikar have sought to locate at least four homeowners who may desire to install and maintain innovative systems on their properties. Earlier this year, they worked with two homeowners to design innovative systems to replace failed septic tanks and drainfields. At one site, blackwater and greywater will be separated. Constructed wetlands will be used for secondary treatment of the blackwater, while the greywater will be disinfected and spray irrigated. At the other site, a sand filter will treat wastewaters and effluents will be applied with spray irrigation. Both systems are now being constructed. Other technologies they hope to implement and demonstrate include evapotranspiration beds, aerobic units, and low-pressure dosing.

Summary

"Ultimately," Hoffman says, "we hope to develop a tool kit which residents in this region can use to make wise choices about new on-site wastewater strategies or maintaining existing systems. If we can do this, it should help protect water quality throughout the region."

NOTE: For details, contact Canfield at (254) 773-2230 or kevinctsu@yahoo.com, Hoffman at hoffman@brc.tamus.edu or (254) 770-6562, Long at long@brc.tamus.edu or (254) 770-6615, Persyn at rap@tamu.edu or (409) 845-9796, or Jahns at (254) 778-7557. The BRC WWW site which includes diagrams of many systems is at http://waterhome.tamu.edu/septic/.

Leaders from North America Meet in South Texas to Learn How to Develop, Improve, On-Site Wastewater Training Centers

Roughly 40 leaders involved with on-site wastewater training from throughout the United States and Canada met in Weslaco, TX, March 4-6 to learn the keys to establishing training centers, how to optimize the training which takes place there, and how to keep these facilities viable over the long-term.

The workshop, "An Academy for On-Site Wastewater Training Programs and Center Development," was sponsored by the National Environmental Training Center for Small Communities (NETCSC) at West Virginia University (WVU), the Consortium of Institutes for Decentralized Wastewater Treatment, the South Texas International On-Site Wastewater Treatment Training Center at Weslaco, the National Training Center for Land-Based Technology and Watershed Protection at North Carolina State University, and the Northwest On-Site Wastewater Training Center in Washington state. Cosponsors include the National Small Flows Clearinghouse and the National On-Site Demonstration Projects (both headquartered at WVU) as well as multiple on-site wastewater training centers and programs from many sites in North America.

"The things I took away from the workshop," said John Drawe, who manages the South Texas Center for Texas A&M University, "is that this meeting helped participants develop a vision of how training centers can be developed and maintained over the long-term. The workshop reinforced the notion that, with a lot of organization and hard work, it is possible to take training centers from concept to reality."

The workshop featured presentations on such topics as how to create a center, instructional methods specifically for adult learners, and funding concerns. Some of the talks addressed such issues as site planning, how to start up a center, models for training programs, obtaining funding and partners, and how to construct a center. Many speakers focused on teaching methods and spoke about adult education instructional techniques, increasing hands-on learning, using case studies in instruction, curriculum examples from existing training centers, and small group interactions.

In addition to classroom presentations, attendees also were given many opportunities to observe the Weslaco Center and see how the many types of technologies installed at that

site enhance the overall training experience and make it more desirable for potential attendees to take classes there.

"A key part of our success," Drawe says, "is that we encourage people to get involved with the individual treatment units we have installed on-site. If someone wants to pull apart an effluent filter and examine it, or peek into an aerobic unit and see how it works, that's great. That's the best way to learn and it provides knowledge they are likely to take home and retain."

What's the lesson to be learned from the academy? According to Drawe, the most meaningful part of the workshop was that it reinforced the needed elements that should be present if such centers are to flourish.

"What I took away from the workshop was that centers have to be a team effort between industry and government if they are going to work as well as they can. The meeting reminded me that the centers become essential if you can incorporate training into certification and continuing education requirements. We have to make participants feel good about what they learned there."

NOTE: For more information about NETCSC training programs and future academies, contact Sandy Miller of WVU at Smiller2@wvu.edu. For an outline of materials that were presented at this academy and which professionals led these training sessions, or for more information about the South Texas International On-Site Wastewater Training Center, contact Drawe at h-drawe@tamu.edu or (956) 968-5585.

New TAEX Fact Sheets Discuss How to Select, Permit, Systems

The Texas Agricultural Extension Service (TAEX) has recently published additional fact sheets describing on-site wastewater treatment technologies and management concerns. The fact sheets were produced by Bruce Lesikar of TAEX.

Fact sheets which have been published recently include the following: *On-site wastewater treatment systems: Selecting and Permitting* (B-6077); *On-Site Wastewater Treatment Systems: Septic Tank/Soil Absorption Field* (L-5227); *On-Site Wastewater Treatment Systems: Evapotranspiration Field* (L-5228); *On-Site Wastewater Treatment Systems: Sand Filters* (L-5229); *On-Site Wastewater Treatment Systems: Constructed Wetlands* (L-5230); *On-site Wastewater Treatment Systems: Conventional Septic Tank/Drainfield* (L-5234); *On-site Wastewater Treatment Systems: Low-Pressure Dosing* (L-5235); *On-site Wastewater Treatment Systems: Spray Distribution* (L-5236); and *On-site Wastewater Treatment Systems: Subsurface Drip Irrigation* (L-5237).

These fact sheets can all be downloaded as Adobe Acrobat files by going to the Texas Agricultural Extension Service Publications World Wide Web site, at http://agpublications.tamu.edu/pubs/eengine. Printed copies of the fact sheets can be purchased by calling the TAEX Publications Office at (409) 845-6571.

Constructed Wetlands at Blessing, TX, Prove to be a Viable On-Site Wastewater Treatment Method

By Ric Jensen
Editor, Texas On-Site Insights

During much of the 1990s, there has been considerable interest throughout Texas for using constructed wetlands for on-site wastewater treatment. For example, many systems of this sort have been designed and installed in place of conventional septic tanks and drainfields in such far-flung sites as Weslaco, D'Hanis, Nacogdoches, Madisonville and points in between. What's often been lacking, though, is data on how these systems actually perform and how well they treat wastewater once they've been installed.

A new report from the Lower Colorado River Authority (LCRA) helps fill this void and provides solid evidence about the performance of two wetlands which were constructed in the small South Texas coastal town of Blessing. The report was written by Burt Carter, who is the environmental coordinator at LCRA for the on-site wastewater program, and Tom Curran of LCRA, who served as the project engineer. The study presents evidence that these systems can be very effective at treating wastewater on-site in difficult situations.

Background Information

LCRA received a Clean Water Act Section 319 (h) grant from the U.S. Environmental Protection Agency to implement and study the use of constructed wetlands as an alternative means to treat wastewater from single family homes in coastal areas of Texas. The study was needed because of concerns that roughly 10 to 15% of on-site systems in Matagorda and Wharton counties occasionally fail, resulting in surfacing or ponding of partially treated wastewater. Soils in the region consist of dense clays with low permeability, many homes utilize small lots, and perched aquifers are common at many sites.

To address these concerns, LCRA assembled a team to design, construct, and test the performance of these systems in the small town of Blessing. Some of the major participants include Bruce Lesikar of the Texas Agricultural Extension Service, who built the systems; Ed Schulze of the Matagorda County Health Department (MCHD), who helped select candidate sites and enlist willing homeowners who volunteered to have

such a system built on their lots, and Carol Whittington of the Texas Natural Resource Conservation Commission, who provided regulatory overview and guidance. Other LCRA personnel who played key roles include Bryan Cook, Jerry Guajardo, and Alicia Gill.

Designing and Installing the Systems

In 1995, LCRA staff met with representatives of the MCHD to review candidate sites. Later, Schulze contacted homeowners to determine if they wanted to participate. Two sites were ultimately selected.

At the first location (site "A"), a system design was developed based on the use of an existing septic tank, which was outfitted with a commercial filter inside the tank. The home was retrofitted with low-flow toilets and showerheads. Two people live in the home and the system was designed based on a flow of 120 gallons per day (gpd). Based on system design guidelines from the Tennessee Valley Authority, LCRA developed a plan in which two 4' x 21' cells were arranged in sequence. At the second house (site "B"), the general plan for this constructed wetland was much the same. The only difference is that three people lived at this residence so the flow design was based on 180 gpd. The size of the wetlands cells was increased to 5.5' x 21'. It needs to be noted, though, that once these sites were designed and installed, actual flows varied because of changes in the number of people in those homes. Therefore, site "A" was actually over-designed (the actual residence time was roughly six days), while site "B" was smaller than desired (residence time was only two days).

At both sites, the first cell of each system was lined with a 30-mil plastic membrane, although the second cell was not lined (to promote soil absorption). The cells contained a gravel depth of 13" and the cells were filled with 1.5" diameter gravel as well as 0.4" diameter pea gravel. The effluent operating level was set at 1'.

The systems were built so that flows could be monitored with pumps and flow meters, which were placed at the beginning of the lined cell and the end of the unlined cell. Flows were routed from the wetlands cells to existing lateral lines. The systems were built from May to July, 1996.

Careful attention was given to selecting and installing plants which would take up wastewater and introduce oxygen to promote treatment. At site "A," the first cell was planted with horsetail, soft rush, square stem spike rush, yellow iris and canna lily. The second cell featured canna lily, tharow, thalia, and umbrella sedge. At site "B," the first cell was planted with canna lily, soft rush, square stem spike rush and horsetail. The second cell includes canna lily, yellow iris, thalia and umbrella sedge.

System Performance and Monitoring

Rains were heavy and frequent throughout much of the project (93 inches fell from October 1996 to May 1998) and this resulted in a large volume of water flowing into the

wetlands system. In fact the amount of precipitation which fell on the wetlands was greater than the volume of wastewater being generated by the homeowners. As a result, in 1997, LCRA developed a cover - similar to a carport - which was constructed over the wetland at site "A" to prevent excess rainfall runoff from flowing into the wetland.

There were also other challenges. Four pumps fouled and became inoperable (likely due to clogging caused by vegetative growth). In addition, these sites attracted large numbers of insects, which then devoured many of the plants (this problem was controlled through pesticide application). Finally, some of plants performed poorly in cold weather (canna lilies suffered widespread losses), while others prospered (umbrella sedge, horsetail, and iris).

One of the goals of this project was to evaluate how constructed wetlands might function compared to traditional systems (septic tanks and drainfields). In this regard, the wetlands were a resounding success. For example, biochemical oxygen demand (BOD) was cut by 93% at site "A" and 88% at site "B," while fecal coliform bacteria were slashed by roughly 99% at both sites. Total Kjeldahl nitrogen was reduced by 95% at site "A" and 66% at site "B," and total phosphorus was lessened by 96% at site "A" and 39% at site "B." Total suspended solids (TSS) were cut by 85% at site "A" and 87% at site "B."

LCRA estimated the cost of developing both wetlands and compared it to the expense of installing other alternative (aerobic) systems which may work in these problem sites. Estimates show that a two-cell wetlands system could be installed for roughly $2,495, compared to as much as $4,700 for an aerobic unit. However, these projections do not include the cost of a drainfield. In addition, the report suggests that more money could be saved if wetlands plants could be obtained at no cost (perhaps from the U.S. Department of Agriculture) or if tire chips were used instead of gravel. It should be noted that it would cost $1,000 more to cover both wetlands cells and shield them from rainfall runoff.

Summary and Conclusions

Carter says there are a number of important lessons that can be learned from this study. First, data from this effort show that wetlands can produce effluents which are superior to those generated through the use of conventional systems in the region. Second, it was critical that efforts be taken to reduce how much rainfall ran off directly onto or flowed into the wetlands, since this can affect how much treatment time the wetlands can provide. Such measures as building mounds to divert runoff or the use of covers improve the chances for success in these systems. Finally, this project shed light on how the individual cells may function. It appears as though the first cell worked to reduce BOD, fecal coliform, and TSS, while the second cell served as a way to cut nutrients.

NOTE: The report, "Demonstration of On-Site Constructed Wetland Treatment Systems in Matagorda County, Texas," was published by LCRA in 1998. For more information, contact Carter at (800) 776-5272 or burt.carter@lcra.org or Schulze at 409) 244-2717.