Texas On-Site Insights
Information about On-Site Wastewater Treatment Systems in Texas
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On-Site Wastewater Treatment Training Center Ready for Training Courses

The Texas On-Site Wastewater Treatment Training Center is now open and is already serving as an educational resource for industry professionals and regulators.

The Center is located at the Texas A&M University Riverside Campus on Highway 21 west of Bryan and was officially dedicated September 22. The Texas On-Site Wastewater Treatment Research Council provided funding to help construct the facility.

The Center demonstrates treatment and land application options. Treatment technologies at the site include conventional septic tanks, three aerobic treatment units, a trickling filter, two subsurface flow constructed wetlands, a buried sand filter, and a train of six experimental sand filters. Land application units include four subsurface drip irrigation fields, a spray irrigation field, conventional trenches, low pressure dosing systems, gravel-less pipe, leaching chambers, mounds, and an evapotranspiration bed.

Bruce Lesikar of Texas A&M describes features of the Texas A&M On-Site Wastewater Treatment Training Center during dedication ceremonies.

Much of the work that went into developing the Center was led by Bruce Lesikar of the Texas A&M University Agricultural Engineering Department. Others playing significant roles in the development of the Center include Paul Morris of the Texas Engineering Extension Service (TEEX), Doretta Conrad of the Texas Natural Resource Conservation Commission, and the Texas On-Site Wastewater Association (TOWA) Training Center Committee that was chaired by Delma Perry. TOWA members donated materials and time for the site.

"We only had six weeks to develop the site and install many on-site wastewater systems here," says Lesikar. "Teamwork and cooperation were keys to making this effort successful."

Lesikar noted that this site will soon begin to play a major role in educating on-site professionals. Morris will present a 20-hour installer basic training course at the Center for December 5-7. TEEX is planning a one-day course, "Operation and Maintenance of Surface Irrigation Systems with Aerobic Treatment," at the Center January 16. This class is intended for installers, designated representatives, inspectors, maintenance technicians, professional designers, and homeowners. It will cover such topics as spray irrigation systems, the use of chlorine disinfection tablets, rules governing surface irrigation, principles of aerobic treatment, and how to maintain these systems.

Lesikar says the facilities at the Center will provide greater opportunities for training. "When developing the site, we took great care to design features that will benefit hands-on instruction," he said. "People taking these courses will get to observe first-hand how many on-site systems should be constructed and operated. We feel this is knowledge they should be able to take back to their communities and use."

It needs to be noted that courses at the Center include a $25 surcharge to cover maintenance and operation at the site. TEEX will continue to offer its training courses at locations throughout the state.

Companies that supported the development of the training center include the following: Bohon Septic, Clearstream Wastewater Systems, Inc., Concrete Products Inc., Country Boy Systems, David Venhuizen, Enviro-Pal, Inc., Geoflow, Goulds Pumps, Grunfos Pumps, Hill Country Concrete, Hydro-Action, Inc., Infiltrator Systems, Inc., Meyers Pumps, Netafilm Irrigation, Inc., Norwesco, Orenco Systems, Inc., Pioneer Concrete of Texas, Inc., Southern Manufacturing, Inc., Sunbelt Pumps, U.S. Controls, Inc., Wallis Concrete, Inc., Wastewater Technologies, Inc., and Zabel Environmental Technology.

For details, call Lesikar at (409) 845-7453 or Morris at (713) 921-1665.

1996 On-Site Conference Set for College Station

The 1996 conference of the Texas On-Site Wastewater Treatment Research Council is being planned for March 10-12, 1996, in College Station, TX.

At last year's conference, many participants filled out surveys on the research and technology transfer needs in Texas. Howard Ladewig of the Texas Agricultural Extension Service at Texas A & M University has evaluated the surveys and identified the top issues. These were soils, site evaluations, system failures, surface irrigation systems, drip and trickle irrigation systems, and aerobic systems.

The Council appointed a committee to plan the agenda for the conference. The committee members are: Council Executive Secretary Warren Samuelson; Jones Bohon, an on- site system installer from Johnson County; Burt Carter, Vice President of the Texas On- Site

Wastewater Association; Paulo Pinto, a regulator from Williamson County; and Council member Jose Gil. The committee's first task was to develop the agenda around the issues identified above.

A tour of the new training center facility at the Texas A & M University Riverside Campus will be part of the conference. This will be a great opportunity for people to see this Center that the Council helped fund and will give them a chance to visit with the experts. The center is a cooperative project of the Research Council, the Texas On- Site Wastewater Association, the Texas Agricultural Extension Service, the Texas Engineering Extension Service, and the Texas Natural Resource Conservation Commission.

If you have any questions about the conference, please call Warren Samuelson at (512) 239-4799 or conference planner Mary Garrett at (512) 888-5400.

Council Votes to Continue Funding of Three Projects

The Texas On-Site Wastewater Treatment Research Council has announced that it will continue to fund two projects, and will provide supplemental funding for another study.

At its October meeting, the Council decided to fund continued monitoring at a constructed wetland developed by Pineywoods Resource Conservation and Development (RC&D). The wetland is located at the Rusk County Youth Exposition Center in Henderson and was completed earlier this year. The Center can generate as much as 5,000 gallons of wastewater each weekend and is heavily used on the weekends by visitors who come for fairs, rodeos, and high school graduations. The Council helped fund initial construction of this site. "The site has been operating since May and we've gathered some initial water quality data that shows the site is performing well so far and is removing significant levels of nutrients," said Ken Awtrey of Pineywoods RC&D. "But to really know how well this site is working over the long-term we need more data. This grant will help us do that." Awtrey said that Pineywoods RC&D has prepared an operations and maintenance manual for this site. A manual was developed that describes general operations and water level management. This year, a site-specific manual is being developed that will include instructions for plant care, nutrient management, mosquito control, and trouble shooting tips. For details, call Awtrey at (409) 568-0414.

At its November meeting, the Council voted to provide additional funds to the Center for Maximum Potential Building Systems in Austin to complete construction of a landscaped natural treatment system engineered by Susan Parten of Community Environmental Systems, Inc. The system is a component of the Center's green demonstration building project that contains many sustainable features including water conservation, composting toilets, 1-pint flush toilets that use treated greywater, irrigation of flower beds and lawns with treated wastewater, and constructed wetlands to provide added wastewater treatment. Center staff Pliny Fisk, Gail Vittori, Brian O'Brien, and Jesus Bendezu are working on the project . It should be operational next year. They hope the project will show how drainfield sizes can be significantly reduced and that it will show how

sustainable technologies can be incorporated into standard home designs. The Center's phone number is (512) 928-4786.

The Council also voted at its November meeting to grant an award for continued work on the Texas A&M University On-Site Wastewater Treatment Training Center. Lead investigators include Bruce Lesikar of the Texas Agricultural Extension Service, and Frank Aguirre of the Texas On-Site Wastewater Association. This grant will help fund a site evaluation station and gravel sidewalks at the Center to provide all-weather access. Lesikar's phone number is (409) 845-7453.

More information will be presented on each of these projects in upcoming issues of the newsletter. You can get more details by contacting Council Executive Secretary Warren Samuelson at (512) 239-4799.

Austin Study Identifies Site Specific On-Site Wastewater Problems, Management Options

By Chris Guzman
Austin Water and Wastewater Utility

In December 1994, the City of Austin's Water and Wastewater Utility initiated a study to assess a variety of alternative wastewater collection, treatment and disposal technologies in Austin's 5-mile extraterritorial jurisdiction (ETJ). It will also provide recommendations for operations, maintenance and management models and structures. Susan Parten of Community Environmental Services, Inc. (CES) was contracted to perform the study. The project is being funded through Austin's Capital Improvements Program .

Susan Parten and Chris Guzman discuss the specific needs of this area of Austin's ETJ. The map contains information on land types, geophysical and physiographic conditions, and key environmental considerations

Currently, work on Phase I, the study and planning phase, has been authorized. Phase II and III will include design, construction, demonstration and monitoring of selected systems and technologies. The City propose s to move some monitoring activity on conventional on-site systems into Phase I to develop more reliable recommendations regarding alternative technologies and their anticipated performance.

Progress on Project Tasks:

1. **Development of a map showing representative land types in the study area.** This work has been completed and a final draft map is available. It shows 15 representative land types based on geophysical and physiographic characteristics of the study areas in the ETJ. The map also includes a description of key environmental considerations associated with these areas.
2. **Development of a candidate list of collection, treatment and disposal technologies.** This work has been completed and it includes a listing of eight collection methods, l6 small cluster systems, 14 large treatment and pretreatment systems and 14 disposal technologies that might be applicable. All these technologies were identified through personal experiences of team members , and an extensive literature review. An updated computerized bibliographic database with a search and screening process was also developed for and used in this project.
3. **Evaluation of the selected technologies based on various factors which include environmental, legal, operations and maintenance, management and cost considerations.** This effort is more than 75% complete and includes information obtained from a July 1995 survey of local area alternative system owners. About 175 owners of systems on record were sent a questionnaire which covered a number of areas pertinent to some of these criteria and more than 26% responded. This information will be presented in a matrix format.
4. **Development of system management models which will include operations and maintenance considerations.** This work will also be represented in a matrix format. This work is about 50% complete. It too includes information obtained from the survey mentioned above as well as documentation of experiences in other communities.
5. **Identification of relevant state and local regulations and ordinances affecting the implementation of alternative technologies.** This work is about 90% complete. Special interest is being given to the TNRCC rulemaking process . TNRCC staff have been informed about our project and encouraged to consider the findings in our project report in their deliberation of changes to the on-site rules.
6. **The preparation of a final report with recommendations is the final work product.** A final draft report for staff review and comment is expected in December 1995.

Note: For more information, contact Guzman at (512) 322-2894.

How On-Site Fees Are Collected and Used by the Council

by Ric Jensen
Editor, *Texas On-Site Insights*

Many of the questions that are most frequently asked about the operations of the Texas On-Site Wastewater Treatment Research Council revolve around the issues of how funds are collected, managed and used. This article attempts to clear up some of these issues.

How does the Council Get Its Funds?

Each time individuals apply for a permit to install or substantially modify an on-site wastewater treatment system, they must pay a $10 fee. On-site systems treat less than 5,000 gallons per day. Fees are mandated by Title 71, Subchapter D, 4.02 of the Texas Administrative Code.

From September 1993 to August 1994, the Texas Natural Resource Conservation Commission (TNRCC) collected more than $378,000 from these fees. Since September 1995, the TNRCC has collected $141,000. The TNRCC is now compiling data on fees it collected from September 1994 through August 1995.

It needs to be noted that the fees are not always submitted to the TNRCC promptly, so it's difficult to use the fee information to accurately estimate how many on-site systems are installed during a given time period.

How Are Fees Collected?

Each locally authorized agent (typically a city, county, or regional health department or river authority) provides monthly activity reports to Warren Samuelson in the Agriculture and Watershed Management Division of the TNRCC. In counties that do not have locally authorized entities, the TNRCC is in charge of collecting these fees. It's important to note that the TNRCC -- not the Council -- administers the fee collection process.

If authorized agents are late in reporting on-site installations and collecting fees, the TNRCC will work with them. So far, there have been no instances where local entities have been fined or penalized for not submitting their fees properly.

"We have had some problems with collecting fees in a timely manner, but it's often something that can be easily explained," Samuelson says. "Sometimes agencies are limited by time and manpower constraints, because they don't know they're supposed to turn them in, or because they lose key personnel. In a few isolated cases, agencies haven't turned them in because they have concerns about how the program is operated. We're working to resolve those instances."

How Does the Council Use the Fees?

The Texas On-site Wastewater Treatment Research Council decide how these fees should be used to fund research, demonstration, and technology transfer programs. It's the job of the Council to consider both solicited and unsolicited proposals s that are submitted.

Many projects have been funded by the Council including this newsletter and various research projects (a complete list of Council-funded projects is available from Samuelson). Council funds also help support TNRCC staff members who work directly with the Council programs.

The Council consists of a group of 11 people appointed by the Governor. These people represent such groups as homebuilders, industry professionals, state and local regulators, and soil scientists.

Making Things Better: Future Efforts

One major challenge facing the Council is that it is not now allowed to spend all the funds it collects. For example, the Legislative Appropriation Request (LAR) for the Council was only $220,000 per year for the current biennium that runs through August 31, 1997. Fees generated in excess of this amount now roll over into general revenues.

Samuelson says the Council is now working on establishing a better record of the amount of funds being collected so that appropriations can be substantially increased. "In general, legislators preparing appropriations requests want to be certain that the amount of money appropriated is going to be available. We feel that we can make a case that more funding needs to be provided for Council programs by establishing a solid paper trail."

Samuelson adds that the Council is now working at identifying a set of specific research priorities that can be used to identify the types of projects that most need funding. This should help make sure that Council funds are directed at the most pressing issues facing Texas.

NOTE: Updates on the amount of fees that are being collected and how the Council is using these fees will be regularly featured in upcoming issues of the newsletter. For details on the fee collection program, contact Samuelson at (512) 239-4799.

Faced with a Failing System, Texas A&M University Researchers Design, Install Their Own

Like all too many rural Texas homeowners with on-site wastewater treatment systems, Jim Bonner and Robin Autenrieth found themselves in a difficult dilemma this Spring.

The couple, both of whom are faculty members in the Civil Engineering Department at Texas A&M University, had built a home just south of College Station in the small town of Wellborn a year and a half earlier. They installed a conventional system with a septic tank and drainfield. Unfortunately, the

Jim Bonner (far left) supervises construction of a sand filter. This work replaced an on-site wastewater system at his College Station home. Steven Murdock (in back) of Infiltrator helped install the system, while Steve Gonzales of the Brazos County Health Department observed the installation.

system didn't work at all.

"Our toilets were bubbling with the smell of raw sewage, wastewater was surfacing on our property, our pipes were corroding, and we were concerned that the quality in nearby Friesen Lake would be adversely affected" says Bonner. "We installed the type of system most commonly used throughout this area and it failed."

This pressure distribution manifold (above) will evenly distribute wastewater onto the sand filter.

Fortunately, the couple were able to draw upon their own knowledge and the help of some interested and skilled professionals to solve their problem. Bo Burroughs of Leaching Chamber Systems, Inc., of Amarillo offered his assistance.So did Texas A&M University Agricultural Engineering researcher Bruce Lesikar. With their help, Bonner and Autenrieth developed an innovative system, which they installed over the Easter weekend.

"If we were the `typical' homeowner, we probably could not have done this," Autenrieth says. " We were fortunate that Jim and I have training in wastewater system design and that we found people like Bo and Bruce who are knowledgeable about state-of-the-art systems. They cared enough to spend a lot of time and help us out, and they too wanted to get some experience installing sand filters and observing how well they work." Bonner and Autenrieth also say that the Brazos County Health Department was especially helpful in allowing them to use this innovative system.

Jim Bonner (with shovel) helps excavate the area where his on-site wastewater system will be installed.

The system Bonner and Autenrieth chose works this way. Wastes first flow into the old 500-gallon septic tank and are then sent to a new 1,000-gallon septic tank. A pump transfers wastes to a 20' x 18' x 4' biological sand filter with a sump pump that is equipped with clean-out ports for easy maintenance. Effluents then are distributed to landscape zones near the house through a subsurface "dome" irrigation system designed by Bonner. This system irrigates

the landscape and keeps the soils near the house moist enough so soils don't shrink and swell and cause the foundation to crack.

Bonner and Autenrieth say this system would have cost roughly $4,700 to install, compared to the $3,500 they originally paid to install the conventional septic tank and drainfield. However, with free labor from Burroughs and Lesikar, the actual cost was significantly reduced.

"We think there will some additional savings down the road because we will no longer have to irrigate our yard," Bonner says. "Still, the actual operations and maintenance costs may be slightly higher because the system pumps effluents to the distribution lines for irrigation."

"The joys of this system are, first of all, that it works," says Autenrieth. "But also, it lets us use water three times -- in the house, to protect the foundation, and to irrigate our landscape. It's worked great so far."

As may be expected from university researchers, Bonner and Autenrieth expect to monitor and analyze how the system performs. Bonner says he hopes to monitor levels of fecal coliform, nutrients, and total suspended solids entering and exiting the system.

For more information, call Bonner at (409) 845-9770, Autenreith (409) 845-3593 or Lesikar at (409) 845-7453.

TNRCC Gathers Public Input to Help Revise New On-site Rules

The Texas Natural Resource Conservation Commission (TNRCC) is now in the process of revising rules for on-site wastewater systems. This time, it's asking many local officials and industry officials for their help in drafting the new regulations.

In 1994, the TNRCC published a draft of new rules governing on-site sewage facilities (OSSF) without first receiving many comments from affected parties. There were complaints at public hearings that there was not adequate time to comment on that draft and that many of the changes were unacceptable.

As a result, TNRCC's OSSF program utilized a process that involves more on-site professionals before the new rules are published. First, they produced a TNRCC Rules concept paper this Summer. This document spells out key issues and identifies specific areas where rules changes may be needed. In August, TNRCC produced an 84-page preliminary draft of the proposed rules revisions.

After that draft was printed, TNRCC staff created a working group composed of on-site professionals and regulators to provide input and comments. This committee includes John Blount of the Harris County Engineering Office; Tom Boeker, a sanitarian from Smith County; James Bohon, an installer from Johnson County; Bo Burroughs of Leaching Chamber Systems of Texas, Inc., in Amarillo; Burt Carter of the Lower Colorado River Authority; Jim Howe of the Texas Homebuilders Association in Temple;

Robert Morriss, an engineer from Cedar Park; Delma Perry, an installer from El Paso; Kenneth Petersen, an Austin attorney who represents product testing institutions; Raynaldo Rodriguez of the Cameron County Health Department; Wayne Farrell of the Bell County Public Health Division; Bob Harbuck of the Angelina County Health Department; James Sims, an engineer from Fort Worth, and Tom Touchstone of the Aransas County Health Department.

At the same time, TNRCC hosted public meetings to gain comments about the draft rules in September and October. These town hall style meetings were in El Paso, San Angelo, Austin, Beaumont, Houston, Victoria, Weslaco, Amarillo, Lubbock, Arlington, and Tyler. As many as 100 people attended some of the meetings.

Comments from both the public meetings and the ad hoc committee are being forwarded to an internal TNRCC rules writing team. Team members include James Kowis, Doretta Conrad, Lemarcus Johnson, Ken Graber, Lezlie Cooper, Steven Crank, David Gonzales, Bob Burrell, Gene Snelson, and Warren Samuelson.

The TNRCC intends to publish the final draft rules in early 1996 and hold public hearings shortly afterwards. The new rules could be adopted in the Summer or Fall of 1996 and be implemented in early 1997.

"We think that the end result of this process is that we are going to develop a set of rules that will be much more acceptable to the public when they are published because we've tried to gain public input," says Michael Fahy of TNRCC's OSSF program. "The extra benefit is that we're building stronger relationships by showing people that we're listening and are responsive to their concerns."

The new draft rules cover a wide range of subjects including relationships between TNRCC and authorized agents, training, maintenance, responsibility of homeowners, site evaluations, and fees.

For details about the rules, call Fahy at (512) 239-1490.

TEEX Offers On-Site Wastewater Short Courses

The Texas Engineering Extension Service (TEEX) is offering many short courses about onsite wastewater issues.

TEEX's installer (basic training) course will be held Jan. 9-10 in San Antonio, Jan. 30-31 in Tyler, and Feb. 13-14 in Nederland. The designated representative course will be offered Jan. 9-11 in San Antonio, and Jan. 30-Feb. 1 in Tyler. Operations and maintenance of surface irrigation systems with aerobic treatment will be Jan. 16 in Bryan and Jan. 18 in Sugar Land.

The courses are taught by Paul Morris. For details, call TEEX at (409) 845-6246.

Texas A&M Extension Specialist Analyzes Results of 1995 Onsite Research Needs Survey

A detailed analysis of a survey dealing with on-site wastewater research needs in Texas has been completed by Texas A&M University. Howard Ladewig, a specialist with the Program Development and Evaluation Division of the Texas Agricultural Extension Service, analyzed responses to a survey that was circulated at the 1995 Texas On-Site Wastewater Treatment Research Council conference in Austin. The survey analysis was funded by the Council.

How the Survey Was Developed

At the conference, roughly 350 participants were asked to rate issues they felt the Council may need to research in each of three broad categories -- conventional on-site systems, alternative on-site systems, and technology transfer issues. There were 22 items to consider for conventional onsite systems and alternative onsite systems, and 10 issues relating to technology transfer methods. They were asked to rank these issues on a scale ranging from 1 (most important) to 7 (least important). Issues with the lowest scores are ranked as most important. Only 77 individuals responded to the survey. Responses were color coded so regional trends could be identified.

How Survey Results Were Analyzed

Ladewig analyzed the survey data and generated maximum, minimum, and mean scores and standard deviations for each issue.

Results of survey responses for conventional onsite systems show that issues identified as high priorities for research and education efforts include soil types (1.58), recognizing system failures (1.89), water tables (1.96), site restrictions (2.01) and system sizing (2.05). Lower priorities for research and education were given to piping material (3.86), alternative tank construction materials (3.72), solids removal (3.64), septic tank construction (3.39) and trench dimensions (3.26).

For alternative on-site systems, the most important research and education needs issues were identified as soil types (1.72), maintenance (1.81), sizing of systems (1.91), trickle irrigation systems (2.01), and aerobic systems (2.03). Composting systems (3.45), mound systems (3.45), rotating biological contact systems (3.32), leaching chamber systems (3.25), and climate and weather (2.81) were identified as lower priority areas.

Participants were asked to rank the importance of methods used to disseminate research and transfer technological issues. Most important issues include training (1.42), workshops (1.67), regulations (1.76), newsletters (2.12), and conferences (2.12). Less important issues were mass media (3.35), development of computer databases (2.53), low income funding measures (2.33) and brochures (2.24).

Examining Regional Differences

Ladewig also examined regional differences. The Council divides the state into five geographic regions representing the High Plains, Central Texas, East Texas, the Hill

Country, and the Lower Rio Grande Valley. Ladewig compared the rankings of participants from the Hill Country and Central Texas, because most conference attendees were from those two regions.

Most important issues dealing with conventional on-site systems for participants from Central Texas include system maintenance, soil types, system sizing, and recognizing system failures. Responses of Hill Country participants show the most important issues include subsurface restrictive barriers, water tables, and site restrictions. For alternative systems, the highest ranking issues for Hill Country participants include soil types and system maintenance. Central Texas residents ranked system sizing and maintenance as most important.

Identifying Common Themes

Ladewig utilized a technique called principal component analysis to develop a rotated factor pattern matrix. In basic terms, this involves using factor loadings or multiple regression coefficients to examine relationships or correlations between variables. The goal is to identify underlying themes that may be represented by a cluster of issues.

He identified seven common themes dealing with conventional systems. These include: 1) septic tank construction, alternative tank construction, gravel-less pipe, alternatives to gravel, and piping materials; 2) water tables, system costs and maintenance, and recognizing system failures; 3) cluster systems, evapotranspiration beds, and soil absorption systems; 4) site restrictions and topography; 5) trench dimensions and barrier materials; 6) subsurface barriers, water tables, and solids removal; and 7) site restrictions and climate and weather.

For alternative onsite systems, common themes were identified deal with: 1) climate and weather, soil types, sizing, water tables, and site limitations; 2) rock-reed filters, and trickle and drip irrigation; 3) system costs and maintenance, and system failures; 4) low pressure dosing and mound systems; 5) leaching chambers, composting, and greywater systems; 6) trickling and sand filters; and 7) rotating biological contact filters, aerobic systems and surface irrigation.

Summary

This survey provides preliminary information about research needs that were identified by participants at the 1995 conference. To more accurately identify research needs, broader participation from additional regions of Texas is recommended.

Council chairman Bill L. Harris of Texas A&M says this analyses and future surveys will provide initial information the Council will use to identify and prioritize research needs that most Texans want to see investigated.

NOTE: This analyses was funded by the Council. A full copy of this report can be obtained by contacting Ladewig at (409) 845-7210.

NOTE: This report was published in 1995 by the Texas On-Site Wastewater Treatment Research Council. To obtain a copy with the text and all the tables, contact Warren Samuelson of the TNRCC at 512/ 239-4799. His email is wsamuels@tnrcc.state.tx.us.