Texas On-Site Insights
Information about On-Site Wastewater Treatment Systems in Texas

Volume 5, Number 1, March 1996

1996 Annual On-Site Conference is March 10-12 in College Station

Make plans now to attend the 1996 Conference of the Texas On-Site Wastewater Treatment Research Council March 10-12 in College Station.

The conference, titled "The Ground Floor: A New Beginning" features many hands-on workshops and activities.

"We feel this year's conference addresses many of the needs of professionals in the on-site industry in Texas," said Council chairman Bill Harris. "We've taken the results from the survey circulated at last year's conference and looked carefully at the results to see what kind of information regulators, installers, designers, and others dealing with on-site wastewater really want and we've tried to incorporate that into the conference agenda. In particular, I think participants will be especially pleased with the hands-on workshops dealing with soils, and system selection, installation and maintenance. We're also delighted to give those attending the conference an opportunity to visit the new training center at Texas A&M University's Riverside Campus that the Council helped fund."

The conference begins on Sunday, March 10. Registration and exhibit move-ins are scheduled from Noon - 5 PM. A reception will be held from 5 to 7:30 PM.

Highlights of the program for Monday, March 11, include a general session from 8:50 to 9:50 AM featuring representatives from the U.S. Environmental Protection Agency and the Texas Natural Resource Conservation Commission. Concurrent sessions on on-site wastewater treatment and disposal systems, and operations, maintenance, and sampling of systems run from 10:20 to 11:50 AM. Concurrent sessions continue Monday afternoon. Legal issues and small business needs are the themes of sessions running from 1:10 to 2:40 PM. Concurrent sessions covering failed systems, pumps and controls, and a hands-on workshop on system sizing, selection and maintenance run from 3:10 to 4:40 PM.

The program for Tuesday, March 12, features a series of rotating, concurrent sessions. These sessions are scheduled for 8 to 9:50 AM, 10:20 to 11:50 AM, 1 to 2:50 PM, and 3:10 to 4:40 PM. Session topics will include soils training, site evaluation, failed systems, pumps and controls, and round table discussions. A highlight of Tuesday's program will include guided tours of the new On-Site Wastewater Treatment Training Center at the

Texas A&M University Riverside Campus near Bryan that was recently completed and funded in part by the Council.

The fee is $30 for registrations received through February 23 and $60 afterwards. Registration fees should be mailed to: Mary Garrett and Associates, 400 Mann, Suite 909, Corpus Christi, TX 78401. Garrett's phone number is at (512) 888-5400.

The conference meeting site is the College Station Hilton. It is located at 801 University Drive East, College Station, TX 77840. The phone number for Hilton reservations is (409) 693-7500.

ANRA Studies Effect of On-Site Wastewater Systems on Lake Sam Rayburn

The Angelina and Neches River Authority (ANRA) has begun a comprehensive study to examine water and wastewater issues surrounding Lake Sam Rayburn. The lake covers an area in East Texas that includes Nacogdoches, Angelina, Jasper, San Augustine and Sabine counties. ANRA officials estimate there are roughly 130 subdivisions near the lake that may contain up to 3,000 on-site systems.

Doug Dowler of ANRA stands beside this on-site wastewater system near Lake Sam Rayburn.

The study, which began in October 1995, is being led by ANRA water planner Doug Dowler. The goal is to review and analyze water supply and wastewater issues within the control zone of the lake. The study involves a preliminary evaluation to identify areas that may have water quality concerns. This includes developing databases, maps, and geographic information on licensed on-site wastewater treatment systems, permitted treatment sites, property owners, and natural resources including soils, aquifers, creeks, streams, and slopes. Information ANRA hopes to obtain includes details on individual subdivisions, the year on-site wastewater systems were installed, the sites of individual septic tanks and drainfields, and the sites of individual homes and the number of bathrooms and bedrooms in each home. Data on systems designs will be compared to current TNRCC criteria for the design of on-site systems.

"We think this study will be comprehensive enough in nature that we will be able to identity water and wastewater concerns in and around Sam Rayburn Reservoir," Dowler said. "We hope to follow- up on instances where there may be inadequate systems or no system at all. If these cases occur and are having an effect on water quality, we want to help find solutions to the problem."

Throughout the process, public meetings will be held with local citizens to gather their input and answer questions. Other sources such as database searches, surveys, and on-site inspections will be utilized. Preliminary water quality sampling was conducted on Lake Sam Rayburn in December. ANRA staff went on the lake in small boats to gather water quality data from many sites. The data led to the selection of 11 sampling sites on the lake. These sites will be monitored for the next nine months for fecal coliform bacteria and other parameters.

ANRA officials say results of the study will be used to assess water issues around the lake. Eventually, they hope to develop feasible and cost- effective alternatives to on- site wastewater treatment systems now being utilized. Alternatives for water supply will also be addressed. The study will identify potential sources of funding to implement new wastewater treatment technologies and drinking water sources.

For details, contact Dowler at ANRA at (409) 632-7795.

Trinity River Authority Report Assesses Site-Specific Use of Constructed Wetlands for On-site Wastewater Treatment

The Trinity River Authority (TRA) has published a report that evaluates the use of constructed wetlands for on-site wastewater treatment. The report, *Feasibility of Constructed Wetlands in the Trinity River Watershed*, was published in July 1995. Principal authors of the study include Richard Browning and Sam Scott of the TRA, Kent Adair and Ken Awtrey of Pineywoods Resource Conservation and Development, Inc., (RC&D) in Nacogdoches; Febe Ortiz of the Southeast RC&D in Kountze, Dan Schellenberg of Second Nature Systems in Kennard; P.R. Blackwell of the Tucker Center at Stephen F. Austin State University, and Gene Lindemann and Harrell Green of the U.S. Department of Agriculture Natural Resources Conservation Service (USDA/ NRCS) in Temple.

The report was developed as part of TRA's overall effort in the Texas Clean Rivers Program. The report describes the use of a model that can help determine the feasibility of using on-site wastewater treatment systems, an overview of site factors that determine system costs; and a description of ecological areas of the Trinity River watershed. Model systems were developed for each ecosystem in the watershed, including coastal marshes. Appendixes to the report contain information on operating wetlands in the TRA service area, an annotated bibliography, current Texas regulations and design criteria, and detailed interpretations of statistical data.

Browning says this report is important because it presents a systematic approach that can be used to determine if constructed wetlands may be the appropriate technology to treat

wastes in a specific area. The model presented in the report can be used to determine the feasibility of these systems at specific East Texas sites and in various regions of Texas. For details, contact Browning at TRA at (817) 467-4343.

New Paper Describes "Green" On-Site Wastewater Treatment

A position paper dealing with small-scale, on-site wastewater treatment systems has been published by an Austin consultant. David Venhuizen published the report, titled *Green Wastewater Management: On-Site/ Small Scale Wastewater Management for Environmentally Sensitive Watersheds*. The report describes the fate of water and nutrients discharged to on-site systems, nitrogen utilization, and the use of denitrifying sand filters, gravel marsh treatment systems, and drip irrigation. The report provides advice on installation of drip irrigation fields, design and installation costs, permitting, and operations and maintenance. Venhuizen says the report is useful for environmentally sensitive areas like Barton Springs near Austin, where wastewater must be treated to a high quality level. For details, call Venhuizen at (512) 707-2397.

Remediating Failed Septic Tanks Near Lake Livingston is Focus of Sam Houston State University Research

Unfortunately, it's not uncommon to see septic tanks and drainfields failing near the shoreline of Lake Livingston and many other Texas lakes. Some experts suggest that half these systems fail. The problems can usually be linked to a few recurring causes -- lots that are too small, clogging of drainfields, and heavy rains. When these systems need to replaced, it's often expensive for homeowners.

In this photo, an existing septic tank and drainfield is being replaced by an aerobic treatment unit. Variations of aerobic units can provide better treatment, especially in sites like this on small lots.

Terry Hoage, a researcher in the Biology Department at Sam Houston State University (SHSU), is developing site-specific methods to retrofit existing septic tanks and convert them to aerobic treatment units. Much of the work centers on failing systems near Lake Livingston and is done in cooperation with Mark Waters and Richard Gerard of the Trinity River Authority (TRA) and Paulene Johnson, a consultant with Septic Hydro-Tec in Goodrich.

Cleaning Wastewater to Reduce Solids Buildup

Hoage says the ultimate solution is to provide better treatment to reduce the solids content of these wastes. In general, Hoage's efforts consist of the following steps. First, existing drainfield lines are flushed using bacterial digestion and the absorption field is restored. Then, an aeration unit is placed in the front chamber of the septic tanks to improve primary treatment. A modified clarifier digests suspended solids and a filter removes them from the effluent. Often, the designs involve treatment with sand filters. Sometimes, the treated wastewater is used for above-ground or subsurface irrigation, or to keep home foundations moist to prevent cracking and settling.

Using Aeration in Laboratory Studies

In 1992, SHSU entered into a cooperative agreement with TRA to investigate failing on-site systems in the Lake Livingston project. An early project involved setting up a system with two, 500-gallon tanks that processed 300 gallons of wastewater a day anaerobically. This system was monitored for 14 weeks and tested for biochemical oxygen demand (BOD), total suspended solids (TSS), pH, dissolved oxygen, and fecal coliform bacteria. Soon after, an aeration unit was placed in the first tank and water quality samples were taken for 10 weeks. Results show that BOD and TSS levels were cut in half and fecal coliform counts were reduced by 90%. In a laboratory study, Hoage studied the performance of a 500-gallon tank with a baffle to separate a third of the wastes. An aerator was placed in front of the baffle and 300 gallons of raw wastewater were pumped into the tank daily. Effluents were sent into a 30-square feet sand filter. Results show that BOD, TSS, and fecal coliform levels were reduced by more than 85%.

Remediating Failing Systems

So far, Hoage and Johnson have retrofitted more than 30 sites at individual homes where septic tanks were failing. In a system in the Texas Landing subdivision, the absorption area was clogged with solid wastes. Field lines were flushed and restored using bacterial digestion. An aerator was placed in the first of two septic tanks, and a modified clarifier and filter were installed to retain suspended solids. The second septic tank was fitted with a submersible pump that lifts wastewater to a holding tank and regulates flows into a sand filter used for landscape irrigation. Effluents from the sand filter are routed into the cleaned field lines. This system has been operating for more than two years with no malfunctions.

Hoage has also fixed other failing systems. In one case, he cleaned clogged field lines and installed a new self-cleaning, underground, drip irrigation system on undersized lots. To fix a malfunctioning system on clay soils that was causing severe foundation problems, Hoage first removed solids that were obstructing field lines and placed an aerator in front of some existing septic tanks. Remaining tanks were converted to clarifiers and pump tanks to provide water to emitters placed around the house so that a constant moisture level could be maintained. In another study, Hoage was faced with fixing a system near a lakefront with a small drainfield area that restricted the use of field lines. Four tanks were cleaned and the first tank was converted to an aeration chamber with a clarifier filter. The second tank was converted to a pump tank and the remaining tanks were used as back-ups to hold excess flows. Effluent flows from the pump tanks to

an above-ground sand filter that was landscaped to look like a flower bed. Additional field lines were placed in the 850-square-foot front yard.

Hoage reports that all these systems are now performing well, and that levels of BOD and TSS have been substantially reduced. He says these renovations have been performed at a much lower cost than it would take to replace an existing septic tank with a new system.

Note: For details, contact Hoage at (409) 294-1549 or BIO_TRH@SHSU.EDU

High Plains On-Site Wastewater Issues Include Dealing with Wide Open Spaces, Cesspools

Officials from the Lubbock Region of the TNRCC and the Lubbock City County Health Department discuss the installation of this leaching chamber. Ric Jensen of TWRI has his back to the camera and is wearing a blue sweater. Amy Sanchez of the TNRCC Lubbock office is at the far left.

Covering wide open spaces on Texas' High Plains and dealing with an old technology are two of the major challenges facing on-site wastewater regulators in Lubbock. The Texas Natural Resource Conservation Comission (TNRCC) Regional Office in Lubbock covers more than 10,000 square miles, but only two professionals are assigned to on-site wastewater issues in the region. This makes it hard to adequately cover such a large territory. The TNRCC works with other regulatory agencies in the region. The Lubbock City-County Health Department (LCCHD) administers the on-site wastewater program in the City of Lubbock, and the South Plains Health District regulates on-site systems in Terry and Yoakum counties.

"We estimate that there are 40,000 to 50,000 rural homes in the region -- nearly all of which rely on on-site wastewater systems," says Amy Sanchez who heads the TNRCC program.

Inspecting On-Site Wastewater Systems

The Texas Department of Health began inspecting systems in the region in 1989. The LCCHD began permitting on-site wastewater systems in the 1960s and was one of the first agencies in Texas to do so. Together, they now inspect about 500 permitted systems per year.

Still, many systems are not permitted. "If we find an unpermitted system that has already been installed, we can have it dug up, reinspected by a licensed installer, and reinstalled," Sanchez says, "and fines can also be levied."

This photo shows piles of dirt that were excavated to install on on-site wastewater system.

Many times, mortgage companies will contact TNRCC when properties are sold. "They want an environmental assessment and a copy of the original permit that was issued," Sanchez says. "What they're after is a guarantee that some type of legal system was installed properly on the property at one time."

If a system is unpermitted, TNRCC and LCCHD personnel will go out to a site and dig down to the septic tank to make sure it's not a cesspool and to certify that sewage is not surfacing. Cesspools, which are 6- to 8-foot diameter holes in the ground with a lid over the top, are common in the region and have been used for more than a quarter century. They often work well because depths to groundwater are great and average water wells extend 100 to 170-feet deep. Still, cesspools are illegal under current TNRCC regulations because they can provide a direct conduit that may allow wastewater to contaminate groundwater. "If we find a cesspool, we notify the homeowner that this system doesn't comply with state regulations and needs to be replaced with a properly designed and installed system or needs to be closed," Sanchez says. "Usually, homeowners are eager to work with us. If not, we can follow up when we get more complaints."

Amy Sanchez and Ric Jensen work to open this inpection port on a newly installed septic tank.

Both TNRCC and the LCCHD work with local contractors to observe new homes that are being built. Many of the homes in Lubbock's outlying areas are built with individual drinking water wells and on-site wastewater systems. Extra care is taken to make sure that areas for on-site wastewater treatment and disposal are located sufficiently far enough away from drinking water wells and wellhead areas.

Soils and Climate Help On-Site Systems Work Well

Fortunately, soils and climate conditions are generally favorable to allow on-site wastewater systems to function properly. Most soils are fine sandy loams and silty clays that work well with many types of systems. Because there isn't much rain and summer temperatures are often high, most wastewater evaporates through the system. "Many TNRCC rules governing the sizing of systems may be overkill for this region," says Mark Rich of LCCHD. "We have almost ideal conditions for on-site systems to function properly and evaporation rates are high. The rules provide extra protection for the environment, but that costs homeowners." One feature of the region's climate that may hamper on-site system performance is cold winter weather. As a result, typical systems in the region are installed at depths of 31 to 48 inches so that soils can provide greater insulation.

Currently, 1-acre lot sizes for septic tanks and drainfields are required by TNRCC for new standard systems, but the County is working with developers to design system separation requirements that work on small lots. Many leaching chamber systems are now being installed that work well on only half or two-thirds of an acre.

Like many Texas cities, Lubbock is now working to reduce the number of on-site wastewater systems within its city limits. A city ordinance states that residents cannot use an on-site system if a sewer main is located within 100-feet of their property. When these situations occur, the City requires that these systems be backfilled to reduce potential threats to groundwater quality and works with homeowners to help them hook up to the city sewer.

Note: For more information, contact Sanchez at (806) 796-7092 or Rich at (806) 767-2905.

This photo shows a leaching chamber being installed. Leaching chambers are attractive in many areas of Texas because the reduce the amount of land that needs to be dedicated for a drainfield.

Unincorporated Areas, Mix of Regulations, Pose Challenges

By Ric Jensen
Editor, "Texas On-Site Insights"

Sometimes, it's easy for something as seemingly simple as on-site wastewater issues to become complicated and controversial. If you need an example, just ask Mike Loving, Director of the San Angelo-Tom Green County Health Department.

Loving's job is a big one. Two county sanitarians on his staff manage the county's on-site wastewater program which includes systems installed in limestone rocks near Cristoval and unincorporated areas like Grape Creek. The department's city sanitarians regulate

undersized systems near Lake Nasworthy and on-site systems still operating within San Angelo's city limits.

Working with Unincorporated Communities

For more than a year, Loving has tried to sort out complaints about failing on-site systems and proposed new systems in the unincorporated Grape Creek area 10 miles north of San Angelo. The challenges stem mainly from confusion of neighborhood residents about which systems are legal and which are not. Many people are moving to Grape Creek and installing mobile homes and a mix of large and small conventional homes. "The problem is that many of these systems were installed over a period of many years when different regulations were in place," Loving says. "As a result, one system may be covered by a particular set of rules while a neighbor may be subject to other regulations."

Topper Rawlings and Mike Loving look at this septic tank that was installed to service a mobile home at Grape Creek.

For example, lots subdivided before 1983 required only 20,000 square feet (less than half an acre) to install an on-site wastewater system and a drinking water well. From 1983 to 1988, the lot size needed for a septic system and drinking water well increased to 35,000 square feet (two-thirds of an acre). In 1983, the distance that on-site wastewater drainfields must be separated from drinking water wells was increased from 100 to 150 feet.

Now that the TNRCC is going through the lengthy process of revising its rules, it's only natural that people are confused. "We're increasing our efforts to educate the public about what the rules are and what they have to do to live with them," Loving says. "If someone wants to know what type of system can legally be installed under the county and state regulations we can work with them."

Some of the problems are posed when people try to save money by installing an on-site wastewater system and a drinking water well on a small lot. "We have many low income residents in the area that cannot buy a large piece of property," Loving says. "What often happens is that they have to end up choosing between having an on-site wastewater system or a drinking water well -- the site is not large enough for both." Another problem occurs when large families move into a house that uses an on-site system designed for

only an individual or a couple. "Because the lots are small, there's little room for error. It's easy to overload a system and cause it to fail."

Other problems occur when neighbors try to use setback restrictions to prevent newcomers (usually in mobile homes) from moving in. Loving cited a case where a homeowner installed a drinking water well at the edge of his property to make it impossible for a potential neighbor to obtain a permit for and install a legal on-site system.

Loving says there are now efforts underway to provide public drinking water supplies to the area and to reduce the instances where people may be pumping groundwater that is at risk from contamination from failing on-site wastewater systems. Residents in Grape Creek that have a drinking water well to close to an on-site wastewater system are encouraged to hook up to the Concho Rural Water Corporation for drinking water. In many cases that means closing and sealing drinking water wells that individuals may have used for years.

This photo shows the amount of gravel that has to be imported to install on-site systems. The cost of gravel is a major factor that affects overall system expenses.

Other Issues Facing the County

"We have a number of on-site systems in the region near Lake Nasworthy and they basically function pretty well," Loving says. "Still, detailed inspections of the lakeshore show that there were potential problems including the use of undersized, one-chamber tanks, and small drainfields installed in clay soils or below water lines." Loving says many programs are in place to put many of those on-site wastewater systems on sewers within two years to protect lake water quality.

Topper Rawlings and Mike Loving check on the progress of this on-site system being installed near Grape Creek. In this case, a large amount of excavation was required.

At the small town of Cristoval in the southern end of the County, the main problem is finding enough suitable soil to make systems work. The area is mostly covered with easily fissured limestone. Evapotranspiration systems work well as long as a plastic or soil liner is also used.

County and city sanitarians work to conduct joint enforcement programs. Each month, roughly 20 systems are installed in the county and a few

systems are installed in the city limits. Loving says many of the new on-site systems are infiltrators and leaching chambers that reduce the overall amount of land needed for wastewater treatment. The infiltrators also reduce the need to haul rock and gravel and reduce the amount of backhoe work that needs to be done to prepare a site for system installation.

Note: For details, contact Loving at (915) 657-4214.

Topper Rawlings of the San Angelo -Tom Green City-County Health Dept. points out limestone formations that are commonly found in the southern part of county. Conventional septic tanks and drainfields don't work well in areas like this.

TEEX Offers On-Site Courses

Many short courses on on-site wastewater treatment are offered by the Texas Engineering Extension Service (TEEX). The basic installer course will be taught March 19-20 in Mesquite, April 2-3 in Fort Stockton, April 9-10 in San Antonio, and April 24-25 in Sugar Land. The designated representative and inspector course will be offered March 19-21 in Mesquite and April 24-26 in Sugar Land. For details on any of these courses, contact TEEX at (409) 845-6649.

Innovative STEP Program Helps Colonia Residents Replace Failing On-Site Systems

By Matt Hollon
Loomis and Associates, Inc.
Austin, TX

Residents of a Rio Grande Valley colonia are solving their own wastewater problems, thanks to a new program initiated by the Texas Natural Resource Conservation Commission (TNRCC). The Texas Small Towns Environment Program (Texas STEP) is a "self-help" program that directs technical assistance and resources to help communities design, develop, and construct water and wastewater solutions. It is designed to solve problems promptly while saving money.

In many small Texas towns and rural areas, residents are faced with inadequate wastewater treatment systems that may pose health risks. The problem is especially acute along the Texas-Mexico border where rapidly growing "colonias" have outpaced local governments' capacity to provide basic water and wastewater services. Colonia residents often rely on cesspools or undersized on-site wastewater systems or may even have no on-site systems at all. In many cases, traditional on-site solutions such as septic systems fail in colonias, due to unsuitable soils or improper design and installation. Other water problems in colonias involve lack of quality drinking water and poor drainage. Major state efforts have been initiated to resolve these problems. The Texas Water Development Board's (TWDB) Economically Distressed Areas Program (EDAP) has already

committed $423 million, but these funds may soon run out, and may only reach 75% of the roughly 360,000 colonia residents. As a result, alternative, cost-effective strategies are urgently needed.

A major part of this project involved burying existing septic tanks and excavating areas for a new collection and distribution system.

Even where residents agree that something must be done, major barriers often exist that make it difficult to provide adequate wastewater treatment. Low income communities often feel they cannot afford to pay for adequate facilities. The design and planning of water or wastewater systems is complex and intimidating for those not familiar with civil engineering and utility construction. Most communities feel they must resort to outside experts and financial aid to address these problems. They know public assistance is difficult and slow to obtain. Given these frustrations, many towns now want to help solve their own water problems. To help them, TNRCC developed Texas STEP.

Basic Principles Behind Texas STEP

With Texas STEP, communities learn they often have the knowledge, labor, and skills to develop their own solution. The process is closely guided by private engineering expertise and government assistance. By helping themselves, these communities cut costs, achieve faster results, control the selection of reliable technologies that meet their needs, and gain community self-reliance. STEP projects in other states have yielded remarkable results and savings of 64% less than conventionally designed and installed systems.

No single "solution" to water or wastewater needs is advanced by this program. STEP welcomes a full range of options, from construction of individual and community-scale wastewater systems to works connected to regional systems. The program seeks to use the best, most cost-effective system for the task. Texas STEP was modeled after a program originally developed by the Rensselaerville Institute (TRI), a non-profit, community development organization near Albany, NY.

The principles of STEP self-help projects are simple and straightforward:

1. **Community self-help.** Communities actively direct their projects and provide labor for facility construction. Not all communities can or will want to use self-help. STEP coordinators help judge if a community has the capacity and readiness to initiate a project. Towns must have widespread agreement that a problem exists and a resolve to fix it through self-help. A strong community leader is needed to guide the project. While some technical tasks may be beyond a town's abilities, many shortcomings are resolved by STEP on an individual basis. STEP is structured so communities always pay for a significant portion, if not all, of project costs.
2. **Government expertise and limited financial aid.** Local and state governments provide technical assistance and coordination and help communities discover resources they possess. Government funding does not bankroll the entire project. Some government funds may be provided for poor communities to put make needed systems affordable. Only communities which are willing to help pay for project costs become involved.
3. **Community control of engineering, design and materials procurement.** STEP project designs begin by asking "How much can the community afford?" This makes sense from many perspectives. When those benefiting from the system directly bear the project costs, technical solutions chosen are more likely to match true needs rather than be over-designed and over-expensive. Self-help communities recognize their financial limits and work with engineering firms which understand the goal is to use simple but effective technologies. Low-tech, low-maintenance solutions requiring greater labor inputs are preferable to technology and capital-intensive solutions, which may be costly to design, operate, and maintain. Creative arrangements can often be made to lower costs when local leaders and businessmen bargain for low-cost or free supplies and assistance.

STEP efforts will replace failing septic tanks with this new collection system.

Texas STEP is a collaborative effort from the start and is coordinated by George Freitag of TNRCC. State agencies such as TWDB, the Texas Department of Housing and Community Affairs, t and e Texas Department of Healh are tdeveloping pilot projects. Freitag's office offers overall coordination and support, yet most of the work is done at the local level with staff members of participating agencies working directly in involved communities. "TNRCC sees self-help as an option communities can use to cost-effectively solve water and wastewater problems," Freitag says.

Using Texas STEP to Help Arroyo Colorado Estates

One of the first uses of Texas STEP was to correct failing on-site systems in the Arroyo Colorado Estates (ACE) subdivision in the Lower Rio Grande Valley. ACE consists of roughly 190 houses and 800 residents and is sited near Harlingen. Septic drainfields often back up after heavy rains. As a result, residents are often temporarily unable to flush toilets or take showers. Undersized drainfields are common in the subdivision and are often as small as 50 x 80 feet, according to Ray Rodriguez of the Cameron County Health Department.

There are other complicating factors. Water does not percolate well through the clay soils and often ponds on the surface. Raw wastewater frequently surfaces in yards and flows into drainage ditches. Many septic tanks are inadequately sized and 500-gallon tanks used in many systems may be incapable of properly removing solids and greases, especially when used routinely by households with up to 10 residents. Drainfields clog often and system performance is reduced.

This site was plagued by the runoff of raw or poorly treated wastewater. In this photo, wastewater can be seen flowing into a ditch.

To make matters worse, the subdivision lies in a low spot, is poorly drained, and receives irrigation runoff from nearby agricultural fields. Runoff waters can sit in the colonia's ditches for days. As many as 20 systems in Arroyo Colorado Estates malfunctioned in 1995. Rodriguez says the Cameron County Health Department had to take court action to force owners to bring systems up to standards.

Because of these problems, ACE was targeted by the TWDB for connection to Harlingen's nearby centralized wastewater plant. The project was estimated to cost $1.2 million, a fraction of which would be paid by the community. While planning for this construction moved slowly forward, ACE residents became determined to solve their problem quickly and inexpensively. They contacted TRI, which had just entered Texas, and inquired about self-help prospects. TRI coordinated with the TNRCC to move ahead with a solution and Texas STEP took shape as this project evolved.

Each successful STEP project depends upon the efforts of a community leader or "sparkplug." Richard Ferguson served this role for ACE and devoted time and energy to direct the project. The community realized it possessed utility construction expertise in the form of two members who could operate heavy construction equipment and direct the installation process. Other residents provided materials procurement, surveying, and equipment maintenance.

ACE selected an engineering company, Loomis & Associates of Austin, that was willing and able to respond to the self-help component of the project. Loomis developed a system design and produced plan and profile sheets three weeks after residents completed a field survey. At the completion of the site survey, 98% of households formally pledged financial support. In earlier efforts to collect money, less than half 50% of ACE residents pledged such support.

The solution selected by ACE was a conventional gravity collection system that will be connected to the City of Harlingen. Ownership of the system will eventually be assumed by Harlingen, which worked with Loomis to ensure that the design and installation were according to its specifications. At first, there were concerns Harlingen may not be ready to accept effluents for three to five years, even if the collection system was completed. The community considered using an interim treatment system of a package plant or a constructed wastewater system. Negotiations resulted in a commitment by Harlingen to construct its portion of the line that would connect to the ACE line when work in subdivision would be finished. This avoided added costs of construction and operations of a wastewater treatment plant.

In November 1995, ACE began constructing the collection system. Early obstacles were overcome with the support of the TNRCC, TRI, and Loomis. The community rallied around the project, with 10 to 30 residents volunteering to work each weekend work was scheduled. To date, the project has completed approximately 14% of the goal of 15,000 feet of line work and is expected to finish this Spring.

Substantial Cost Savings

Texas STEP appears to be saving costs. ACE's portion of the construction is estimated to cost $150,000, substantially less than original "retail" cost estimates (this figure does not include Harlingen's portion of construction costs). TWDB has supported ACE and will likely reimburse the community for part of the project using EDAP funds. Time and energy required from public officials must be calculated into this overall cost. Loomis found its "limited" role of engineering design was not practical. The firm provided added work to ensure that the project proceed smoothly. Since most STEP projects will be "retrofits" into existing communities, planning, design and construction often have to circumvent irregularities and obstacles not seen in conventional projects.

Even with these difficulties, Texas STEP may offer more project for the money and allows the state to efficiently promote far more projects. It make sense to encourage folks who are willing to help themselves. Residents at ACE are proud of what they are doing. They're paying for much of the project themselves and are controlling costs.

Note: For more details, contact Freitag at (512) 239-6123; Ferguson at (210) 361-2748; or Hollon at (512) 327-1180.