



**Volume 2, Number 2, Summer 1993**

### ***Abstracts Now Being Requested for October On-Site Conference***

Abstracts are now being requested for the Second Annual On-Site Wastewater Treatment Research Council Conference. The meeting will take place October 10-12 at the Wyndham Hotel in Austin.

Topics that have been identified include performance of treatment units; alternative distribution and disinfection methods; management of innovative systems; and policy and regulatory issues. Papers on other related topics will also be considered.

People who wish to present a technical paper should submit abstracts by July 30. Morning and afternoon sessions will be available and authors will have roughly 20 to 30 minutes to make their presentations. There will also be limited opportunities for people to demonstrate new products and technologies.

Three copies of each abstract should be sent and abstracts should be limited to two pages (single spaced). On a separate page, authors should include their full mailing address, title, and phone number as well as any special equipment they will need when making their presentation. Persons who have submitted abstracts will be notified within a month as to whether their abstracts have been accepted.

Conference organizers also hope to attract companies or organizations that may want to sponsor an exhibit at the meeting. Groups interested in displaying an exhibit should contact Crespín Guzman of the City of Austin for details on the amount and type of exhibit space that is available and how much it will cost.

For more details on how to submit a paper, how to arrange for an exhibit, or for any other information on the Conference, contact: Crespín Guzman, City of Austin Water and Wastewater Utilities, P.O. Box 1088, Austin, TX 78767. The phone numbers are (512) 322-3656 and (512) 322-2894. The FAX number is (512) 322-2842.

### ***Stephen F. Austin State U. Will Sponsor "Synergistic Constructed Wetlands Conference" August 12-13***

Stephen F. Austin State University (SFASU) will be the site of the "Texas Synergistic Constructed Wetlands Conference" August 12-13.

Co-sponsors of the Conference include the SFASU Forestry School, the American Water Foundation, Community Resource Group, Inc., and Pineywoods Resource Conservation and Development, Inc. (RC&D).

The conference will provide practical information based on research findings from basic and field studies. The theme will focus on how constructed wetlands improve wastewater quality. It is structured to be highly interactive between speakers and participants. For example, experts will give 30-minute presentations and will then meet with a small group of attendees for a 30-minute detailed question and answer sessions. This format will continue until each group of participants will have an opportunity to interact with each speaker.

Some of the featured speakers include John Porterfield of the Angelina-Neches River Authority; Jack McCullough of the Biology Department at SFASU; Commissioner John Hall of the Texas Water Commission; and Robert Gearheart of Environmental Resources Engineering Department at Humbolt State University in California.

The registration fee is \$175. It includes a copy of the book, "Constructed Wetlands for Wastewater Treatment," other printed materials, and a lunch, reception, and dinner. For details, contact Ken Awtrey of the Pineywoods RC&D at (409) 568-1192.

***UTEP will Host Conference on Subsurface Flow Constructed Wetlands  
Aug. 16-17***

The U.S. Environmental Protection Agency (EPA) and the Center for Environmental Resources Management at the University of Texas at El Paso (UTEP) are sponsoring a conference that will take place August 16-17 at El Paso.

The conference, "Subsurface Flow Constructed Wetlands," will feature information on subsurface flow wetlands technology that can be used for on-site wastewater treatment. The meeting will cover the selection, design, construction, operation and maintenance of these systems. Information will also be presented on the economic feasibility of these systems and energy requirements. The meeting will emphasize how these systems can be used in low income areas of the Southwest, including west Texas, New Mexico and Mexico.

The target audience for the conference includes professionals and officials with federal, state, and local regulatory agencies; researchers; consultants and engineers; and interested persons. It is anticipated that roughly 400 people will attend.

The meetings and literature will be available in both English and Spanish. The conference fee is \$45. For more details, call Nancy Lowery or Randy Olivas at the Center for Environmental Resource Management at (915) 747-6648. The FAX is (915) 747-5145.

### ***Council Awards Grant to Upgrade Hornsby Bend Site***

Researchers that are looking for a well-equipped site to conduct studies about on-site wastewater will be pleased to learn that a grant has been awarded to upgrade the Hornsby Bend site near Austin.

The \$46,000 grant was awarded by the On-Site Wastewater Treatment Research Council to the Center for Environmental Research, which is headquartered at the City of Austin's Hornsby Bend Wastewater Treatment Plant. Maureen McReynolds of the CER and Crespín Guzman of the City of Austin submitted the proposal.

The grant consists of two phases.

Much of the work involves building the infrastructure for a 0.75 acre tract so that it can be used for research. This involves installing pipes (to transport wastewater to and from the site), holding tanks, pumps and valves. Other aspects of this phase include paving, extending power lines, and fencing the area.

The rest of the project involves purchasing additional laboratory equipment such as balances and meters to measure dissolved oxygen, pH, and ions. The grant also provides funds for chemicals and other supplies. Discretionary spending for specific equipment that scientists may request has also been included. The equipment would be kept in laboratory facilities at the Center for Environmental Research, which is based at Hornsby Bend.

The grant should make it easier for researchers to carry out field and laboratory studies at the site. The CER was created so that scientists from the University of Texas, Texas A&M University, and other institutions could utilize the site for environmental studies.

For more details, call the Council at (512) 463-8260.

### ***EPA Report Describes Ways to Treat Septage***

A report on how to treat and dispose of septage (the liquid and solid material pumped from a septic tank when it is cleaned) is available from the U.S. Environmental Protection Agency (EPA).

The report, *Septage Treatment and Disposal*, is divided into technical sections dealing with septage characterization, receiving station design, land disposal, co-treatment of septage and sewage, independent treatment of septage, and operation and management considerations. The report is available by contacting the EPA Center for Environmental Information, Cincinnati, OH 45268. Ask for report number EPA-625/ 6-84-009.

### ***Five New Members Appointed to On-Site Council; Morriss is Acting Chairman***

Five new members have been appointed by Governor Richards and confirmed by the Texas Legislature to serve as members of the Texas On-Site Wastewater Treatment

Research Council. The new members are James Brooks, Nancy Hanson, Rick Goldberg; Bill Harris, and Chester Vaughn. The terms of all the new members but Harris expire in 1994. Harris' term expires in 1993.

Three other members are still serving at the request of the Governor Richards: Acting Chairman Robert Morriss, Leo Rodriguez, Boone Coy, and Dan Beckett. The terms of two council members that were not reappointed recently expired. They were Leo Wood (formerly the Chairman of the Council) and Bill Tenison.

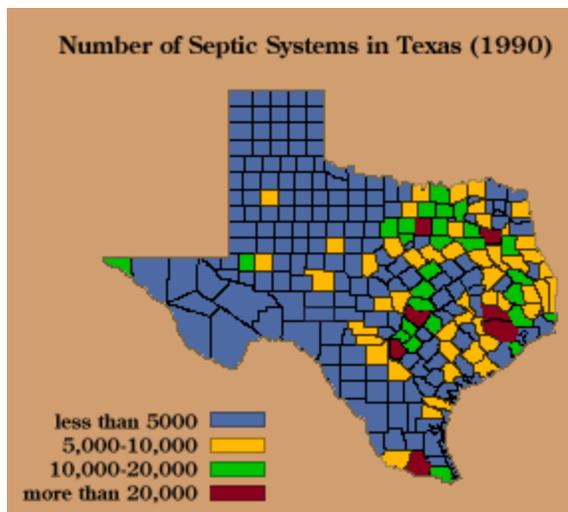
The addresses and phone numbers for the Council Members can be found here. Feel free to contact them if you have questions about the program or need more information

### ***1990 Census Sheds Light on Numbers of Septic Systems in Texas; Regional Trends***

*By Ric Jensen  
Editor, On-Site Insights*

If you want to know which counties or regions contain the greatest number of septic tanks, the 1990 U.S. census can become a valuable source of information.

One of the questions that census takers asked residents throughout the U.S. was, "Are you served by a septic tank or some other on-site wastewater treatment system?"



By looking at the county summaries, which are available at Texas A&M University's Rural Sociology Department, you can get a broad overview of some of the current trends concerning on-site wastewater.

According to the Census, Texas contains roughly 1,256,811 septic systems. For example, seven counties have more than 20,000 septic tanks (see Figure 1). Most of these counties are in major metropolitan areas including Harris (44,120) and Montgomery (29,763) in the greater Houston area; Tarrant, which includes Fort

Worth (22,019); Travis, which includes Austin, (29,289) and Bexar, which comprises the San Antonio region, (26,605). The other two counties that contain large numbers of septic tanks are less urbanized -- Smith, in the Tyler area (24,868) and Hidalgo in the Lower Rio Grande Valley (35,290).

In addition, 27 other counties have between 10,000 and 20,000 septic tanks and 58 counties house more than 5,000 but less than 10,000 septic tanks.

Another way of looking at the trends in on-site wastewater systems is to compare the number of systems by geographic region. For example, the Texas Water Development Board divides the state into 15 geographic regions. The regions with the most septic tanks included North Central Texas (195,000), the Gulf Coast (173,000), and Northeast Texas (172,000). Two other regions (Deep East Texas and the Edwards/ Winter Garden area) each had more than 100,000 septic tanks, while two other regions (Central Texas and the Heart of Texas had more than 90,000 septic tanks). Finally, three other regions (West Central Texas, the Coastal Bend and the Lower Rio Grande) each contained more than 60,000 septic tanks.

### ***TWC Develops New Recommendations for Sizing Evapotranspiration Beds***

*By Sherman Hart, On-Site Wastewater Staff, Texas Water Comm., Austin, TX*

The Texas Water Commission (TWC) has developed a new method that it recommends be utilized to properly size evapotranspiration (ET) beds that are utilized to treat and dispose of domestic wastes on-sites.

The TWC developed the new procedure because many ET beds in Texas were failing, even though they had been properly designed according to State recommendations that were approved at the time. Major problems with the old method were that it underestimates the amount of rainfall that would enter the beds, and that it overestimates water losses by transpiration (plant growth) and surface evaporation. As a result, many ET beds received too much rainfall and runoff, failed, and were unable to recover.

The new formulas differ substantially in two critical areas from the methods previously used to size ET beds in Texas. First, they consider site specific data for evaporation and rainfall for specific regions of Texas. This is essential because climates vary so widely across Texas. Secondly, they incorporate specific information about the amount of wastewater that is likely to be generated from different sized houses and other facilities that are likely to utilize ET bed technology.

For many years, State regulatory agencies have utilized formulas to estimate the proper size of ET beds to accommodate a given amount of waste.

For example, the old formula for single family residences calculated the total area for both beds based on a standard size (31,000 square feet) and the number of bedrooms divided by the mean pan evaporation rate and the rainfall rate.

The formula is shown below:

$$\text{Area} = 31,000 (1 + \text{total number of bedrooms}) \left[ \frac{1}{P_i} \right] (\text{mean pan evaporation rate} - \frac{1}{2} \text{ the mean rainfall rate})$$

For non-single family residences, the old formula was as follows:

$$\text{Area} = 310 (\text{average daily flow into the system in gallons per day}) \left[ \frac{1}{P_i} \right] (\text{mean pan evaporation rate} - \frac{1}{2} \text{ the mean rainfall rate}).$$

The new recommendations use one formula for both individual homes, apartments and condominiums, restaurants, parks and other areas.

The new formula is as follows:

$$Area = 1.6 \text{ (estimated daily amount of wastewater generated in gallons per day)} \\ \text{[[Pi]] (net local ET rate).}$$

The TWC has produced tables that estimate the amount of wastewater likely to be generated by different uses (see Table 1).

**Table 1. Amount of Wastewater Generated by Different Uses**

Type of Facility	Wastewater Generated (gallons per day)
Single family residence (1 or 2 bedrooms)	250
Single family residence (3 bedrooms)	350
Single family residence (4 bedrooms)	450
Mobile homes (1 or 2 bedrooms)	250
Apartments	75 per bedroom
Day care centers (with kitchen)	25 per child
Parks (with bath house)	15 per person
Schools (with food service and gym)	25 per student
Recreational Vehicle Parks	50 per space

The TWC has also published yearly averages for net evaporation (evaporation minus rainfall) for many areas of Texas. Some examples are shown below.

**Table 2. Net Evaporation Rates for Key Areas of Texas**

Area	Net Evaporation (inches per day)
Amarillo	0.19
Austin	0.10
Beaumont	0.00
Big Spring	0.17
Brownsville	0.08
Chillicothe-Vernon	0.12
Daingerfield	0.08
Dallas	0.13
El Paso	0.27
Fort Stockton	0.26
Houston	0.00
Lake Somerville (College Station)	0.09
Laredo	0.24
Lubbock	0.19
Nacogdoches	0.00
San Antonio	0.10
San Angelo	0.25
Temple	0.09

In general, the new formula suggests that it will be impractical to install ET beds in areas with a net evaporation of less than 0.1 inches, including most of east and southeast Texas. For example, an 3-bedroom home sited in an area with a net evaporation of 0.1 inches would need a 5,600 square foot ET bed.

In addition to the sizing criteria, the TWC has also developed additional advice about constructing and maintaining ET beds. The TWC now recommends that sandy loams be used to backfill ET beds in place of sands, because they produce more capillary suction. During dry months (typically June to October), the TWC recommends that one bed be opened and the other bed be closed and that flows should be rotated between beds on a monthly basis so that one bed is always dry and rested. During wet weather, both beds should be opened to maximize evapotranspiration.

**NOTE:** Hart is a professional engineer and provides technical support for the TWC on many issues pertaining to on-site wastewater treatment and disposal. He can be reached at: Texas Water Commission, On-Site Wastewater Team, P.O. Box 13087, Capitol Station, Austin, TX 78711-3087. The phone number is (512) 463-7972.

### ***LCRA Receives Grant to Study On-Site Systems in Colorado, Lavaca Coastal Basins***

*By Burt Carter  
Lower Colorado River Authority*

The Lower Colorado River Authority (LCRA) has received a grant from the Texas Water Commission (TWC) to identify clustered sites of on-site wastewater treatment and disposal facilities in the Colorado and Lavaca coastal basins that may be failing.

Sites that will be included in the study include parts of Calhoun, Jackson, Matagorda, and Wharton counties. The goal of the project is to identify, inventory, prioritize, and map septic tanks and other on-site systems that may be "pollution prone." In particular, the project focus will be on areas with known failures or illegal discharges from on-site systems and regions that anticipate increased population growth will also be targeted. Areas with tight soils, shallow groundwater tables, high rainfall rates and minimal slopes will also be studied. The study involves both assembling



*Part of this project involves identifying obvious areas where septic tank effluents are not being properly discharged. For example, this home (above) discharges septic wastes through an exposed pipe which may lead to runoff pollution.*

and analyzing existing information and gathering new data on many densely populated areas (mobile home parks and subdivisions) that rely on on-site systems.

The study will be led by Burt Carter, who supervises septic tank operations for LCRA. Carter says that many Texas counties do a good job of inspecting new on-site systems, but many times there is little information on the performance of systems that have been in place for many years. Often times, these older systems may be failing.

Ultimately, information from the study will be used to identify areas which may qualify for funding under Section 319 of the Clean Water Act and to provide more information to guide watershed management programs.

For details, call Carter at 1 (800) 776-5272. In Austin, the phone number is 473-3200, extension 2710.

### ***Bastrop County Bans New Septic Tanks Along Alluvial Aquifer Recharge Zone***

In a move to protect water quality, Bastrop County has imposed a moratorium that limits the construction of new septic tanks along lands that lie over an aquifer recharge zone.

The moratorium, which was announced in March, covers a 3-mile long section on Highway 71, which is along the recharge zone of the Colorado River's alluvial aquifer.

County Health and Sanitation Director L.C. Smith says the action still may allow some residential septic tanks to be considered on a "case by case" basis. He said the intent of the moratorium was to limit large commercial operations that may want to utilize septic tanks that were inadequately sized to handle the wastes they would generate.

"We have a number of septic tanks throughout the County that function effectively, but we have to be especially careful in lands over the recharge zone," he said. "We need to be as careful as possible to prevent pollution and maintain the aquifer's quality."

The moratorium may only be needed for a limited time. The City of Bastrop is considering annexing this same area in the near future. If they do, they hope to extend sewer lines into the region that would eliminate the need for on-site systems.

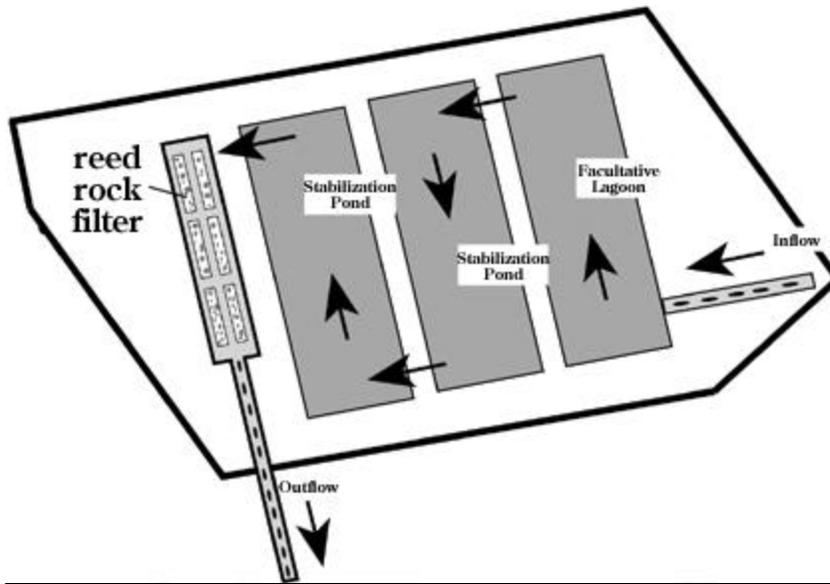
### ***Whitney Uses Reed Rock Filter to Effectively Treat Domestic Wastes: Technology Could be Useful for Small Flows***

*By Robert Kyle  
Kyle Engineering  
Dallas, TX*

Recently, there's been a lot of interest expressed in using reed-rock filters to treat household wastes on-site, but there haven't been many examples that people can observe of how the systems actually work.

Now, there may be such an example of how a small Texas town is employing this technology to treat its wastewater.

In 1991, Whitney began construction of a reed-rock filter system to treat municipal wastes. The system was the first of its type to be approved by the Texas Water Commission. It went on-line in July 1992.



In the system, as much as 400,000 gallons of raw sewage per day is first dumped into three huge (850 x 128-foot) lagoons behind a city park. In the lagoons, some of the suspended solids and nutrients are removed by microorganisms that naturally live in the water. Later, the effluents flow by gravity through a

*Effluents are treated in a reed rock filter after flowing through a series of lagoons.*

series of six rock filters that are planted with a reedy plant called thalia. Beneath the rock filters are more naturally occurring microbes that provide additional treatment. The microbes break down the nutrients and pollutants into relatively harmless by-products.

It will take about 62 days for the wastewater to flow through all the lagoons and rock filters before it's ready to be discharged.

The system is effective at reducing levels of biochemical oxygen demand (BOD) and total suspended solids (TSS). For example, raw wastewater at the site averages 200 parts per million of TSS and BOD. After it leaves the rock filters, BOD and TSS levels are slashed to less than 5 ppm.

One of the major gains that has been accomplished by utilizing the rock filters is that operating costs have been reduced considerably. For example, electricity costs have been slashed from \$250 per month to less than \$50. That's because the system uses gravity -- not pumps -- to let the water flow from one stage to another.

Another benefit of the system is that odors are virtually eliminated. Whitney officials noted that people hardly recognize the plant is nearby.

Two minor problems are associated with the system. First, the systems are land intensive. For example, the Whitney plant requires 15 acres to treat 400,000 gpd (another 12 acres were needed to build a berm around the lagoons because the site is in a floodplain). In contrast, the City of Fort Worth treats 120 million gpd on a 200 acre site. Secondly, Whitney officials are considering stocking the lagoons with algae-eating grass carp to control nuisance water weeds and other vegetation in the lagoons.

These systems can potentially be used on a much smaller scale and may be practical to treat small flows of domestic wastewater from individual homes with septic tanks, mobile home parks, and remote resorts.