



Volume 7, Number 2, May 1998

Texas On-Site Wastewater Treatment Research Council Conference is May 20 - 22 in Corpus Christi

It's time to get ready to attend and participate in the 6th Annual Conference of the Texas On-Site Wastewater Treatment Research Council.

The Conference takes place May 20 - 22, 1998 in Corpus Christi. The meeting site is the Omni Bayfront Hotel.

This year's Conference has been planned in cooperation with Texas Natural Resource Conservation Commission (TNRCC). The Conference has been designed to provide thorough information about how on-site wastewater treatment and disposal systems work, and strategies to manage these systems to ensure that public and environmental health are protected.

The Conference program features many experts in the field from Texas and elsewhere. The program for this Conference is published on page 3 of this issue.

"This is an excellent opportunity to learn about the various on-site wastewater technologies that are available , as well as to network with other members of the on-site wastewater community from across Texas," says Warren Samuelson, who is the Chairman of the Council. "Staff from the TNRCC will be available during the conference to consult with all conference participants about their concerns."

For the first time, TNRCC is offering 8 certification hours for continuing education credits for those who attend this Conference. Under the new TNRCC regulations, continuing education credits are required for designated representatives, installers and site evaluators and others involved in the on-site wastewater industry.

To contact the Omni Hotel, call (512) 887-1600. For information about the materials that will be presented at the Conference or to register, contact Paula Callaway of the TNRCC at (512) 239-6330 or pcallawa@tnrcc.state.tx.us.

TAEX Develops Fact Sheets Discussing Design and Maintenance of Septic Tanks, ET Beds

Two great-looking fact sheets that discuss on-site wastewater issues have been published by Bruce Lesikar of the Texas Agricultural Extension Service (TAEX). Both fact sheets present recent information with a Texas emphasis and include color graphics, tables and charts, and references.

'Septic Tank/ Soil Absorption Field' (E-1/ 5-98) discusses how septic tanks work, as well as differences between concrete, fiberglass, and polyethylene or plastic tanks, and the proper sizing and construction of septic tanks. The fact sheet includes guidelines about the proper size of tanks (based on the number of bedrooms and square feet in a house), and how often tanks should be pumped (based on the number of people in a household and the size of the tank). A diagram of a typical two-compartment septic tank is displayed.

'Evapotranspiration Beds' (E-2/ 5-98) describes how ET beds provide on-site wastewater treatment and how they should be designed, operated and maintained. Maintenance tips discuss how often grasses over the top of ET beds should be mowed, how to divert rainfall runoff around these sites, types of vegetation that can be planted near and in the beds, and how to prevent weeds from growing near the beds. A diagram of an ET bed is included.

Lesikar can be contacted at (409) 845-7453 or b-lesikar@tamu.edu. The fact sheets can be downloaded from the Texas On-Site Wastewater Treatment Research Council's World Wide Web site at <http://towtrc.tamu.edu>. The fact sheets are Adobe Acrobat pdf files. Individuals can then print copies from their personal computer. At this time, however, no printed copies are available.

Tentative Agenda for the Texas On-Site Wastewater Treatment Research Council's 1998 Conference

Wednesday May 20, 1998

Noon-5:00 p.m. Exhibit move in and registration

1:00-5:00 p.m. On-site Wastewater Treatment Research Council (TOWTRC) Meeting

5:30-7:30 p.m. Reception. Visit Exhibits

Thursday, May 21, 1998

7:30-8:20 a.m. Registration. Visit Exhibits.

8:20-9:50 a.m. GENERAL SESSION

8:20-8:50 a.m. Welcome -- Franz Hiebert, Chairman, TOWTRC

8:50-9:50 a.m. The Texas On-site Wastewater Program-- Warren Samuelson, TNRCC

9:50-10:20 a.m. Break. Visit Exhibits. Refreshments.

10:20-11:50 a.m. CONCURRENT SESSIONS

SESSION I SOILS EVALUATIONS - PART I

John Jacobs, Texas Agricultural Extension Service

SESSION II PRESSURIZED DISTRIBUTION SYSTEMS

Field Performance of Subsurface Drip Disposal System --

Bruce Lesikar, Texas A&M University

Spray Irrigation System Overview -- Glenn Turner, TNRCC, Beaumont Region

Low Pressure Dosing Overview -- John Blount, Harris County Engineering Department

11:50-1:10 Lunch on your own

1:10-2:40 p.m. CONCURRENT SESSIONS

SESSION I SOILS EVALUATIONS - PART II

John Jacobs, Texas Agricultural Extension Service

SESSION II REGULATORY PRESENTATIONS

OSSF Regulations: County Adoption Process -- Phillip Schmandt, Watson, Bishop,
London and Galow, Attorneys at Law

Texas Home Improvement Loan Program -- Rebecca Jones, Texas State Affordable
Housing Corporation

Corpus Christi Bay National Estuary Program Study of OSSF Systems -- David Sullivan,
Naismith Engineering, Inc.

2:40-3:10 Break. Visit Exhibits. Refreshments.

3:10-4:40 CONCURRENT SESSIONS

SESSION I TNRCC PROCEDURES

Development and Adoption of Orders/Ordinances -- Ken Graber, TNRCC

Enforcement Development -- Bob Brach, TNRCC

Questions and Answers

SESSION II OSSF TREATMENT SYSTEMS

FAST Wastewater Treatment System with Nitrogen Reduction

-- Raymond Peat, Bio-Microbics

Effluent Quality and Water Balance from Constructed

Wetland -- Richard Weaver, Texas A&M University

Optimizing the Performance of Sand Filters and Packed Bed

Filters through Media Selection and Dosing Methods --

Harold Ball, Orenco Systems, Inc.

Friday, May 22, 1998

8:15-9:45 CONCURRENT SESSIONS

SESSION I PERMITTING AND RECORD KEEPING

Harris County -- Roscoe Bayless

TNRCC -- Ronnie Hebert, Beaumont Region

Discussion

SESSION II PUMP SELECTION AND MAINTENANCE

Jim Fuller, Haywood Pioneer Sales, Inc.

9:45-10:15 Break. Visit Exhibits. Refreshments.

10:15-11:45 CONCURRENT SESSIONS
SESSION I CLUSTER SYSTEMS

(Committee member from On-site Wastewater Treatment
Research Council-funded OSSF Cluster Systems Workshop)

SESSION II WATER REUSE

Wastewater Reuse and Greywater Systems for Landscape
Irrigation -- Bruce Lesikar, Texas A&M University
Water Reuse in Texas -- Bill Hoffman, Texas Water Development Board
Discussion

Corpus Christi Bay Program Studies Coastal Bend On-Site Issues

A comprehensive study about the potential impact of on-site wastewater systems on water quality in Corpus Christi Bay has recently been conducted.



The study was funded by the Corpus Christi Bay National Estuary Program (CCBNEP). It was carried out by David Sullivan, John Michael, Anna Smith, and Paul Pilarczyk of Naismith Engineering, Inc. The project included extensive cooperation with Ivan Santoyo, Warren Samuelson and Ken Graber of the on-site wastewater staff of the Texas Natural Resource Conservation Commission (TNRCC), and

Richard Volk and Van Fischer of CCBNEP. Local health department personnel, including Jim McFarland of the Nueces County Health Department, County Judge Charles Stone of San Patricio County, and Tom Touchstone of the Aransas County Health Department provided assistance.

Background Information

The study was conducted as part of the broad CCBNEP mission to assess issues in the region that may affect 'water quality degradation' of area bays. Goals were to assess the number of on-site wastewater systems in the region, to identify situations in which on-site systems may be likely to fail, and to identify resource needs and potential sources of technical and financial assistance.

One objective was to gather data about on-site wastewater systems in the region (Nueces, San Patricio, Aransas and Refugio counties). "This project allowed us to look at diverse conditions that exist throughout our region related to on-site wastewater issues. Nueces

County includes Corpus Christi and is highly urbanized, but still faces challenges with its on-site program," Sullivan says. "San Patricio and Refugio counties are more rural and have to confront such issues as the presence of colonias and the need for public education. Ultimately, we hope the information in the project can be used to make recommendations to improve the management of on-site systems in coastal areas and to help local program managers implement the new TNRCC on-site regulations."

The Coastal Bend area faces challenging issues regarding the successful management of on-site systems. For example, many systems have been installed in areas where the soils may not be suitable for conventional systems to function properly. Many systems have been installed on small lots. Some of the other potential problems that were investigated include general operations and maintenance issues, the extent to which soils are saturated, the number of occurrences in which systems malfunctioned, and cases in which improperly treated sewage was found standing on the ground or running off into ditches.

It should be noted that the study did not include monitoring of inland or coastal waters to determine if contaminants from on-site systems were, in fact, contaminating area waters. However, historical water quality data were examined to identify if water quality problems that could be traced to failing on-site systems had occurred previously. The approach was to gauge if conditions were such that on-site systems were likely to fail and could threaten the area's environment.

How the Study Was Conducted

One of the first tasks in this project was to identify how on-site wastewater systems are being managed, both statewide and in the region. Project leaders compared the programs operated at the TNRCC headquarters staff in Austin and efforts at the TNRCC regional field office in Corpus Christi.

Another aspect included gathering data on each of the County programs within the study area. Many components of county program management were evaluated include local regulations and ordinances, the number and type of complaints that are typically received and how these issues are resolved, resources available to support program staff, and whether each county makes efforts to educate the public.

The project leaders also sent written surveys to each installer in the region to determine how well they understood the requirements of the new TNRCC rules and to learn the extent to which they were following the new regulations.

The study also assessed natural resources, pollutant loadings, rainfall and evaporation rates, depth to groundwater, the occurrence of flooding, and public health issues. The project team identified problem soils (typically Class III and Class IV clays) that make it difficult for on-site systems to function properly. Later, they mapped the location of many on-site systems and correlated those sites to the presence of problem soils. Areas that may pose management problems were identified. The study located the presence of colonias (developments without adequate wastewater and drinking water) as well as subdivisions in problematic sites near rivers and the Gulf Coast.

Results of the Study

Some of the study's findings regard program management. The study reports most of the counties in the region utilize an environmental health department to manage their on-site programs, although Refugio County's efforts are led by the County Judge, his staff, and outside contractors. Aransas County has the highest average number of reported complaints (10) during the study period (1994-97).

The project reports that during 1994-97 the largest number of new conventional or standard systems were installed in Aransas County (659). The greatest number of new low-pressure dosing systems were installed in San Patricio County (218). Only small numbers of other types of systems, including leaching chambers, gravel-less pipe, and spray irrigation, were installed in the region during this time.

Problems and challenges are described in detail for each of the counties in the study area.

The study reports that there are roughly 5,900 systems in Nueces County and, because of poor drainage and the potential of flooding, it is anticipated that as many as 20% of these are likely to fail. The biggest problem in Nueces County was identified as systems that are located in sites with poor drainage and a risk of flooding. In San Patricio County, many of the more than 5,700 on-site systems are sited in numerous subdivisions near Lake Corpus Christi. As a result, small lot sizes are cited as the primary concern. Meanwhile, roughly 6,400 on-site systems are used throughout Aransas County and only a small portion of county residents are served by community sewers. Key challenges in Aransas County include the use of inadequately sized drainfields, high groundwater tables, and the risk of flooding. In rural and less populated Refugio County, residents rely on only about 1,000 on-site systems. However, more people would choose them if soils were more suitable (shrink-swell clays dominate).

Recommendations of the Report Many of the findings of the study suggest there is a need - at all levels - to increase the knowledge of the public about how on-site systems function as well as how they are regulated in Texas.

As a response, the project created two brochures. The first fact sheet, intended for homeowners, describes how on-site systems should be designed, how they work, and methods to manage and maintain them. The other brochure, targeted at regulators and program managers, provides information about the new TNRCC rules and what those changes mean regarding such issues as permitting, enforcement, and the qualifications of industry professionals.

The project recommends that a strategy be developed to increase public awareness among program leaders about possible sources of funding (the report describes details of assistance programs from the Texas Department of Housing and Community Affairs, the TNRCC's Small Towns Environmental Program, the Texas Water Development Board, the U.S. Department of Agriculture's Rural Development Administration, and the U.S. Environmental Protection Agency).

Other recommendations of the study are that a committee ought to be formed to comment on the new TNRCC rules and suggest possible changes, and that more emphasis needs to be focused on preventing on-site problems before they occur (through the subdivision development and plat approval processes as well as making sure industry professionals are properly trained and licensed). The study suggests more efforts be targeted towards monitoring and ensuring compliance with state and local regulations.

NOTE: Sullivan can be contacted at Naismith Engineering at (512) 814-9900 or smh@neionline.com. The final about this project will be published by CCBNEP later this year. For more details, CCBNEP can be contacted at (512) 980-3420 or rvolk@tnrcc.state.tx.us or you can visit their WWW site at <http://www.sci.tamucc.edu/ccbnep/>

NOTE: The Corpus Christi Bay National Estuary Program [CCBNEP] has recently made a report discussion on-site wastewater issues in the region available on the WWW.

The report, "Corpus Christi Bay National Estuary Program Study of On-site Sewage Facilities," was published by this program in December 1997.

You can download it as a Microsoft Word file by going to this site, <http://www.sci.tamucc.edu/ccbnep/Library/publications.htm>.

Grinder Pumps, Small Diameter Sewer, Replacing Failing On-Site Systems Near Lake Worth

Can the use of innovative small community wastewater systems cost-effectively protect water quality in an urban lake? That's the question that was recently addressed in a project to replace potentially failing septic tanks and drainfields with a grinder pump system near Fort Worth.

Background Information

The project, was funded jointly by the EPA Clean Lakes Program and the City of Fort Worth. It is part of a broad effort to preserve water quality in Lake Worth, which is only 8 miles northwest of downtown Fort Worth. Project leaders included Jeffrey Caffey, A. Lee Head, and Alan Tucker of the engineering firm of Alan Plummer Associates, Inc., and Madelene Mayhall of the City of Fort Worth.

The area the study focused on, the Cahoba Drive subdivision near Lake Worth, which was developed in 1914. Originally, many of the houses built near the lake were cottages that were used only in the summer. Over time, however, many people have developed permanent residences and live at the lake throughout much of the year.

Throughout many of the lakeside subdivisions, there are concerns that the septic tanks and drainfields being used are inadequate and could lessen the water quality in the lake, although that has not been proven so far. For example, some lakeside homeowners use more than one small septic tank, have built structures over the top of septic tanks, and have inadequately sized drainfields. In addition, many of the residents rely on drinking

water from private wells. Many of these systems do not meet current Texas Natural Resource Conservation Commission regulations.

Developing a Community System

This project began in 1990 when the City and engineers from Alan Plummer carried out a diagnostic and feasibility study. In 1993, the City received a grant from the U.S. Environmental Protection Agency to implement this pilot project. To meet the terms of the grant, the system had to be installed by 1997.

The engineers considered three types of small community systems to replace the septic tanks - 1) a low-pressure, small diameter sewer that uses effluent pumps or grinder pumps, 2) a conventional gravity sewer system that uses effluent pumps or grinder pumps, and 3) a vacuum sewer system.



In this case, the low-pressure system (option 1) was selected as the preferred system because it can use small diameter pipes (only 2" to 6"), it requires less excavation than a gravity system, less electrical power is needed than would be used in the vacuum system, it may reduce odor problems (because 'fresher' sewage will be pumped), and the total construction costs were the least of the three options.

In this system, all solids are ground up (hence the name "grinder" pump). Each time the grinder pump is activated, wastes flow into a 60-gallon or larger holding tank which takes the place of the septic tank. The system was designed to accommodate as many as 146 residences, although it is expected that not all the grinder pumps will be operating simultaneously. These effluents are pumped into the low pressure sewer system through the use of a 1.25" diameter force main.

The small diameter sewer was designed so that flows would normally be faster than 3 feet per second. At this flow rate, the system would be self-flushing and solids would not settle in the pipeline and block the sewer. In addition, connections were installed at 500-foot intervals and at the end of lines to flush the system. So far, there has not been a need to flush the system.

ASAE Publishes Proceedings of 1998 On-Site Wastewater Conference

The proceedings of a major conference about on-site wastewater has recently been published by the American Society of Agricultural Engineering (ASAE). The proceedings, titled 'On-Site Wastewater Treatment,' contains papers that were presented

at the 8th National Symposium on Individual and Small Community Sewage Systems, which met in Orlando, FL in March 1998.

Sections of the book cover such broad topics as how to analyze system failures, site and soil evaluation, education and training, how to design loading rates for soil-based systems, and the use of natural and constructed wetlands. Other subject areas that are discussed in the proceedings include regulations, the use of sand filters, the impacts of on-site systems on surface and ground water quality, demonstration projects, and innovative and alternative systems.

Some of the presentations were given by Texas A&M University (TAMU) researchers and graduate students including 'Subsurface Drip Systems for the Disposal of Residential Wastewater,' by Bruce Lesikar and George Sabbagh; 'Nitrogen Fate in a Subsurface Flow Constructed Wetland for On-Site Wastewater Treatment' by Matt Johns, Lesikar, Ann Kenimer and Rick Weaver; and 'Plant Selection for Treatment of Septic Effluent in Subsurface Wetlands' by Srinivasan Neralla, Weaver and Lesikar. Two other papers were presented by David Venhuizen, an on-site wastewater system designer in Austin. They are, 'Sand Filter/ Drip Irrigation Systems Solve Water Resources Problems' and 'Washington Island Project: Evolution of the Dentrifying Sand Filter Concept.'

The proceedings can be purchased from ASAE by calling (800) 695-2723 or visiting their WWW site at <http://www.asae.org>.

EPA Manual Discusses Land Application of Septage

A manual that discusses the use of septage in land application programs has been published by U.S. Environmental Protection Agency (EPA) Office of Research and Development.

The report, 'Process Design Manual: Land Application of Sewage Sludge and Domestic Septage' (EPA/ 625/K-95/001) was published in September 1995.

The manual presents comprehensive information about the land application of domestic septage, including a general overview, a comparison of domestic versus industrial septage, and pertinent regulations. The manual also discusses methods to determine annual application rates, restrictions on crop harvesting and animal grazing, methods to adjust the pH levels of septage, and strategies that can be employed to reduce pathogens and vectors.

The report can be downloaded from the EPA World Wide Web site at <http://www.epa.gov/ORD/WebPubs/Landap.html>.

Texas Company Develops Software to Manage On-Site Systems

A Texas company has developed a computer software program that may help regulators manage their on-site wastewater systems. The program, "Computer-Assisted Septic System Tracking" or "CASST," was created by Byron Polk and the staff of AppliTech in Kaufman, TX.

In essence, the program is a database manager which includes ready-made file types created especially for on-site wastewater programs. The software allows users to enter and edit data on permitting agencies as well as when and by whom systems were inspected and installed. Other forms in the program let users fill in information about whether systems are still under warranty or under a service contract.

This software lets program managers search for systems by permit number and to enter data on the specific components of individual systems (including whether aerators, many types of pumps, disinfection devices, and electric circuits are being used and are operating properly). CASST also allows users to enter water quality testing data.

NOTE: CASST software is designed to work on IBM-compatible personal computers. For details, contact AppliTech at (888) 287-4390 or (972) 962-4824, or e-mail Polk at bpolk@airmail.net. It needs to be noted that other similar programs are available. This article does not constitute an endorsement of this product by the Texas On-Site Wastewater Treatment Research Council, the Texas Natural Resource Conservation Commission, or TWRI.

TAEX Offers On-Site Short Courses

The Texas Agricultural Extension Service is offering the following on-site wastewater short courses for continuing education (CEU) credit . The courses are:

- Site and Soils Evaluation [8 CEUs], June 2 in San Angelo, July 6 in College Station, and August 27 in Bryan
- Overview of On-Site Wastewater Treatment Systems [8 CEUs], June 19 in Killeen, Aug. 21 in College Station, and August 26 in Lubbock
- Constructed Wetlands [8 CEUs], June 26 in Bryan.

For details about the content of these courses, contact Monica Garcia at 409-847-8984 or m-garcia@tamu.edu. To register, contact Jacquie Hand of TAMU at 409-845-8904 or jhand@uc.tamu.edu.

Madison County Homeowner Uses Wetlands to Treat Wastewater from Bed and Breakfast

A rural homeowner in Madison County is finding that a constructed wetland is a great way to treat wastewaters from large numbers of guests. George and Liz Delfeld operate a bed and breakfast in a large four-bedroom, two-and-a-half bathroom home that sits in the wide open spaces near the small East Texas town of Madisonville.

"Because the home provides a pleasant respite for weary travelers and those who want to just get away from it all, the atmosphere has to be very pleasant," George says. "That means the site is well landscaped with roses and other trees and shrubs, the turfgrass has to look great, and there can't be any foul odors or standing effluent from a failed on-site wastewater system."

A few years ago, the Delfelds began working with Big 8 Resource Conservation and Development, Inc. (RC&D), which is headquartered in Bryan, TX and is part of the U.S. Department of Agriculture Natural Resource Conservation Service (NRCS). The RC&D supports community development in many small towns in the region, including on-site and small community wastewater treatment and disposal options. The idea of working with Big 8 RC&D made sense because George is a director for a local soil and water conservation district and is familiar with NRCS and RC&D programs.

Developing the system was a joint effort between the Delfords, the RC&D, the Texas Natural Resource Conservation Commission (TNRCC), a recycling company in the region, and a willing engineer. The RC&D helped provide money to construct the system and arranged for many in-kind



services. In exchange, the Delfords agreed to have the system be monitored and operated as a demonstration site. The TNRCC agreed to allow the use of the wetlands if it could be shown the system was technically sound and would be sampled regularly. Max Recycling, Inc., of Bryan, TX, recycled and shredded used tires that serve as a filtering medium on the subsurface of the wetland. Madison County supplied heavy equipment and teamed up with the RC&D to provide the manpower to install the system. Dario Guerra, an engineer and on-site system designer from Temple, TX, engineered and designed the wetlands. It was installed in the spring of 1996.

"The RC&D wanted to get involved because many of the small communities in our region are faced with pressing and challenging on-site wastewater problems and are seeking innovative solutions," says Joe LaBarbera, the Director of Big 8 RC&D. "We want to have a site in this region, operating under the conditions found here, that local officials, regulators, agency personnel and homeowners can go to and observe how well systems like this work." "The soils are 9" thick of Zulch fine sandy loam, which is underlain by shale," Guerra says. "The soil wouldn't support a conventional system because it has poor permeability and wastewater doesn't drain properly through it."

How does this system work? The system was designed to treat flows of roughly 300 gallons per day. Wastewater flows by gravity from a 250-gallon grease trap and two 500-gallon septic tanks to the wetlands and, ultimately, to a 550 linear-foot leach field for final treatment and disposal. A valve was installed so that wastewaters can be bypassed to

a drainfield when the wetlands needs to be maintained or in the event of system failure. The wetland cell was built on a 3% slope, and is 30' long, 17' wide, and 14" deep. It is lined with a 20-millimeter flexible plastic membrane. Tires were recycled and shredded to make chips with a 3" diameter and these chips cover the bottom 11" of the wetlands cell. The top 3" of the cell are covered with river rock. The system features an 8" gravel-less pipe drainfield. Tires were provided by Max Recycling of Bryan, TX.

The wetlands are filled with many plants including many varieties of cattails, bulrushes, canna lillies, elephant ear, arrowhead, and pickerel weed. The wetlands plants were supplied by the USDA Plant Materials Center in Nacogdoches, TX. These plants help treat the wastewater, providing a medium for microorganisms to attach to, and also enhance the beauty of the landscape. "I think the wetlands plants add a lot of variety and color to the site," Liz says. "The great thing is that you can incorporate plants into this type of system that are not only functional but are also very pleasing to look at."

Guerra says the system has been in operation since 1996. It is doing a good job of treating wastewater and removing significant amounts of nitrogen, phosphorous and biochemical oxygen demand and has not yet experienced a failure. The RC&D hopes to install innovative additional on-site systems in each county in the region.

For details, contact Big 8 RC&D at (409) 846-0819 or big8rcd@tca.net, Guerra at (254) 771-0378 or bigdengineering@juno.com, or Max Recycling at (409) 823-2588.