Texas On-Site Insights
Information about On-Site Wastewater Treatment Systems in Texas
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International On-Site Wastewater Center Opens in El Paso

A new training center that will enhance hands-on instruction in on-site wastewater issues was recently dedicated in El Paso. The International On-Site Wastewater Treatment Training Center, located at the Texas A&M University (TAMU) Agricultural Research and Extension Center in El Paso, was dedicated this February. More than 50 people, including many members of the media, took part in the dedication. Participants included representatives from government agencies and universities in Mexico, New Mexico, and state and local agencies.

Many of the people who made the El Paso training center a reality gathered for the dedication including (left to right) Bruce Lesikar, Jaroy Moore, Delma Perry, TOWA President Dudley Burton, Warren Samuelson, and Franz Hiebert.

"We think the training center will be beneficial to the region for many reasons," says TAMU El Paso director Jaroy Moore. "There is a tremendous opportunity to help professionals deal with on-site wastewater because there is so much growth in the region," Moore says. "Having this facility in place will help develop professionals who can better design and maintain systems that will function well and protect the environment." Franz Hiebert, the chairman of the Texas On-Site Wastewater Treatment Research Council (TOWTRC), says that creating additional training centers like this one is one of the most important functions of the Council. "One of the primary missions of the Council has to be to get useful information to the on-site wastewater community in Texas," Hiebert says. "Anything we can do to serve their needs, especially as it relates to education and training, is a critical part of what the Council is all about."

The training center is similar to the other two existing Council-funded facilities in Bryan and Weslaco in that many types of full-scale systems have been installed. At the El Paso training center, individuals taking classes and those visiting the site can see demonstrations of many treatment systems including a conventional septic tank, a sand filter, a trickling filter, a constructed wetland, and an aerobic treatment system. The site

features several types of wastewater application systems including standard drainfields, low pressure dosing, an evapotranspiration bed, and a mound.

"Many of these systems were installed here specifically because we thought they would work best in West Texas conditions," says Bruce Lesikar of the TAMU Agricultural Engineering Department who did much of the preparatory work and designed the site. "We hope to use the training center to introduce professionals and regulators to systems that they may not have seen before, technologies they may not have used, or to increase their understanding of systems that are now widely used. Ultimately, we want to place better information in the hands of professionals, regulators and decision makers."

Building the training center was the result of teamwork between many agencies, associations and private parties. For example, funds to help construct it were provided by the Council. Lesikar designed how the training center would be laid out and which components it would contain. Delma Perry, a El Paso installer of on-site systems, organized volunteers who worked with Lesikar and other TAMU staff to construct the training center. Many members of the Texas On-Site Wastewater Association donated equipment that was installed at the site.

Now that the training center is completed, the Texas Engineering Extension Service (TEEX) will offer many courses here that incorporate classroom teaching and hands-on instruction. Eventually, Lesikar hopes it will be used to instruct individuals throughout the region in courses for installers, site evaluators, and designated representatives.

NOTE: To learn about when courses will be offered at the training centers, contact TEEX at (409) 845-2559 or visit their World Wide Web site at http://www.tamu.edu/teex. For details about the new international training center, contact TAMU El Paso at (915) 859-7725.

EPA Report to Congress Describes Decentralized Systems

The U.S. Environmental Protection Agency (EPA) recently published a report to Congress describing issues related to the use of on-site wastewater systems throughout the United States. The report, Response to Congress on the Use of Decentralized Wastewater Treatment Systems (EPA 832-R-97-001b), was published in April 1997.

Chapters of the report cover such topics as an analysis of the benefits of decentralized systems, potential savings and costs, overcoming barriers to implementation, and the ability and plans of EPA to implement strategies to facilitate the use of decentralized systems. According to the report, roughly 25% of households and 37% of new developments in the U.S. rely on on-site wastewater systems.

The report can be viewed on the WWW at http://www.epa.gov/OWM/scpub.htm and can be ordered from the National Small Flows Clearinghouse at (800) 624-8301 or e-mail nsfc_orders@estd.wvu.edu. The NSFC WWW site address is http://www.estd.wvu.edu/nsfc/.

Audit: Agency broke septic system rules
Some homeowners, builders in limbo after state report finds Austin-Travis health department mistakes

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By Tara Trower and Ralph K.M. Haurwitz
American-Statesman Staff

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As many as 900 septic systems were approved in Travis County last year in violation of state rules intended to protect ground water and to promote new technologies, according to a state audit.

The finding has raised questions about the legal status of about 150 septic systems under construction, which cost $5,000 to $25,000 or more per lot. It also has focused attention on a relatively low-profile agency, the Austin-Travis County Health and Human Services Department, which grants permits for septic systems in the county.

The audit by the Texas Natural Resource Conservation Commission faulted the city-county health department for failing to follow new rules the conservation commission adopted in February 1997 and, in some cases, for not following the health department's

own rules. The state has given the agency 60 days to develop a plan to implement the state rules.

There is no evidence that ground water contamination resulted from the violations, and in some cases the county rules are stricter than the state rules. Nonetheless, County Judge Bill Aleshire did not dispute the state's findings.

"We had no idea that the rules were being misapplied," Aleshire said Monday. "I find this particularly appalling in a region that has focused so much effort and attention to protecting water quality."

Officials estimated that 150 homeowners and builders are in limbo. Dieter Billek is one of them. He sold his house in Cedar Park a few weeks ago and is having a house built in Northwest Travis County off FM 1431. At the time, he wasn't unduly concerned about installing a septic system on his 2.6-acre plot.

Now, a week before construction is scheduled to start on the $170,000 house, the city-county health department has said that Billek may have to redesign the septic system. Engineering, modifications and delays could add as much as $10,000 to the price of the house.

"This was not the plan," Billek said. "Every day is hurting me."

Septic systems are common in outlying areas and other neighborhoods where, because of the terrain or density restrictions, wastewater must be disposed of on individual lots rather than piped to a central treatment plant. The systems generally consist of settling tanks, pumps, pipes and drainage fields.

It is doubtful that builders and homeowners who have already installed septic systems would be asked to make modifications. However, it is unclear what might happen in cases in which permits have been issued but installation has not begun or been completed.

"The big fear is that if you've gotten a permit and started the job, the rules will change on you midstream," said Harry Savio, senior vice president of Texas Capitol Area Builders Association, a trade group. "We don't want to be out crying wolf, but we're worried about the possible ramifications."

Health department officials said they misunderstood the state rules adopted in 1997 and thought the county could give variances in special circumstances. After receiving the audit, county commissioners two weeks ago ordered health officials to review permits for systems not under construction, such as Billek's, to ensure compliance with state rules.

Although the county's plan will probably include new local rules, specifics will not be available until Wednesday, said Stephen Williams, the county's executive manager of the health department.

Marcia Conner, an assistant Austin city manager who oversees health and human services matters, said she has not had time to fully review the audit and is awaiting an analysis by her staff. It is premature to say whether all of the findings are correct, Conner said.

"This is a transition period. We are trying to develop rules right now," Conner said, adding that a likely outcome would be that the health department would enforce the stricter of the rules, whether local or state.

David Lurie, director of the health department, also stopped short of confirming or disputing the audit. "We're confident we can have the program in compliance," he said.

Audit findings

The conservation commission's audit, issued earlier this month, cited the health department for issuing permits for installation of 900 septic systems without following state rules.

The new rules increased the required size of some types of septic systems and tied the type of system used to the type of soil in the area.

The city-county health department has not updated its rules since 1983. Many permit applicants received a manual from the department for "approved" septic systems even though the systems had not been approved by county commissioners or the state.

The audit also found:

Although Travis County pays the City of Austin $665,000 to manage the septic system permit program, the city is not authorized by the state to issue permits.

Septic system owners have built drainage fields directly on bedrock, although the state requires at least 2 feet of soil beneath the fields and the city-county department requires 4 feet. The purpose of the soil is to filter harmful bacteria and other pollutants that otherwise might seep through fissures in bedrock and contaminate ground water.

The health department has been using the wrong soil test to determine which type of septic system is appropriate.

The department has failed to pay $9,000 in required fees to the state for septic treatment research. The county has not paid the fees since September 1996.

Conflicting rules

Joel Katz, president of Katz Builders Inc., said the problems have put a cloud over a 1-acre lot off Camp Ben McCullough Road in Southwest Travis County where he plans to build a house in the $400,000 price range.

"We don't know what rules they're going to follow, so my engineer can't design a septic system," Katz said. "That's got me in limbo."

Bob Fluegge, a builder and engineer who designs and installs septic systems, said the differences between the state's rules and the local rules are numerous and complex. In some cases, the state's rules seem more environmentally protective, while in other cases the county's rules seem stronger.

For example, the state requires 1 to 2 feet of soil beneath drainage pipes for wastewater, to absorb bacteria and other pollutants. The county has allowed variances for pipes to be installed directly in limestone bedrock. There is no clear evidence that the county's approach has caused ground water contamination, Fluegge said.

Fluegge said the state allows wastewater to be sprayed onto the ground but the county does not. He said the practice could be dangerous if homeowners failed to chlorinate wastewater before spraying.

Aleshire and County Commissioner Margaret Moore said the health department's problems may stem from the hybrid nature of the agency. The county's health clinics and other health programs are also managed by the city.

Although the city manages the septic program, the county is ultimately responsible for the program's effectiveness, said Elston Johnston, who was part of the state commission's audit team.

"We generally treat initial audits as a learning experience," Johnston said, adding that fines and other sanctions are not being considered at this point. "But we expect compliance with our rules."

Council WWW Site Records 70,000 "Hits" in 1997

Although it's been up and running for only about a year, the World Wide Web (WWW) site of the Texas On-Site Wastewater Treatment Research Council is getting rave reviews.

The WWW site, located at http://towtrc.tamu.edu, was developed by Ric Jensen and students Sergio Acosta, Jonathan Jones, Jason Middleton and Tung Tran of the Texas Water Resources Institute (TWRI) at Texas A&M University.

The WWW site can be accessed by anyone with a computer, a modem, a WWW browser, and an Internet service provider. The goal of the TOWTRC site is to provide useful features that regulators, agency personnel, and the general public can use to learn more about on-site wastewater issues. "It supplements the information provided by the Council and gives users an easy to use way to access newsletter articles and find other related sites. The goal is to get a lot of information into the hands of the public and to provide a way of accessing and searching for information around the clock from remote sites.

The TOWTRC site includes the following features: 1) Detailed information about the Council, its statutory authority, and its programs, 2) Text, color photos, and graphics from all issues of the "Texas On-Site Insights" newsletter, 3) A subject index that groups articles that have been published in the newsletter into 40 categories, 4) A search tool that lets users find information on any word that is listed on the site, 5) Links to other WWW sites dealing with on-site wastewater, 6) On-line information on state regulations, which is provided by a link to Texas Natural Resource Conservation Commission WWW pages, and 7) An updated listing of training opportunities provided by the Texas Engineering Extension Service and other groups.

The WWW site also includes a feature that allows users to e-mail TWRI directly to ask questions, offer comments, and subscribe to the newsletter. Last year, roughly 75 e-mail messages were sent through this feature, either to provide information about timely events or to seek answers to questions about on-site issues. These messages were forwarded to Council chairman Warren Samuelson and other key members of the Texas on-site community.

Is the WWW site actually being used? Usage statistics generated automatically by TWRI computers compile information on the extent to which the site is being used hourly, daily, and monthly as well as the country or domain users are from. The statistics are displayed on graphs that can be viewed on the WWW site. Statistics for 1997 show that the site was accessed roughly 70,000 times last year. The statistics show that most of the U.S. users were from commercial Internet sites, followed by network addresses, and 10,000 individuals from colleges, universities, and public schools. Other major U.S. users groups include individuals with state and federal governments, the military, and non-profit organizations. The site has been accessed from users in more than 45 countries. The most frequent foreign users were from Canada, Australia, the United Kingdom, Japan and Denmark. Items on the WWW site that were accessed most often were the "Texas On-Site Insights" newsletter, information about the Council, and the search tool.

TWRI has made many efforts to make people aware of the WWW site and learn how to use it. Feature articles have been written about the site in the "Texas On-Site Insights" newsletter. Jensen has demonstrated the site to many users groups including a workshop of the Texas WWW Water Users Group, the National On-Site Wastewater Recycling Association, and presentations to classes at Texas A&M University.

NOTE: For more details about the WWW site or to learn how to use it, contact TWRI at twri.tamu.edu or (409) 845-1851.

Soil Self-Test Kits Available from TAMU

Kits that can be used to self-test knowledge of soil texturing and serve as texture standards are available from the student chapter of the Soil and Water Conservation Society at Texas A&M University (TAMU).

The kit contains 12 soil samples and includes two or more samples of each texture (coarse, moderately coarse, medium, moderately fine, and fine). In the kits,

approximately one pint of each sample is included, along with instructions about how to perform hands-on soil textures. Cost per kit is $40 which includes shipping and handling. The kits can be ordered by written request to C. Thomas Hallmark, Soil and Crop Sciences Department, Texas A&M University, College Station, TX 77843-2474 (Fax 409-845-4678) or Bob Knight, Rangeland Ecology and Management Department, Texas A&M University, College Station, TX 77843-2126. Checks should be made out to the Soil and Water Conservation Society.

ASTM Publishes Book on Site Characterization

The American Society for Testing and Materials (ASTM) has published a new book titled *Site Characterization and Design of On-Site Septic Systems.* It was edited by M.S. Bedinger, J.S. Fleming, and A.I. Johnson. The book contains papers that were presented at an ASTM symposium that met in New Orleans, LA, in January 1997. Sections of the book cover such issues as septic system operation and evaluation, site characterization and design, and alternative systems and component design. Some of the papers describe an inspection manual for existing systems and discuss sodium levels in domestic wastewater as well as the design and performance of septic tanks.

To order the book or for more information, call ASTM at (610)832-9585 or visit their World Wide Web site at http://www.astm.org.

Southwest Texas State University Survey Examines Experiences of LPD System Users

How well do low-pressure dosing systems work in Central Texas and are homeowners pleased with their performance? These are the questions Southwest Texas State University (SWTSU) graduate student Suraiya "Sue" Murray recently addressed in her Master's research project.

The overall goal of the study, Murray says, was to investigate the performance of non-engineered, low-pressure dosed (LPD) systems that are common in the eastern portions of Travis County. Murray wanted to find the answer to two specific questions. First, have these systems functioned properly in the clay soils that are widespread in that area? In other words, were problems with standing sewage, wastewater backups and odors the exception or the rule? Second, what types of system failures were most widely reported and could the malfunctions be attributed to the design, misuse, or maintenance of these systems?

"Part of the reason I wanted to conduct this study was because the Texas Natural Resource Conservation Commission (TNRCC) recently passed new regulations that require more extensive plumbing for LPD systems that makes them more costly," Murray says. "I wanted to assess whether there was a scientific basis that would support the new rules."

How the Survey Was Conducted

In the initial phases of the project, Murray developed a draft survey instrument, which was refined after meeting with health department regulators and system installers. Before the survey was administered, it was tested on 10 county residents who used these systems, and some modifications to the survey instrument were made.

Murray points out that in this phase of the project she received the assistance of many cooperators. For example, Ervin Coonrod and Ray Kenmatsu of the Austin - Travis County Health Department helped Murray identify roughly 330 non-engineered LPD systems in eastern Travis County. Only systems that had been in use for at least a year and those that included the name and phone number of the current property owner or resident were utilized for the study. Chris Guzman of the City of Austin's Water and Wastewater Utility and Max Castaneda, an intern of the Health Department, assisted with the translation of the survey into Spanish. Castaneda interviewed several Spanish-speaking users of these systems.

In the project, 72 property owners and residents who used LPD systems were called in early 1996. Of the 50 who answered, roughly 80% answered all the questions in the interview.

Later, monthly rainfall data was gathered to correlate the occurrence of heavy rains and soggy drainfield areas. Information on water use data was obtained to see if there was a link between households with high water use and system failures.

Results of the Survey

What did LPD users identify as the most important issues associated with these systems? First, more than 81% said they were concerned about wastewaters that rose to the soil surface and made their yards "soggy." Follow-up questions revealed that most of the complaints focused on conditions following heavy rains. Second, instances where wastewater backed up and overflowed were identified as a problem by 25% of those surveyed. In most cases, survey respondents attributed the problem to pump failure, although most indicated that they were warned by alarms when this occurred. Third, many of the respondents experienced odor problems, although everyone who reported foul odors also experienced at least one other aspect of system failure.

The results also provide insights into other aspects of LPD maintenance and operations. A quarter of survey respondents said they did not receive any instructions on how to operate their system. Roughly two-thirds of LPD users requested a booklet from the Health Department about how to care for these systems. Roughly 85% of system users said they had some information about how to use valves that are used to apply effluent to one or more drainfields.

"One of the most important findings from this survey," Murray says, "is that it shows that overall customer satisfaction with non-engineered LPD systems in Eastern Travis County is relatively high. Another important result is that this survey seems to support the new TNRCC rules that require increased piping in these systems. Finally, the survey shows

that many users want more information on how to maintain and operate non-engineered LPD systems and would likely use it if it were available."

In the future, Murray recommends that additional follow-up studies may need to be conducted to examine this problem in more detail, which would include more extensive monitoring and a larger sample size.

NOTE: Murray graduated from the SWTSU Geography and Planning Department in May 1997. The chairman of her graduate committee was James Kimmel. For details about the survey, contact Murray at (512) 505-7354 or Murray@Electric.Austin.tx.us.

NOTE: Since the time the article was published Sue Murray has moved to another department of the City of Austin. Her new phone number is 512/ 322-6207. She should be contacted there. The e-mail address shown in this article is still valid, as of April 1998.

Detailed Soils Information Available from USDA/Natural Resources Conservation Service

Before an on-site wastewater system can be constructed, altered repaired, or operated in Texas, individuals must obtain a permit and get plans approved by the Texas Natural Resource Conservation Commission or its authorized agent. In order to obtain a permit, a site evaluation is required and must be performed by a qualified professional, who is acceptable to the permitting agency. The objective of a site evaluation is collect information about the site and soil characteristics, and to evaluate their potential to treat and dispose of wastewater. A good site evaluation will provide enough detail to make it possible to select the most appropriate on-site wastewater system for a particular site.

What the public may not know is that considerable soils information has been collected by the U.S. government through the Department of Agriculture's Natural Resource Conservation Service (NRCS).

Micheal Golden, the NRCS State Soil Scientist, directs the soils and natural resources data gathering and interpretation projects for the Texas headquarters of NRCS in Temple, TX.

To develop the surveys, NRCS staff utilize aerial photographs, remote sensing data, and on-site verification. After this information has been gathered, NRCS publishes detailed, county-wide publications and databases with information on many soil properties, including soil texture, plasticity, permeability, bulk density, soil water-holding capacity, salinity, the sodium absorption ratio, the cation exchange capacity, shrink-swell characteristics, erosion potential, and many related issues. Much of the information has

been developed at two mapping scales - 1-to-24,000 (2,000 feet per inch) or 1-to-250,000 (roughly 4 miles per inch).

How can on-site professionals and interested individuals utilize the NRCS data? Golden says the first step should be to locate a specific parcel of land on aerial photographs which are included in the printed county soil surveys. Based on a soil symbol printed on each map, users can then identify the soil series. Tables in the county reports describe the specific soils characteristics in both scientific and non-technical terms. Charts in the books provide basic guidance about how individual soils may function when used for on-site wastewater treatment.

"The surveys provide accurate, detailed information on soil properties, but only include limited guidelines on how these soil types should be used for on-site wastewater systems or other activities," Golden cautions. "You still need to have a professional site evaluator go out to a specific location to see what the exact conditions are like at the site."

NRCS staff are now working to convert their existing comprehensive soil data sets into a geographic information system (GIS) format. "The use of GIS technology will let us analyze issues more thoroughly than we have been able to previously," Golden says. He notes that, with a GIS, NRCS staff were able to identify and map areas in Lubbock County that may not be suitable for conventional systems (septic tanks and drainfields) based on soil textures, flooding risks, the presence or absence of high water tables, the potential of effluents to surface or pond, permeability, and slopes. In addition, the use of GIS systems allows users to rapidly obtain multiple soil data sets for specific locations.

So far, Texas soils data are available in GIS format for 10 counties, and five more counties will soon be completed. Users of GIS systems can now download digital line graphs and related data that can be imported into GRASS, ArcInfo, or other GIS software.

NRCS staff are also working on a pilot project to let users query soils data and view replies for a single county through a World Wide Web browser and the Internet. In the meantime, Golden says that individuals can contact their local NRCS office or soil and water conservation district to ask questions or obtain information about local soil conditions.

NRCS staff members have also recently worked with professionals from the Texas Natural Resource Conservation Commission (TNRCC), the Texas Engineering Extension Service, and Larry Wilding and Tom Hallmark of the Texas A&M University Soil and Crop Sciences Department. Together, they helped craft guidelines and training materials for the new site evaluator course required by the 1997 TNRCC revised on-site wastewater guidelines.

NOTE: Relatively recent printed county soil surveys have been published for roughly 235 Texas counties. Local NRCS offices, which are located in most Texas counties, typically maintain and distribute soil surveys for their county. For details, contact

Williamson at (254) 742-9830 or dwilliam@tx.nrcs.usda.gov or Golden at (254) 774-1261 or mgolden@txso1.tx.nrcs.usda.gov.

Meetings and Conferences

The Texas On-Site Wastewater Treatment Research Council will host its 1998 Annual Conference May 20-22 in Corpus Christi. The meeting, titled "Texas With a Tropical Twist," is the Council's 6th Annual Conference.

The conference will feature presentations dealing with many areas relating to on-site wastewater treatment and disposal. The Conference tentatively will include the following topics: an overview of the Texas On-Site Wastewater Program, soils evaluations, pressurized distribution systems, regulatory presentations, Texas Natural Resource Conservation Commission (TNRCC) procedures, on-site sewage facility (OSSF) treatment systems, permitting and record keeping, maintenance contracts, pump selection and maintenance, cluster systems, and water reuse. All conference participants will be eligible to receive continuing education credits.

For details about the conference, contact Warren Samuelson of the TNRCC at (512) 239-4799 or wsamuels@tnrcc.state.tx.us. The meeting site is the Omni Bayfront Hotel, which can be contacted at (512) 887-1600.

The Texas On-Site Wastewater Association (TOWA) will hold its annual meeting in Corpus Christi on May 21, in conjunction with the Council meeting (see above). The TOWA meeting will include an election of officers. The meeting also provides an opportunity for TOWA members to ask questions and provide input into upcoming issues such as training, enforcement matters, the status of membership benefits, and Legislative concerns.

For details, contact TOWA President Dudley Burton at Baylor University at Dudley_Burton@Baylor.edu or (254) 710-3405.

The National Onsite Wastewater Recycling Association (NOWRA) has issued a call for papers for its 1998 annual conference, which will meet October 22-25 at Cincinnati, OH.

NOWRA invites interested individuals to submit abstracts of presentations for this meeting. In broad terms, NOWRA will consider abstracts that deal with the private sector, regulators or the academic community. Some of the specific topics that NOWRA seeks presentations about include system installation, management or maintenance; new designs or concepts; innovations in system regulation; and case studies and research results.

If accepted, speakers will be given 20 to 40 minutes to make presentations at the conference. Presenters whose abstracts are accepted will be required to register for the meeting. Also, NOWRA requires that authors submit a copy of their papers before the

conference so they can be included in the proceedings that will be distributed at the meeting.

To be considered, abstracts must be received by NOWRA by May 15, 1998. Authors will be notified by June 30, 1998 as to whether their papers have been accepted. For more details about the meeting, contact NOWRA at (847) 559-9233 or 103061.1063@compuserve.com.

The Texas Agricultural Extension Service is sponsoring on-site training courses for continuing education. A courses describing soil evaluation and treatment is currently proposed and additional courses are under development. The course will be offered March 17 in Weslaco, April 28 in Angleton, and June 2 and July 6 in Bryan. For details, contact Bruce Lesikar of TAEX at (409) 845-7453 or b-lesikar@tamu.edu.

The Texas Engineering Extension Service (TEEX) is sponsoring many training courses at locations throughout Texas.

* The Installer I course will be taught March 17-18 in Mesquite and April 14-15 in Bryan.

* The Installer II course is being offered March 10-12 in San Antonio, March 17-19 in Abilene, March 24-26 in Tyler, March 31-April 2 in Kerrville, April 14-16 in Houston and April 28-30 in Bryan and Midland (two classes).

* The Site Evaluator class is being taught March 10-12 in El Paso, March 24-26 at Lake LBJ, March 31-April 2 in Tyler, April 14-16 in Amarillo, April 22-24 in San Antonio, and April 28-30 in Kerrville.

* The Designated Representative class will be taught March 10-13 in Bryan, March 24-27 in Amarillo, April 7-10 in El Paso, April 21-24 in Corpus Christi, May 5-8 in Kerrville, May 26-29 in Odessa, June 23-26 in Bryan, July 7-10 in Mesquite, July 21-24 in San Antonio, August 4-7 in Houston, and August 18-21 in Abilene.

For more details or to register, contact TEEX at (800) 252-2420 or (409) 845-6246 or visit their World Wide Web site at http://www.tamu.edu/teex.

The National Environmental Health Association Annual Conference will be June 27-July 1 in Las Vegas, NV.

The conference includes an on-site wastewater systems (OSWS) workshop. Topics to be discussed in the workshop include state-of-the-art OSWS technologies, advantages and limitations of alternative OSWS systems, how to select systems for site-specific needs, and how to analyze and correct a failing OSWS. Sections will focus on OSWS technology concerns, troubleshooting on-site systems, and operations and maintenance issues. There will be also be a demonstration of the OSWS Training Center.

For more information, contact NEHA at (303) 756-9090 or visit their World Wide Web site at http://www.neha.org.

"Septic Tank Page" WWW Site Describes On-Site Issues

"The Septic Tank Page" is a World Wide Web (WWW) site that contains information about septic tanks and on-site wastewater systems. The WWW site was created by Miles Abernathy of the University of Texas Utilities and Energy Management Department. The site discusses basic principles of on-site wastewater disposal, what to look for when purchasing a new septic tank or replacing an existing unit, and a "do it yourself" septic tank repair page. The site also includes articles describing how bacteria and enzymes decompose wastes and how sodium contributes to soil failure.

Some articles on the site were written by David Venhuizen of Austin, who designs on-site systems. These articles include a description of a septic tank system featuring a denitrifying sand filter and drip irrigation, a discussion of how alternative on-site wastewater practices influence water quality, and an article about the design and use of intermittent sand filters for on-site treatment.

The WWW site address is http://www.geocities.com/RainForest/Vines/5240/Septic_Tanks.html. For details, contact Abernathy at (512) 471-1600 or miles@mail.utexas.edu or Venhuizen at waterguy@ix.netcom.com.

Constructed Wetlands Provide Ecological Way to Treat Wastewater in Brazoria National Wildlife Refuge

Nestled along 46,000 acres of the Texas Gulf Coast between Angleton and Clute, the Brazoria National Wildlife Refuge is a sanctuary for such waterfowl as ducks, geese, sandhill cranes and Texas flamingos. The refuge contains an extensive network of streams, marshes, wetlands and bayous that are also home to a wide array of fish, insects, and mammals. Remarkably, this natural preserve is only a few miles away from some of the most industrial sections of the Texas coast. The refuge also attracts many human visitors who come to take advantage of hiking trails and plenty of good fishing spots.

Recently, the refuge sports a new feature that is entirely in tune with its ecological theme and activities. A team of scientists from the Texas A&M University (TAMU) System teamed up with the U.S. Fish and Wildlife Service to design, build, and monitor a constructed wetland that will treat wastewater from recreational vehicles that are periodically housed at the site. If all goes well here, project sponsors hope this type of system may serve as a model that could be used

at many other park settings and throughout Brazoria County.

The on-site wastewater system developed for this site was designed by Bruce Lesikar of the TAMU Agricultural Engineering Department and was funded by the Sea Grant Program, which is part of the TAMU System. The Sea Grant Program is also funding regular monitoring at the site, which will measure flows as well as water quality criteria. Lead personnel who made the project a reality include Brazoria County Marine Agent Rich Tillman, refuge manager Rich Antonette, and Karen Barclay of the Brazoria County Health Department.

"This facility is a great fit for a wildlife refuge," says John Jacob , an Environmental Quality Specialist with the Texas Sea Grant Program, "because it is designed with nature in mind. We take advantage of nature to filter and purify wastewaters. Instead of a more conventional wastewater treatment system, which would stick out like a sore thumb in this setting, this constructed wetland blends in with the environment and is in tune with the natural areas at this site."

Wastewater is being generated by a recently developed site that serves as a temporary home for as many as eight recreational vehicles that will be used by volunteers working at the site. The campsite provides electricity and running water to the volunteers, who, in turn, will serve up to 30 hours a week. In the near future, a laundromat is being added to the site.

In basic terms, the system works like this. Wastewater is piped from the recreational vehicles to two, 1,000-gallon septic tanks. After solids settle out in the septic tanks, wastewater is sent to two wetland cells. Each cell is 18 inches deep, 28 feet wide and 14 feet long. The first cell is lined with plastic, while the second is unlined so it can dispose of some of the wastewater. The wastewater enters the wetland cells in 18 inches of gravel, and will usually fill only the bottom 15 inches of the gravel. For the time being, there is a pump between the septic tank and the first cell, between the first and second cell, and between the second cell and the drainfield. The pumps will be used to measure the rate that wastewater flows through the system. At the conclusion of a two-year monitoring period, the pumps will be removed and the wastes will flow throughout the system by gravity.

The wetlands cells are planted with canna lilies, irises, green tarrow, thalia and umbrella palms. Microorganisms attached to the roots of these plants break down organic materials and pollutants. After exiting the wetlands cells, effluents are disposed of in a large quarter-acre drainfield that consists of 1,200 feet of perforated pipe laid out in a gravel-filled trench. The drainfield will receive all the wastewater that is not removed in the wetlands cells by percolation into the soil, evaporation, and transpiration. Jacob says that much of the time the plants in the wetlands will consume all the wastewater.

"The septic tanks will take out the greases and oils and the coarse solids," Lesikar explains. The soil and plant growth will remove the excess water, as well as such pollutants as nutrients, organic matter, and pathogens.

Jacob says constructed wetlands were chosen to treat wastewater at this site for a number of reasons. First, soils in Brazoria County are heavy clays and limit effluent movement. Additionally, seasonally high groundwater tables and saturated soils limit water movement from drainfields through the soils. County officials note that many standard systems (septic tanks and drainfields) suffer from wastewater that runs off or ponds on the surface. Second, this system is economically viable compared to other non-conventional systems that might work on this site. Third, the constructed wetlands are designed to require maintenance. Still, Lesikar warns, "If you don't like gardening, you may want consider other alternatives," he advised. "The primary maintenance activity will be thinning out the plants occasionally."

Everyone hopes that this wetland system will help improve water quality in Bastrop Bayou, which runs through the refuge, and other nearby waters. Tillman notes that fecal coliform counts in the bayou have at times been measured at more than 800 colony forming units per 100 milliliters of water. By comparison, a count of 200 is the maximum level for public swimming and levels above 14 will close oyster beds. In addition, it is estimated that there are 90,000 permitted on-site wastewater systems in the county, the majority of which are conventional septic tanks and drainfields and are likely to fail.

Could this system be useful for other remote settings such as parks, other wildlife refuges, and highway rest stops as well as for individual residences? Tillman estimates that individual homeowners wanting to use constructed wetlands for residential wastewater treatment may be able to install such a system for roughly $1,800 of additional material, more than a conventional septic tank and drainfield. They would still need a single septic tank and drainfield, and would also have to purchase additional gravel, liners, and water control structures. Lesikar estimates constructed wetlands may add as much as $3,000 to the cost of a conventional septic system. However, savings could come in the future if TNRCC rules are changed to allow wetland systems to reduce the size of the drainfield. Jacob also notes this type of system may be ideal for other remote areas such as parks because it is self-contained, requires few mechanical parts, and blends in nicely with nature.

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