Texas On-Site Insights
Information about On-Site Wastewater Treatment Systems in Texas
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2002 TOWTRC Conference Meets In Waco March 5–6

The 2002 Annual Conference of the Texas On-Site Wastewater Treatment Research Council will meet March 5–6 in Waco.

This year's Conference will cover a number of diverse themes that directly affect professionals in the onsite sewage facilities (OSSF) field, including new licensing requirements and procedures established by the Texas Natural Resource Conservation Commission (TNRCC), and issues important for designated representatives, inspectors, and installers.

The conference will also include presentations about several recent Council-funded projects, including a study of chronically malfunctioning systems in Texas; efforts to better size drainfields in arid and semi-arid regions; the development of digital maps to evaluate areas with shallow groundwater; and reassessments of the properties of caliche that may affect the performance of OSSFs.

Other presentations will deal with troubleshooting standard systems, the use of effluent filters, methods to evaluate surface application rates, and resources to assist homeowners.

As is the case with previous conferences, this year's event will also feature numerous exhibitors, as well as opportunities for attendees to interact with and ask questions of other professionals.

"The Conference has always been one of the greatest services the Council provides," said TOWTRC Executive Secretary Warren Samuelson. "We hope that people involved in this field take the time to attend and participate in this very important event."

Note: To learn more, can go to the TNRCC WWW site (http://www.tnrcc.state.tx.us) and look under the "Events" menu. We will feature information on several presentations in future issues of this newsletter.

Council-Funded Report Discusses How Well Caliche Soils Treat Wastewater in OSSF Systems

A new 77-page report produced for the Texas On-Site Wastewater Treatment Research Council (TOWTRC) provides insights into the ability of caliche soils to provide adequate treatment and disposal of effluents from on-site sewage facilities (OSSFs).

This comprehensive literature review, "Caliche Soils as a Filter Medium for Treatment and Disposal of Wastewater, was published in June 2001. The report was co-authored by Larry Wilding, a researcher in the Soil and Crop Sciences Department at Texas A&M University, geology consultant Charles Woodruff in Austin, and Phillip Owens of College Station.

The report describes the results of a literature search the research team conducted for the TOWTRC. The literature search examines the potential for the use of caliche soils to treat and dispose of wastewater. A major emphasis of this project was to more adequately define what caliche really is, both in geological and pedological terms, as well as to arrive at a working understanding of caliche soils. Other sections of the report describe where caliche can be found in Texas, and the chemical, mineralogical, physical, and hydrological properties and attributes of caliche soils. The report discusses the effectiveness of caliche to treat and dispose of wastewater, as well as special problems associated with the fate and transport of viruses in systems with caliche soils, as defined in the literature.

According to the Executive Summary, virtually all the regions with caliche soils in Texas lie west of the 98th meridian or areas of the state that receive less than 30 inches of rainfall annually. Using this definition, Wilding suggests that roughly 9% of Texas (more than 15 million acres) may include areas with widespread caliche soils.

Results of the literature search indicate that caliche soils, in general, are effective in removing phosphorus and heavy metals from domestic wastewaters, can be highly effective in removing total organic carbon from effluents, and can immobilize most heavy metals in upper soil horizons. Other key findings are that caliche soils may allow for the rapid decay of biochemical oxygen demanding (BOD) materials and exhibit high oxidation rates, and that there is typically minimal transport of effluents from OSSFs into lower soil layers because of high evapotranspiration rates.

Wilding says that the findings from this literature review can be very helpful in identifying needed future research. He suggests that field studies that investigate naturally-occurring caliche soils should be undertaken, and that work needs to be done to examine specific pathways that are common in caliche soils (such as soil structures, fissures, fractures and biological voids) that may pose contamination threats.

Notes: Wilding can be contacted at (979) 845-3604 or wilding@tamu.edu. A copy of the text of this report as a Microsoft Word file [without figures] can be obtained by contacting Ric Jensen at TWRI at rjensen@tamu.edu or (979) 845-8571.

Texas Attorney General's Opinion States TNRCC Can Require Maintenance Contracts for OSSFs

A recent opinion of the Texas Attorney General's Office should be of interest to people involved with the on-site wastewater treatment industry in Texas.

The opinion, JC-0440, was published on December 17, 2001. In this case, the Attorney General's Office responded to a request by Harrison County District Attorney Rick Berry of Marshall, TX. The opinion deals with the issue of whether Texas Natural Resource Conservation Commission (TNRCC) rules that require ongoing maintenance contracts for some types of onsite sewage facilities (OSSFs) are legal and constitutional. Specifically, questions were asked about whether maintenance contracts can be required for OSSFs that follow treatment with surface application.

In broad terms, the Attorney General's office ruled that TNRCC rules that require maintenance contracts are a valid exercise of the agency's statutory authority, provided under Chapter 366 of the Texas Health and Safety Code. Further, the Attorney General's Office determined that these TNRCC regulations do not violate federal due process or equal protection guarantees.

In sum, the net effect of this ruling seems to be that the TNRCC can continue to require maintenance contracts for certain OSSF systems.

Note: This 8-page opinion of the Attorney General's Office can be viewed on the agency's website, http://www.oag.state.tx.us. If you email newsletter editor Ric Jensen at rjensen@tamu.edu, I can also send you a copy of the opinion as an Adobe Acrobat file.

TOWTRC–Funded Report Estimates Magnitude of OSSF Failures in Texas; Reasons Why Systems Malfunction

The final report of a study to investigate the magnitude of failing onsite sewage facilities (OSSFs) in Texas and the reasons they may be malfunctioning has been completed and is available on the world wide web as a PDF file.

The 116-page report, "Study to Determine the Magnitude of, and Reasons for, Chronically Malfunctioning On-Site Sewage Facility Systems in Texas," was completed in September 2001. The study was conducted by Scott Pasternak and Kristen Keeling of the consulting firm of Reed, Stowe, & Yanke, LLC in Austin. The report is the result of a project funded by the Texas On-Site Wastewater Treatment Research Council.

The report describes why the study was conducted and the methodology that was used. The project also examines the different issues and trends that are important for each region of five geographic regions of Texas. Some of the major policy issues that are discussed in this report include health and water quality problems caused by malfunctioning OSSFs, instances in which these systems are installed in the wrong types of soils, and issues that pertain to grandfathered or older OSSFs. The report also discusses the need for public education of the owners and users of OSSFs, especially to provide guidance into the operations and maintenance of these systems.

According to the Executive Summary, data obtained in this study suggest that roughly 13% of the OSSF systems now in place in Texas may be chronically malfunctioning. The Summary notes that many problems associated with failing systems are associated with older OSSFs installed before current regulations were in effect. The Summary suggests that maintenance issues are becoming increasingly important as greater numbers of aerobic treatment units are installed.

The report also contains recommendations for the types of research that may be needed in the future, in such areas as informing local officials about system problems and developing research priorities in a systematic way.

Note: To get a copy of this report as a PDF (Adobe Acrobat) file, go to the Reed, Stowe, & Yanke home page at http://www.rsyllc.com. Click on the "Publications" icon. On the "Publications" page, select "Study to Determine the Magnitude of, and Reasons for, Chronically Malfunctioning On-Site Sewage Facility Systems in Texas." The file is 1.3 megabytes. As a follow-up to this initial project, Pasternak is now carrying out a project funded by TOWTRC to obtain more information about malfunctioning systems in South Texas. It was difficult to obtain information from that region in the initial study.

Texas Tech Research to Gather More Data on ETA Systems; Develop Sizing Criteria for Other Texas Regions

The Texas On-Site Wastewater Treatment Research Council (TOWTRC) has funded the continuation of a research project at Texas Tech University to extend efforts to examine the effect of absorbic and evaporative methods on the disposal of wastewater from onsite sewage facilities (OSSFs). The project is expected to come up with data that can be used to develop recommendations and specifications for OSSFs that use evapotranspiration and absorption (ETA) in other regions of Texas.

This study is being led by several researchers affiliated with the Water Resources Center at Texas Tech, including engineers Lloyd Urban, Ken Rainwater, and Andrew Jackson. The project was funded by TOWTRC in September 2001 and will extend through August 2003.

In a recently completed investigation, which was also funded by TOWTRC, this research team demonstrated the extent to which ETA systems coped with hydraulic loads of synthetic or man-made wastewater for a period of 500 days. In this project, the ETA units will be evaluated for an additional 18 months.

According to Urban, results of the initial project suggest that typical climate and soil conditions throughout much of the Texas High Plains may safely accept greater hydraulic loading rates than currently allowed by the Texas Natural Resource Conservation Commission (TNRCC). However, this new study is needed to ensure that enough long-term data is gathered to help the TNRCC adequately determine if changes in loading rates can be scientifically justified. As a result, this study will use six ETA test units that will receive simulated wastewater. In the previous project, half of these six ETA test units received clean water, while the others received simulated wastewater.

Another aspect of this project will be to extend the findings of the first study to other locations throughout Texas, based on correlating soil composition, rainfall, evapotranspiration, and vegetation. The project will incorporate information on the various types of OSSFs that are widely used in other regions of the State. In this task, the research team will consult local OSSF inspectors to determine which systems may be most appropriate, and to identify challenges that need to be overcome in each region.

Note: For details, contact Urban at (806) 742-3597 or lloyd.urban@coe.ttu.edu.

Meetings, Conferences, and Training Opportunities

Designing and managing on-site sewage facilities to treat high strength wastes is the focus of a national conference that will meet in San Antonio March 14-15, 2002. The National High Strength Onsite Wastewater Conference is cosponsored by the National Onsite Wastewater Recycling Association (NOWRA) and Septic Systems Express, a company headed by Frank Aguirre of San Antonio. Presenters at this conference will be Bruce Lesikar of Texas Cooperative Extension and the Texas A&M University

Agricultural Engineering Department and Bill Stuth of Northwest Cascade-Stuth, a private firm in Washington state. This conference will provide OSSF designers and industry professionals with expertise to help better design on-site wastewater treatment systems for restaurants and other sites. Topics will cover the causes of high strength waste streams in homes and food service facilities; how to estimate biochemical oxygen demands (BOD) and hydraulic loading; the design of complex systems to equalize flows, and situations where multiple treatment trains are involved. The conference will include a visit to a failing system, where strategies to remedy this site will be discussed. The course will provide certificates of completion that may be used for continuing education credit. For details, contact Aguirre at (210) 490-9780 or frank@septicsystemsexpress.com. The workshop's website, http://www.highstrengthwastewater.com.

The Texas Engineering Extension Service (TEEX) has announced its training schedule for on-site sewage facility (OSSF) classes for the March through August 2002. The Installer I, Installer II, Site Evaluator, and Designated Representative classes are required for those seeking Texas OSSF Licenses. The classroom hours for these four courses include the examination period for these licenses. State regulations require those seeking licenses to pre-qualify for the exam. Applicants for licenses should submit TNRCC applications and notarized statements of work experience, as well as their registration forms and payments, three weeks before classes begin. The Aerobic/Surface Irrigation Operations and Maintenance class and the Water Utility Safety class are for continuing education units (CEUs) only.

The Installer I class provides 16 classroom hours of instruction. Those who complete it will earn 13 hours of CEUs. The class will be taught at the following dates and places: March 26 & 27–Amarillo; July 16 & 17–Longview; April 23 & 24–Houston; July 30 & 31–Abilene; May 21 & 22–Mesquite; August 20 & 21–San Antonio, and June 11 & 12–Weslaco.

The Installer II class provides 24 classroom hours of instruction, and those who successfully finish the class earn 21 CEUs. The class will be offered at the following dates and sites: March 19 through 21–Abilene; June 25 through 27–Houston; April 30 through May 2–Corpus Christi; and August 13 through 15– Mesquite.

The Site Evaluator class provides 20 hours of classroom instruction and 17 CEU credits. This class will be offered at the following dates and places: April 9 through 11–Tyler; July 16 through 18–San Antonio; May 7 through 9–Houston; August 6 through 8–Mesquite; and June 11 through 13–Abilene.

The Designated Representative class provides 27 classroom hours of instruction and 24 CEUs. The class is scheduled for the following dates and sites: April 16 through 19–Mesquite; August 6 through 9–San Antonio; and June 18 through 21–Bryan.

The Aerobic/Surface Irrigation System Operations and Maintenance class provides 8 hours of classroom instruction and 8 CEUs. The class is scheduled for the following dates

and places: May 14–Tyler; July 25–Austin; June 6–Abilene; August 29–Victoria; and July 23–Mesquite.

To learn more about any of these classes, to obtain TNRCC applications and experience forms, or to register, call TEEX at (800) 824-7303.

The 2002 Summer Conference of the Texas On-Site Wastewater Association (TOWA) will meet July 18-20 in San Antonio. The conference will cover such topics as septic system inspection and certification for real estate sales; troubleshooting problems associated with aerobic treatment units; system design and maintenance, treating high-strength wastes, and spray irrigation as a wastewater disposal method. For additional details, visit the TOWA website at http://www.txowa.org, or call them at (512) 494-1125.

The 11th National Conference of the National Onsite Wastewater Recycling Association (NOWRA) is set for September 18-21 in Kansas City, MO. The conference will include technical education sessions, workshops about the functions of onsite wastewater treatment systems (OSSFs), seminars, and a tour of OSSFs. To learn more, visit the NOWRA WWW site at http://www.nowra.org.

The Annual Conference of the National Environmental Health Association (NEHA) will meet July 1-3 in Minneapolis, MN. The conference features sessions dealing with the use of onsite wastewater treatment systems (OSSFs). The workshop will examine issues associated with cluster systems, development of a national code, and the implementation of performance-based standards. Other themes of the conference include new materials designed to educate the public about how to operate and maintain OSSFs. To learn more, visit the NEHA website at http://www.neha.org.

TAMU Researchers Evaluate Usefulness of Constructed Wetlands for OSSFs in East, Southeast Texas

An ongoing study by Texas A&M University researchers and local RC&D councils is evaluating the potential for various types of constructed wetlands to treat wastewaters throughout Southeast Texas. The goal is to evaluate if constructed wetlands may work at sites where treatment was inadequate or where conventional septic tanks and drainfields had failed.

The project, which is funded by the U.S. Environmental Protection Agency and the Texas Natural Resource Conservation Commission through the Section 319 program, is led by researchers Richard Weaver and Kevin McInnes of the TAMU Soil and Crop Sciences Department and Bruce Lesikar of the Agricultural Engineering Department. Other cooperators include Kenneth Awtrey of the Pineywoods Resource and Conservation (RC&D) of Nacogdoches, and John Davidson of the Southeast Texas RC&D in Livingston.

Work on this project began in May 2000 and is expected to continue at least throughout 2002. This study builds upon a previous Section 319 investigation that tested the use of constructed wetlands in the Houston and Bryan-College Station areas. Said Weaver, "We're using a lot of the information we gained in the initial 319 project and incorporating it into this effort. We learned some things about water use, plants, and other factors that we want to study in more detail in this new project."

In this study, 30 wetlands will be installed and monitored in each of three regions of East and Southeast Texas at sites where conventional septic systems were not present or failed. The RC&D staff identified these problem sites. Sites where the team will install and monitor constructed wetlands include Nacogdoches, Apple Springs, Dayton, Point Blank, Cold Spring, Sour Lake, Wiergate, and Beaumont. So far, more than 20 sites have been built and are being tested. At each of these sites, the team will gather monthly water quality samples and analyze levels of pathogens, phosphorus, nitrogen, nitrates, total suspended solids, pH, and other water quality parameters.

Weaver says this new project will evaluate how well several design factors may influence the performance of constructed wetlands. For example, the previous study disposed of treated effluents with drip irrigation. In contrast, this project will assess the success of disinfecting wastewaters with chlorine and ultraviolet light followed by surface irrigation. Another difference in this new study is that some wetlands will be using tire chips as the medium rather than gravel. The water levels in the wetlands cells will be maintained at a shallow depth (less than 10 inches). "When water is kept at a shallow depth, we think we'll get more aeration which should improve treatment," Weaver said. Additionally, this project is going to use umbrella palms, which were found in the first project to be fast-growing, to consume large amounts of water in the summer, and to be hardy and resistant to attacks by insects. "We initially thought that the plants in a wetland really aided in improving water quality," Weaver said, "but what we learned from the first project was that the main role of the plants is to consume water by plant growth and transpiration, especially during warm seasons. As a result, we're concentrating on umbrella palms which grow fast and are hardy."

Other benefits that will result from this project, Weaver said, include the training of local installers, the development of educational projects, and the protection of water quality. Weaver explained that the research team has been able to provide at least six local installers with hands-on experience on how to design and install constructed wetlands, which will help them work on similar projects in the future. "Another great part of this

project is that it strengthens the collaboration between TAMU and local conservation districts. The teamwork is great because the RC&Ds know the issues, problems, and people at the local level, while we at A&M can lend some technical expertise to assist in problem solving.

Meanwhile, Lesikar is developing an educational video that compares the benefits of various OSSF designs and technologies, including constructed wetlands.

Weaver suggests that the most important of this project may be the potential it has to improve and maintain water quality. "The water quality aspect of this project is what most interested the EPA," he said. "Obviously, failing OSSFs constitute a real danger to water quality, since they can be source of nonpoint pollution by possibly heightening levels of pathogens and a host of nutrients. If we can help develop alternative systems that will fail less often and may even work better in problematic sites, we can help better water quality."

Note: For more information, Weaver can be contacted at (979) 845-5323 or rw-weaver@tamu.edu, Lesikar at (979) 845-7453 or b-lesikar@tamu.edu, or McInnes at k-mcinnes@tamu.edu or (979) 845-5986. Awtrey can be contacted at (936) 568-0414 or kawtrey@tx.nrcs.usda.gov, and Davidson can be reached at 936-327-6408 or jdavidso@tx.nrcs.usda.gov.

A&M Student Compares Performance of Wetlands that Use Tire Chips, Gravel, Media

A Texas A&M University graduate student is evaluating factors that may lead to the success or failure of constructed wetlands, as part of her Master of Science thesis. Amanda Richmond is studying in the Soil and Crop Sciences Department, working under the supervision of researcher Richard Weaver. In part, Richmond's graduate studies are supported by the Texas Water Resources Institute, which awarded her a $1,000 Mills Scholarship.

In her graduate work, Richmond is participating in a project to assess the performance of constructed wetlands for on-site wastewater treatment throughout East Texas (see the related story for details). Richmond is comparing the performance of six wetlands that use tire chips as a filter medium as well as six wetlands with gravel substrates. She is also comparing the effectiveness of two disinfection methods—ultraviolet light and chlorine. Finally, Richmond is

learning how variations in seasonal temperatures influence how well these OSSF systems treat wastewater.

Richmond's graduate research began in May 2001 and she hopes to graduate in August 2002. Preliminary results suggest that the wetlands with tire chips may remove more phosphorus, in part because of the iron in the steel belts of recycled tires. Although the effluent from sites with tire chips was distinctly orange or reddish in color at first, and perhaps high in total suspended solids, water quality is gradually returning to more normal levels. Richmond also said that the wetlands with tire chips also appear to have reduced levels of fecal coliform bacteria.

Weaver says that, on a broad level, the idea of involving graduate students in studying real world problems provides a number of benefits. "Giving graduate students a hands-on role in taking part in a large project like this provides them with valuable experiences they will take with them once they've graduated," he said.

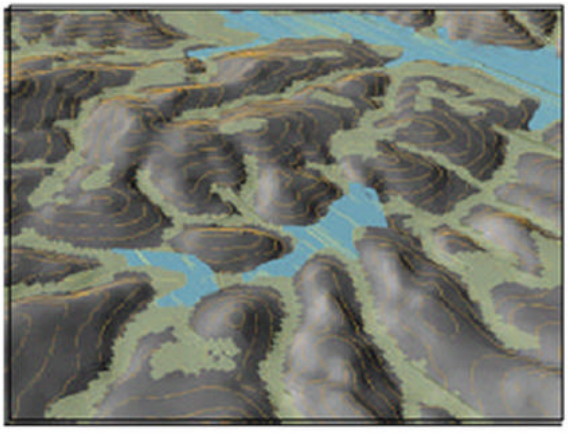
At the same time, supporting graduate studies like this one provides TWRI with an opportunity to support graduate students, to train future scientists, and to learn more about important water resources issues.

Note: Richmond can be contacted at mrichmond00@hotmail.com.

TOWTRC–Funded Digital Maps Now Being Field Tested in Montgomery County; Will Help Evaluate Site Characteristics

Results from a project funded by the Texas On-Site Wastewater Treatment Research Council (TOWTRC) to develop high-tech tools to assess sites for on-site sewage facilities are now being field tested in Montgomery County.

For more than a year, John Jacob of Texas Cooperative Extension and the Texas Sea Grant Program has been working with counterparts at the University of Minnesota to develop a digital map of Montgomery County.



In basic terms, the intent of the project to create a geographic information system (GIS) that incorporates information on soils, slopes, and groundwater resources that could guide regulators and industry professionals about specific sites that may not be suitable for standard onsite wastewater treatment systems due to groundwater concerns.

Some of the work in this project involved converting data from U.S. Department of Agriculture Soil

Conservation Service maps into a GIS format and linking these digital maps to specific points on a grid so they could be used with global positioning systems (GPS). Other aspects of the project involved studying how concave and convex slopes found in landscapes may affect where water flows and where it is likely to pond or surface.

Early this year, Jacob met with Pat Duncan, the OSSF program manager for the Montgomery County Health Department, and her staff. He installed the system on their computers and provided training about how to use the map and related ARC View GIS software. Jacob also taught the health department staff how to use GPS to identify the precise location of a system in the field, and later use those coordinates to find the system on the digital map.

"The great thing is that you can use the GPS to direct you exactly where the data for a piece of land is on the GIS, and thus learn more about very site-specific characteristics that may influence water treatment and wastewater quality."

Since that time, Duncan says she has used the map several times, mainly in situations where there are disputes about whether a specific site is suitable for a standard system. "The maps are great because people can take a look at them, and readily tell if there's a groundwater problem and what the sources of the trouble may be," she said. "In one case, a homeowner readily decided that he needed a non-standard system, in part because of the evidence provided by the digital map."

On the other hand, Duncan admitted the system may be needed in relatively few occasions on Montgomery County because the area is so flat and, as a result, slopes don't play that big of a role. Therefore, even though the county inspects more than 50 systems each week, the digital mapping technology may only really come into play when there are borderline questions about whether a site is suitable or not.

Another interesting aspect of the use of the map, Jacob says, is that it provides a different point of view about the extent of lands in a county that may be suitable for standard, conventional systems. For example, while Duncan estimated that roughly 25% of the County might be able to accommodate a standard system, but Jacob says the maps suggest only 15% of the acreage in the county may be suitable for standard septic tanks and drainfields.

"But keep in mind," Jacob says, "that we intentionally are conservative on the areas we rate as acceptable for standard systems, in order to provide additional safeguards for environmental health."

Even though these maps are an excellent tool that can be used as part of an overall effort to determine which sites are suitable for OSSFs, Warren Samuelson of the TNRCC emphasizes that the only way to know for sure if a site is appropriate is to go out and conduct an in-the-field site evaluation.

Notes: Jacob is currently developing digital maps for a few other Texas counties that will aid in the assessment of whether specific sites are suitable for standard OSSF systems. You can reach him at (281) 333-9216 or jjacob@tamu.edu. Duncan can be contacted at (936) 539-7839 or pduncan@co.montgomery.tx.us. Jacob will prepare a report on this project for TOWTRC in the near future.