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Small Flows

Park Showcases NODP Treatment, Disposal Alternatives

by Nancy Gover
Small Flows *Editor*

A regional park in north central West Virginia is serving as a test site and educational showcase for several wastewater treatment and disposal alternatives.

Dedicated August 30, the site at Chestnut Ridge Park, near Bruceton Mills, West Virginia, is one of seven sites nationwide participating in the National Onsite Demonstration Project (NODP).

The NODP is a three-year project funded by the U.S. Environmental Protection Agency (EPA) with technical assistance from the National Small Flows Clearinghouse (NSFC).

Representatives from several area organizations turned out to witness the dedication of the project site despite the 90-degree heat. Those attending included members of the Monongalia County and West Virginia departments of health, the Monongalia Board of Health, the Monongalia County Commission, the EPA, NSFC, park staff, and West Virginia University.

During the dedication, these individuals were given a firsthand look at some of the inherent problems in providing West Virginia's population with cost-effective wastewater treatment.

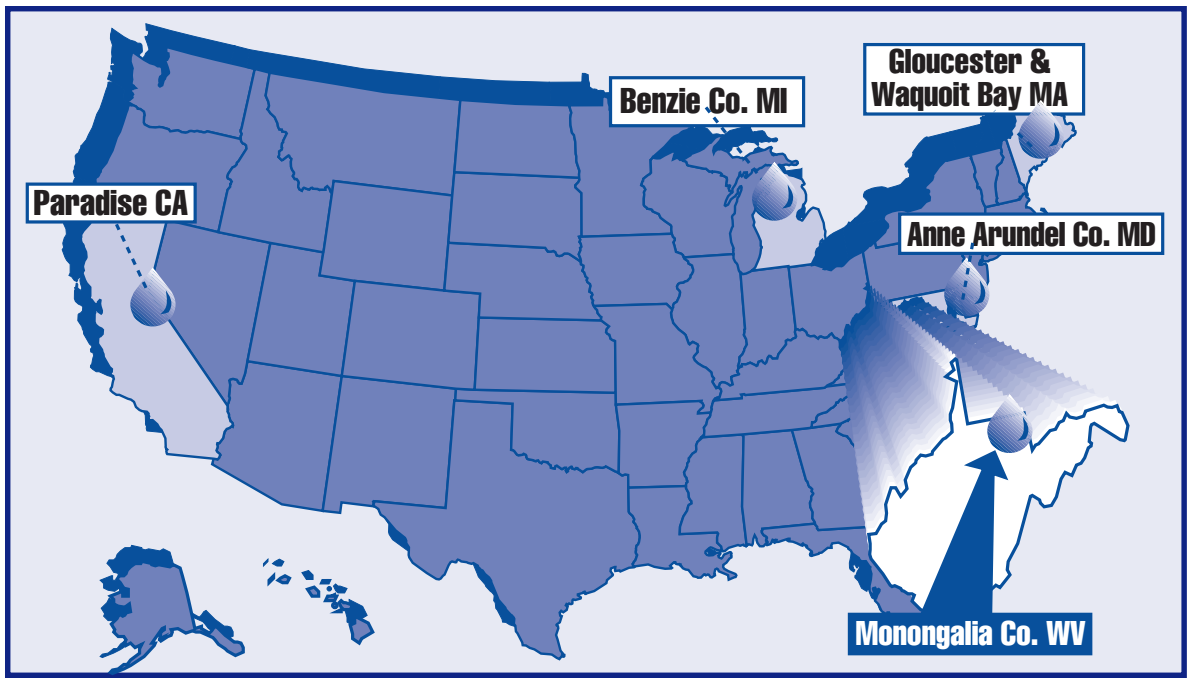
Much of West Virginia's rural population is served by septic systems, which perform adequately with the right soils and topography. However, according to Art Adams, R.S., director of environmental health for the Monongalia County Health Department, septic systems often malfunction in the area's characteristically thin soils, heavy clay, steep slopes, and seasonal high water tables.

Park Demonstration Systems

Treatment System	Disposal Method
Recirculating Sand Filter	Shallow Pressure-Dosed Trenches
Constructed Wetland	Contour Trench or Gravelless Trench
Home Aerobic Treatment Unit	Gravelless Trench
Septic Tank	Contour Trench
Septic Tank/Disc Filter	Drip Irrigation
Waterless Toilets	

He explains that many areas of West Virginia also have water quality constraints limiting the use of conventional septic systems. He says it was for these reasons that the health department proposed the park as a potential NODP site.

The EPA-funded project provides grants and other assistance for participating communities to identify, install, and monitor cost-effective technologies for areas not served by central sewers. The Monongalia County Health Department is coordinating the local project.



Interpretative Program

When it is completed next year, the Chestnut Ridge Park site will be the only one of the six national NODP sites to feature an educational exhibit, according to Cliff Livengood, R.S., sanitarian supervisor, who manages the project for the Monongalia County Health Department.

An interpretative program consisting of displays and signs will teach visitors about the systems being evaluated. Livengood explains that the park's location near a major highway—Interstate 68—and in proximity to other popular parks and recreation areas makes the site accessible to the general public, public health sanitarians, regulators, and others with an interest in learning more about

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Environmental Justice Focuses on Poor, Minorities

by Jeremy Canody
NSFC Staff Writer

As environmental justice issues continue to rise to the top of this country's agenda, innovative and alternative wastewater technologies are beginning to find their way into poor and minority communities.

Perhaps there has been no greater victory for minority environmental activists than the signing of Executive Order 12898 by President Clinton on February 11, 1994. By doing so, Clinton established environmental justice as a top priority on the national agenda.

In April 1995, the U.S. Environmental Protection Agency (EPA) established an environmental justice strategy, showing that it too is concerned with bringing justice to Americans who are disproportionately affected by environmental hazards.

EPA Administrator Carol Browner created the Environmental Justice Small Grants Program in June 1993 to provide assistance to community-based organizations that are searching for solutions to local environmental problems.

During the program's first full year, 1994, the agency awarded a total of $500,000 to 61 recipients. According to an August 1995 EPA press release, in the second year of the program EPA received 716 applications from groups interested in obtaining a portion of the $3 million available in federal assistance. In 1995, 174 community-based organizations, tribal governments, and academic institutions received grants of up to $20,000 each to address environmental justice issues and concerns in their communities.

In terms of wastewater, that meant certain minority communities that lack a safe drinking water supply and proper wastewater treatment would begin seeing federal action in the form of technical assistance, education, and community involvement, although very few applicants propose dealing specifically with water issues.

Included in President Clinton's executive order on environmental justice is a list of several pilot projects created in cooperation with the EPA to generate opportunities for underprivileged, mostly minority and tribal communities.

Water Project

One of the more successful EPA water projects initiated by the executive order is the 1994–95 Rural Community Assistance Program (RCAP)/EPA Environmental Justice Project sponsored by the EPA's Office of Water, in partnership with the Office of Environmental Justice.

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NATIONAL SMALL FLOWS CLEARINGHOUSE

Helping America's small communities meet their wastewater needs

Park Showcases NODP Treatment, Disposal Alternatives

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the treatment and disposal alternatives demonstrated there.

The Chestnut Ridge Park site also contains a range of environmental and site constraints that make it possible to demonstrate a wide range of technologies in a relatively small area, he explains. Five systems will be installed at the park, with others to be added as funding permits. Construction on these systems will be completed this fall, and monitoring will continue for another year.

Project Systems

The park office will be served by a recirculating sand filter that filters the effluent several times before it is pumped into shallow pressure-dosed trenches. These trenches, an alternative to the standard drainfield, are designed to enhance soil treatment of effluent by providing optimum exposure to soil microbes and vegetative root zone activity.

Wastewater from the park's shower facility will be treated in a septic tank followed by a special disk filter that traps solids. From there it will be pumped into a subsurface drip irrigation system, a series of shallow underground pipes that permit the effluent to enter the soil at a slow and controlled rate.

Wastewater from the park's dining hall is treated in a manmade marsh, known as a subsurface flow constructed wetland, before entering a shallow distribution trench.

The park ranger's residence is served by an underground home aerobic treatment unit that resembles a septic tank but includes several chambers and a mechanical aeration unit. The unit will treat the effluent "with air" (aerobically). From there, the effluent will flow into underground plastic "gravelless" chambers used in place of conventional gravel-lined trenches.

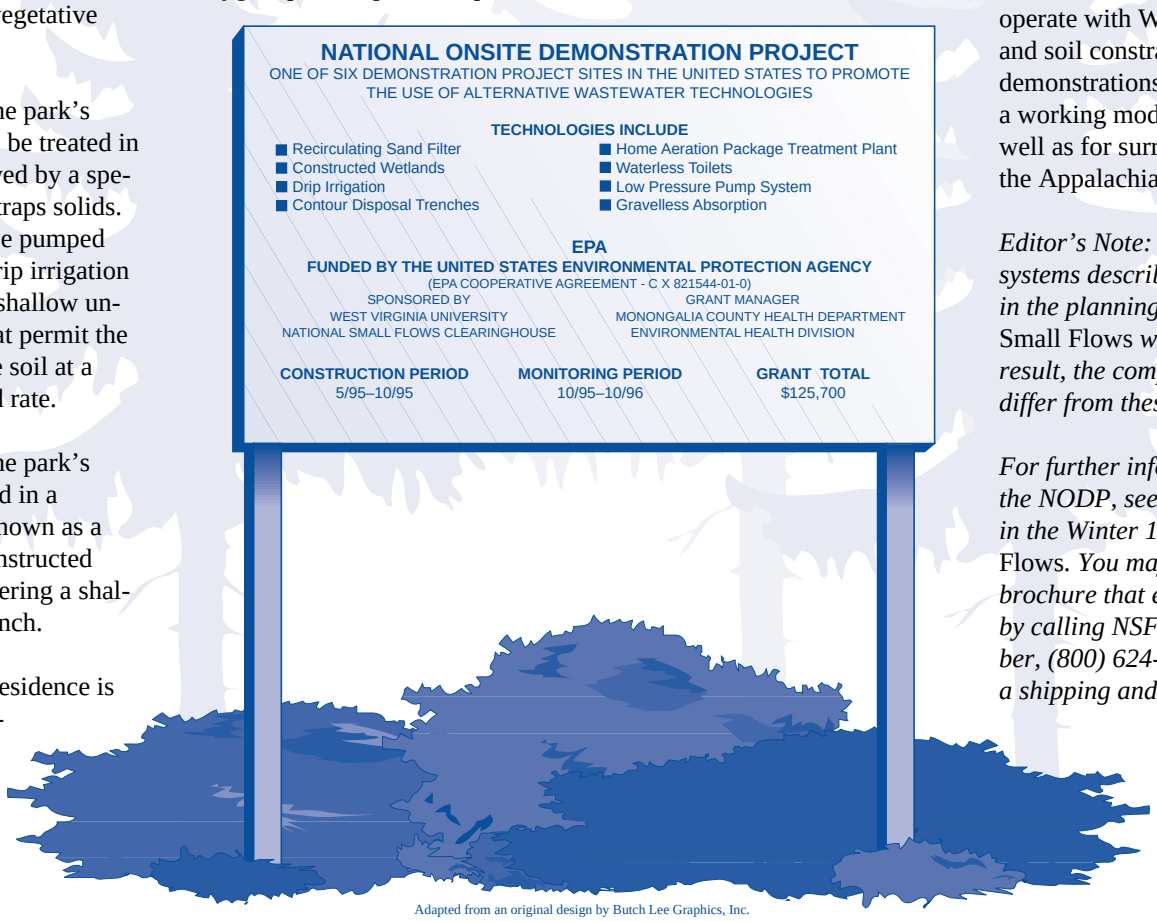
One of the park's visitor's cabins is equipped with a septic tank that drains to a contour disposal field, a shallow underground trench that follows the site's natural contours and is adapted for use on steep slopes. A waterless biological toilet will be demonstrated at another park site.

Monitoring

All the systems will be monitored for a variety of parameters, including biochemical oxygen demand, total suspended solids, total Kjedahl nitrogen, nitrate, dissolved oxygen, pH, temperature, phosphate, sodium absorption ratio, total and fecal coliform, and coliphage.

All sites will be equipped with monitoring wells and other equipment designed to measure their effectiveness. Samples will be taken from within each system's pretreatment unit, inside the soil absorption system, and from the surrounding soil's unsaturated and saturated zones.

Costs associated with the installation, operation, and maintenance of the project will also be carefully monitored. Patricia Miller, Ph.D., NODP technical coordinator, points out that cost is a crucial part of evaluating alternatives. She emphasizes that one of the NODP's goals is to discover the alternatives that are most efficient in terms of cost as well as performance.



Adapted from an original design by Butch Lee Graphics, Inc.

Demonstration Potential

Adams explains that although some of the methods showcased at Chestnut Ridge Park have been available for a number of years, many may be unfamiliar to area contractors, design engineers, regulatory officials, and installers who will now have an opportunity to see them in operation. He explains their use is not widespread, and, like many states, West Virginia law classifies them as "alternatives," which require special permits from the state before they are installed.

"Homeowners, students, and even tourists visiting the park can learn more about sewage treatment options," says Miller. She emphasizes that the systems demonstrated at Chestnut Ridge Park under the NODP make it the only park in the country with an interpretative program of this nature. "Because all the systems were selected and designed to operate with West Virginia's site and soil constraints, the park's demonstrations could well become a working model for the state as well as for surrounding areas of the Appalachians."

Editor's Note: Some of the systems described above were in the planning/design phase as Small Flows *went to press. As a result, the completed systems may differ from these descriptions.*

For further information about the NODP, see the related articles in the Winter 1995 issue of Small Flows. *You may also obtain a free brochure that explains the project by calling NSFC's toll-free number, (800) 624-8301. There will be a shipping and handling charge.*

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Environmental Justice Focuses on Poor, Minorities

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The EPA is working with RCAP to provide onsite technical assistance to 14 environmental justice projects in nine states and Puerto Rico. Of those 14 projects, eight are wastewater projects, five are drinking water, and one is a combined drinking water/wastewater project.

The overall goal of the RCAP project, which began in October 1994, is to provide access to essential water and wastewater services to rural communities characterized as low-income, predominantly minority populations, according to Tracy Weber, RCAP's Environmental Justice program specialist.

Weber said the project is the first year of a multi-year effort. The services being provided by RCAP include technical assistance, needs assessment, and training and education on the proper operation and maintenance of small water and wastewater systems, she added.

Weber further explained that many of the communities receiving technical assistance from RCAP do not have effective wastewater collection and treatment capabilities due to a lack of resources and the communities' isolation.

Communities such as the Hambrick Subdivision in Tunica County, Mississippi, have gone for years without an adequate wastewater disposal system. The 40 households that make up this Black community earn an average annual income well below $10,000, and 60 percent are at or below the poverty level.

Weber explained that some Hambrick residents discharge raw sewage directly into open ditches while others have completely nonfunctioning septic systems due to high water tables. The area is located within a flood-prone area in the northwest section of the state.

Weber said RCAP has been working with local officials, the federal Soil Conservation Service, and local utilities to find an affordable solution to Hambrick's wastewater disposal problems.

At one time, the River Bend Drainage District had planned to install wastewater collection lines and sewer taps to connect the 40 homes to an existing system nearby, but the project was abandoned, Weber explained.

Today, funding being provided by the RCAP/EPA Environmental Justice Project has allowed for a part-time technical assistance provider, assigned by RCAP, to work with local officials and residents to complete a design for an affordable wastewater facility.

Weber said the technical assistant is currently working with county engineers to see if the community can connect with a nearby sewer line. RCAP and local officials will do a feasibility study for placing an alternative lagoon-type system in the area if sewer lines are not available.

Colonias Projects

Other environmental justice efforts being made in wastewater include the installation of sewage disposal facilities in the predominantly Hispanic nieghborhoods, known as colonias, in Texas and New Mexico along the U.S./Mexico border.

Problems in these unincorporated "shanty town" neighborhoods are characterized by deteriorating substandard housing, inadequate plumbing and sewage disposal systems, and little or no access to clean water. Such conditions have the potential to present an immediate health threat to the colonias residents, especially the young and the old, who often come into direct contact with contaminated water.

Thanks to two $10 million grants from EPA Region 6, one in December 1992 and another in January 1995, New Mexico has already funded 13 wastewater treatment projects to serve the colonias in that state. The Colonias Wastewater Construction Grants Program being administered by the New Mexico Environment Department is progressing well as state officials work with the EPA to assure adequate planning, design, and construction of these facilities.

In Texas, the federal government has appropriated approximately $150 million since 1993, according to Velma Smith, an EPA Region 6 project officer. She said this assistance is part of the Texas Water Development Board's Colonia Wastewater Treatment Assistance Program and its Economically Distressed Areas Program. Approximately 65,000 colonia residents who have limited wastewater treatment and little or no access to safe drinking water will receive wastewater treatment service once the currently approved projects are complete.

Smith said while some projects are under construction, additional facility plans are in the making. It is anticipated that a number of grants will be awarded for innovative/alternative methods of wastewater treatment for some colonias in Texas as well.

Politics

Marty Halper, the senior science advisor with the EPA's Office of Environmental Justice, says education and federal assistance are and will continue to be the best measures to improve environmental justice issues such as insufficient water and wastewater conditions in minority areas.

According to *People of Color Environmental Groups*, a directory published by the Robert D. Bullard Environmental Justice Resource Center, since the late 1980s, minorities, including Black, Hispanic, Native American, and Asian groups, have become more involved in the environmental movement due to an increasing awareness of environmental problems found in those particular ethnic areas.

That directory further states that many of the minority communities in this country have fallen victim to hundreds of environmental hazards simply because of who they are and where they live.

Halper believes the way State Revolving Funds (SRFs) are established has a great deal to do with why minority and low-income community projects are being placed on the back burner. "Projects impacting the largest number of people are given higher priority, therefore, the system discriminates against the smaller, low-income and minority communities," he said.

Halper said that these minority communities receive little or no assistance of any kind because they are often seen as the paths of least resistance. "By the time the SRFs get around to these [minority/low-income] communities there is no federal money left."

He applauds efforts such as the president's executive order and the EPA's environmental justice strategy because they direct federal dollars and assistance to the areas most often ignored by SRFs.

For more information on environmental justice issues or grants, contact EPA's Environmental Justice Office at (202) 260-6357 or (800) 962-6215. For more information on the Environmental Justice pilot projects, contact the RCAP national headquarters at (703) 771-8636. A limited number of free copies of the People of Color Environmental Groups *are available. To order, call the Robert D. Bullard Environmental Resource Center at (810) 238-5651.*

"Projects impacting the largest number of people are given higher priority; therefore, the system discriminates against the smaller, low-income and minority communities,"
Marty Halper
Senior Science Advisor
EPA Office of
Environmental Justice

Wastewater Reclamation: A Growing Urban Trend

by Jeremy Canody
NSFC Staff Writer

Editor's Note: In this first installment in a new series on wastewater reclamation and reuse, Small Flows *examines the growing trend toward reclaiming and reusing wastewater in large cities. Such processes are not currently within reach of most small communities due to economies of scale: larger cities can more easily absorb the costs by spreading them over a larger population.*

Many of the factors that drive decisions to recycle wastewater are common to large and small communities alike—the growing scarcity of water, especially in arid areas such as the Desert Southwest, and the political and regulatory climate that determines how existing water resources will be allocated.

The purpose of this article is to give the reader an introductory look at how some communities have chosen to tackle these pressing problems. Given the rate at which the technology is evolving and water supplies are dwindling, wastewater reclamation and reuse may one day be an option that is within the reach of both large and small communities.

As many communities throughout the country approach the limits of their existing water supplies, the option of reusing reclaimed wastewater is becoming more and more attractive. From irrigating golf courses to making man-made snow, reclaimed wastewater is playing an important role in saving communities money while replenishing their ground and surface water supplies.

Origins and Development

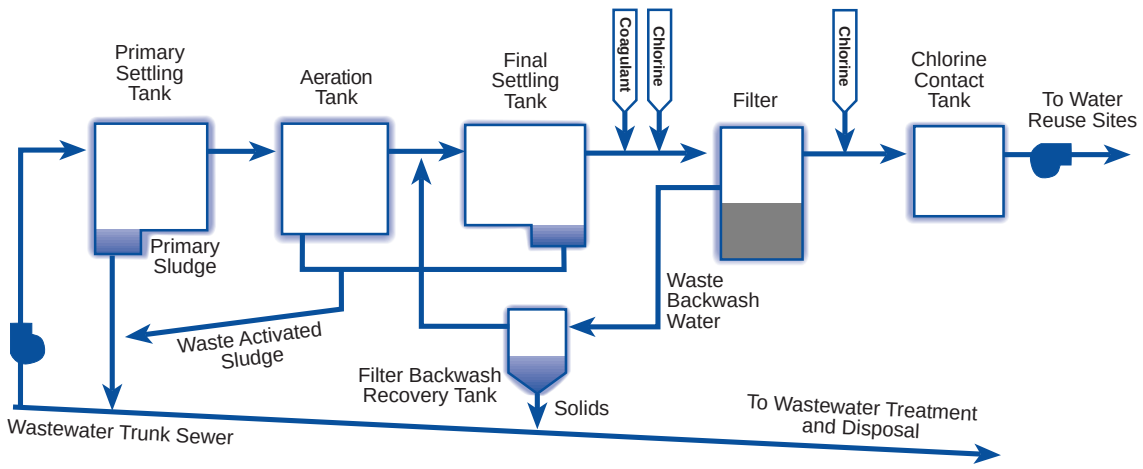
The practice of water reclamation is not new. In fact, various methods of planned reuse have been practiced in the U.S. since the early 1900s. Water reclamation for reuse became an attractive option to arid communities in the 1960s and 1970s, when those areas had to look to alternative methods for preserving a precious and quickly diminishing water supply during times of severe drought. State and local officials found a way to fill their aquifers and reservoirs from a source that was literally right in their backyards.

The exploration into planned wastewater reclamation as a primary method for restoring the diminishing water supply in the West first began to take hold in California. (California can't take all of the credit, however. Golf courses in arid states such as Florida, Texas, and Arizona, have been relying on the same methods for irrigating their greens since the 1960s and 1970s.)

In Clayton County, Georgia, and Occoquan, Virginia, treatment plants have been repurifying up to 30 million gallons of water per day since 1978 without any reported health problems. Today, efforts are underway to augment water for human consumption and water repurification (potable reuse) in many communities including Tampa, Florida, and San Diego, California.

Plans are under consideration in San Diego to augment flow to a surface water reservoir with reclaimed wastewater. If the project is completed, it will be one of the largest of its kind in the country. (See the related article on page 6.)

Typical Water Reclamation Plant Process for Nonpotable Urban Reuse



Drawing adapted from the EPA manual, *Guidelines for Water Reuse.*

Tempe, Arizona, has increased its total water supply by 25 percent by simply reusing its reclaimed wastewater.

But reclaimed wastewater reuse is not limited solely to urban and agricultural irrigation, although the majority of it is reused for those purposes.

Other uses for reclaimed wastewater include industrial cooling and process water, commercial washing, ornamental fountains and reflecting pools, concrete mixing, fire protection, and toilet and urinal flushing. Reclaimed wastewater is being used in habitat restoration efforts such as creating wetlands, stream augmentation (which helps maintain stream flow), and creating man-made bodies of water for recreational purposes.

What are the risks?

Pathogens and chemical contaminants found in untreated wastewater can present a potential for serious health risks—mostly via exposure to toxic chemicals or pathogens.

The pathogens generally found in raw wastewater can be classified into three broad groups: bacteria, viruses, and parasites. Contaminants found in untreated, raw wastewater are broadly classified as microorganisms or organic and inorganic compounds coming from various sources such as urban runoff, industrial waste, and household products.

The transmission of waterborne diseases via pathogens in contaminated water is usually manifested in outbreaks of disease such as amoebic dysentery, salmonellosis, and a variety of viral diseases such as hepatitis A and viral gastroenteritis.

These potentially harmful agents found in both surface water and raw wastewater can, when necessary, be completely eliminated after adequately advanced treatment and disinfection at a wastewater reclamation plant.

Use of reclaimed wastewater for nonpotable purposes is safe if concentrations of pathogenic bacteria, parasites, and viruses are adequately reduced; the chemical constituents are controlled; and public exposure is limited where necessary, according to James Crook, formerly with the California Department of Health Services and director of water reuse in the Boston, Massachusetts, office of Black and Veatch, a consulting engineering firm. (A typical treatment process used for producing effluent used for nonpotable urban reuse is shown in the diagram above.)

Since properly implemented nonpotable reuse for wastewater has not revealed any significant health risk, it generally has been accepted by public and private sectors in both large and small communities where there is a need for stretching available water resources, Crook indicated.

Indirect potable use of reclaimed wastewater in the U.S. is still a relatively new practice in many states, and there are critics who say it is virtually impossible to obtain a risk-free source of potable water from treated wastewater. On the other hand, for years communities such as Orange County, California (Water Factory 21), and El Paso, Texas, have been injecting recycled wastewater into underground aquifers that provide their municipal drinking water supplies.

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Walter Bond, an environmental microbiologist with the Centers for Disease Control and Prevention (CDC), says he is a firm believer that this country's drinking water supply is among the best in the world. Bond says the reuse of reclaimed wastewater appears to be relatively safe, but stressed that the wastewater must be treated correctly and consistently.

Many microbiologists are critical of any kind of reuse with treated wastewater since disinfection may not always kill all harmful parasites, such as *cryptosporidium*.

However, Bond pointed out that a 1993 outbreak of cryptosporidiosis in Milwaukee, occurred due to a problem with filtration of surface water, rather that the reuse of treated wastewater. That outbreak was responsible for more than 400,000 illnesses and more than 100 deaths.

"Low levels of *cryptosporidium* are present in many drinking systems nationwide." Bond said about the parasite that is thought to be present in 65 percent of all surface waters in the country. It is critical to have proper pretreatment of such drinking water sources, as soon as possible, through the latest technological methods like ozonation and microfiltration, he added.

Treatment

At present, long-term health effects of using highly treated wastewater for direct potable purposes are not completely understood or fail-safe. Yet, today's advanced wastewater treatment technologies are capable of producing water that meets drinking water standards.

"Employing the proper wastewater treatment processes prior to reuse is very important," Crook said, adding that some communities are incorporating advanced treatment methods such as activated carbon adsorption, reverse osmosis, and membrane processes at their water reclamation plants.

The microfiltration process uses polypropylene membranes formed into tiny pores that are capable of removing 99 percent or more of suspended and colloidal solids, bacteria, and virtually all parasites, when forced through at a low pressure. Reverse osmosis treatment (see definition at right) further complements the water repurification process by removing any compounds and impurities that may have passed through the pretreatment process.

Crook said the latest filtration technology now available to wastewater recycling plants is fairly easy to retrofit into an existing treatment facility and relatively affordable to install. "We have the technology to produce a high quality water," he said.

To assure the reclaimed water is safe for intended uses, Crook said. treatment effectiveness and reliability are among the top concerns in the scientific community, while the public's concern is focused on cost as well as safety. "That's because some uncertainty remains concerning potable reuse. Water short areas should first evaluate nonpotable reuse options and only embark on potable reuse projects when a better quality source is unavailable," he said.

Recharging the Future

Potential uses for reclaimed wastewater will continue to grow as the demand for water increases in the U.S., where the population is expected to reach 275 million by the year 2000. WEF points out in its W*ater Reuse Manual of Practice* that population growth is likely to be 50 percent higher in the western and southern "sunbelt" regions of the country where water shortages already exist.

This outlook, in addition to the fact that the availability of usable water resources has declined and threats of groundwater contamination have increased, leaves our freshwater resources for the future somewhat limited. It is clear that water reclamation and reuse, if incorporated as an integral component of natural resources management planning, can play an important role in helping to meet our wastewater needs in the future.

For more information on wastewater reuse, order the U.S. EPA manual, Guidelines for Water Reuse. *It is available free from the NSFC. Call (800) 624-8301 and order item #WWBKDM72. A shipping and handling charge applies.*

To order WEF's Water Reuse Manual of Practice, *call (800) 666-0206. The manual is $30.00 for members, $40.00 for nonmembers. Add $4.50 for shipping and handling.*

Reclamation and Reuse Terms

Avanced Treatment
The level of treatment required beyond the conventional secondary stage to remove constituents of concern. These may include nutrients, toxic compounds, as well as organic material and suspended solids. Processes used in advanced treatment include chemical coagulation, flocculation and sedimentation, activated carbon, ion exchange, reverse osmosis, and microfiltration.

Direct Reuse
The use of reclaimed wastewater that has been transported from a wastewater reclamation plant to the water reuse site without intervening discharge into a natural body of water. It includes such uses as agricultural and landscape irrigation.

Groundwater Recharge
The introduction of reclaimed wastewater into underground aquifers. This may be used to replenish the water supply for potable or nonpotable uses, prevention of salt water intrusion, subsidence control, and for storage purposes.

Indirect Potable Reuse
The potable reuse by incorporation of reclaimed wastewater into a raw water supply, allowing mixing and assimilation by discharge into a groundwater aquifer or surface water reservoir used to supply drinking water.

Indirect Reuse
Use of wastewater reclaimed indirectly by passing it through a natural body of water, or use of groundwater that has been recharged with reclaimed wastewater.

Ion Exchange
A unit process in which ions of a given species are displaced from an insoluble exchange material by ions of a different species in solution. For example, to remove sulfates and nitrates in repurified water, sodium chloride can be placed in an ion exchanger to extract the nitrate and sulfate ions and replace them with sodium chloride.

Nonpotable Water Reuse
The use of reclaimed water for other than human consumption. Typical nonpotable uses include agricultural irrigation, groundwater recharge, urban irrigation (lawns, highway medians, parks, golf courses and other landscapes) and flushing toilets and urinals.

Primary Treatment
The first step in wastewater treatment in which a portion of the suspended solids and organic matter is removed by physical processes, such as sedimentation (settling) or screening, and skimming floatable solids (floatation).

Reverse Osmosis
A treatment for removing dissolved minerals, toxic compounds, and other impurities from water. The treatment involves pumping water through a membrane that physically and electrostatically removes bacteriological contaminants and all but the smallest molecular compounds.

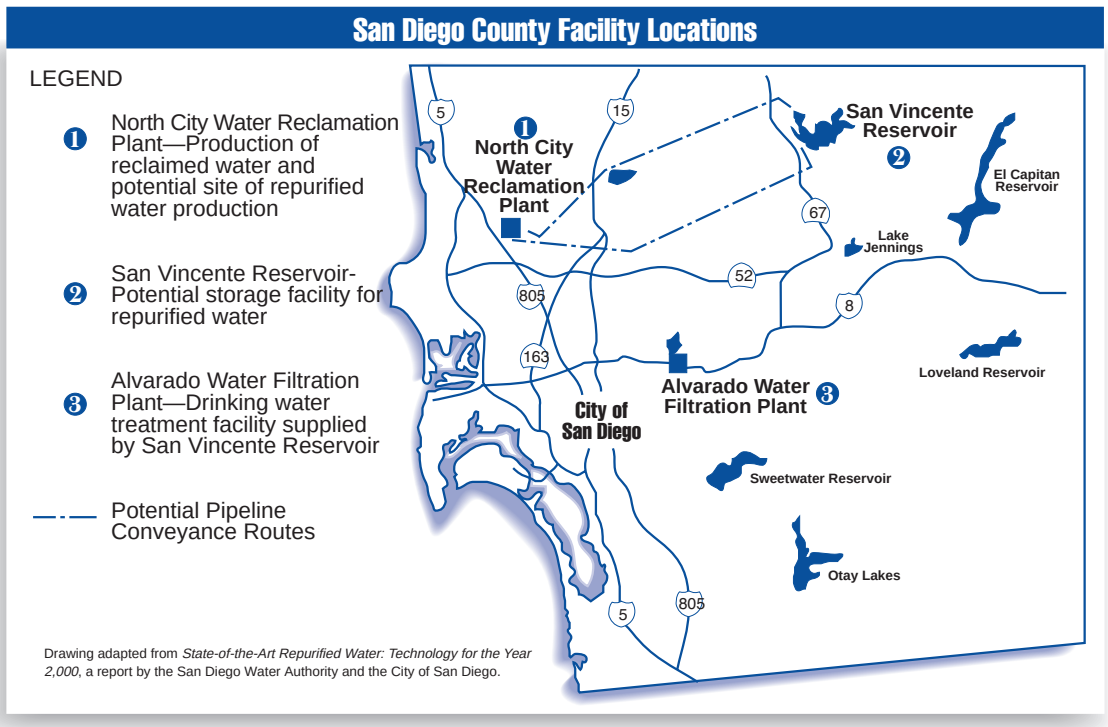
Secondary Treatment
A treatment used for the removal of biodegradable organics and suspended solids. Secondary treatment typically includes biological treatment by such processes as activated sludge, fixed film reactors, or lagoon systems.

Wastewater Reclamation
Treatment or processing of wastewater to make it reusable.

Wastewater Reuse
Beneficial use of treated wastewater for a beneficial use such as irrigation or industrial cooling.

Proposed California Project Explores Potable Reuse

by Jeremy Canody
NSFC Staff Writer



In arid San Diego County, California, efforts are underway for a water repurification project that, if implemented, would treat wastewater to be used in supplementing the county's drinking water supply. Chris Reilly of the San Diego County Water Authority explained that the project would allow San Diego to mix highly treated, repurified wastewater effluent with raw drinking water sources in a reservoir.

He explained that the North City Water Reclamation Plant would treat the wastewater with advanced treatment processes to meet drinking water standards. That water would receive advanced treatment before being treated to higher levels and then pumped into the San Vicente Reservoir, where it would blend with raw drinking water sources such as rainwater, the Colorado River, and other water pumped from northern California. After the blended water is treated again at the Alvarado Filtration Plant, it would then be pumped into the San Diego to become part of the area's potable water supply.

The water authority's November 1994 newsletter, Water T*alk*, explained that the water repurification process they hope to incorporate would involve taking the reclaimed water treatment process a step further.

Where traditional water reclamation technology treats wastewater to a quality suitable for nonpotable purposes such as irrigation, the San Diego project would further treat the reclaimed water by microfiltration, reverse-osmosis, and ion exchange, as well as with ozone, hydrogen peroxide, and chlorine for high level treatment.

An article in the October 12, 1994 issue of *Water Policy Report* quoted California Environmental Protection Agency (EPA) officials as saying they also fully support the project, and noted that the resulting repurified water will have to meet some very demanding state health standards.

Reilly said this proposed reclamation effort would be very beneficial to the city and the region because the San Diego area currently imports approximately 90 percent of its water supply. He said in areas where water sources are limited, it is sometimes less costly to recycle the wastewater than to import water in areas where water sources are limited.

The proposed water reclamation project received conceptual approval by the state Department of Health Services in the fall of 1994. Water authority officials believe if work on the project begins soon, it may be possible to complete the project by the year 2000 or soon after. If completed, the project in San Diego would be one of the largest water repurifica-tion efforts in the country.

For more information on this project, contact the San Diego Water Authority at (619) 682-4100, and request a Repurified Water Project information package.

Snowmaking with Recycled Wastewater

by Jeremy Canody
NSFC Staff Writer

Whitetail Ski Resort in Mercersburg, Pennsylvania, has taken advantage of its wastewater discharge by installing a system that can literally turn treated wastewater into snow.

Mike Collins, Whitetail's mountain manager, explained that the resort uses a deep aerated lagoon wastewater system to reuse the recycled wastewater by turning it into snow. In addition, by locating the dam downstream from the slopes and the valley, the resort is able to collect all of the meltoff from the slopes in a 100 million gallon impoundment and mix it with the recycled wastewater before pumping it back up to the mountain top to make more snow.

This multi-purpose system works by treating the wastewater from the resort in a two-cell deep, aerated lagoon for 14 days and then routes it to another aerated holding pond for further treatment and storage. The partially treated effluent is then filtered through a pressure sand filter and disinfected with chlorine.

In its final stage, the recycled wastewater is sent to an impoundment where it is mixed with 90 percent snowmaking runoff before it is fed into the resort's snowmaking equipment. By this point, there are no fecal coliforms present in the reclaimed water.

Collins said the treated water is tested for fecal coliform each time it enters the snowmaking equipment each time. Various other tests for nitrate, ammonia, and other contaminants are also performed on a weekly and monthly basis to meet strict Pennsylvania Department of Natural Resources requirements.

The system, which was designed by the engineering firm Sheaffer and Roland of Wheaton, Illinois, has not only saved the resort money by addressing concerns about water availability, but has also reduced the need for storage capacity of other water sources, while limiting the amount of discharge into local bodies of water.

Collins said he is currently working with engineers to explore using an upgraded version of the system to irrigate a golf course and housing projects in the making. He said the ultimate plan would be to make snow with the recycled water during the winter months, while irrigating the greens on the golf course during the summer months.

College Examines Pennsylvania's Onsite Options

by Natalie Eddy
NSFC Staff Writer

Delaware Valley College (DVC), Doylestown, Pennsylvania, has established a research and demonstration center to identify and evaluate affordable alternative sewage disposal technologies for sites in the state.

DVC received a $1.5 million five-year grant from the Pennsylvania Department of Environmental Resources (DER) in January 1995. The project is to run through the fall of 1999.

Larry Hepner, associate professor of agronomy and environmental science at DVC and project director, said the goal of the Research and Development Center for On-lot Sewage Disposal Systems is to identify these alternative small flows technologies to give options to Pennsylvania residents.

The center hopes to identify six alternative technologies that "are cost effective, yet environmentally sound," said Hepner.

Approximately 2.2 million Pennsylvania residents, or 18.4 percent of the state's population, are served with either on-lot sewage systems or have no wastewater treatment at all, according to figures provided by John McHale, sanitarian program specialist with the DER's Division of Municipal Planning and Finance office.

Currently in Pennsylvania, regulations allow for trench systems, bed systems, and elevated sand mounds. Recently, spray irrigation options were instituted on soils where a permit for sand mounds cannot be obtained.

Hepner said the project may have long-term benefits for the state. "It will have a great deal of benefit in terms of overall land use. The additional technologies may allow land planners to utilize poorer soils for development and save prime soils for other uses such as agriculture."

Project Scope To Be Decided

The charge of the state-funded project is to identify six existing technologies currently used in the U.S. or other countries and evaluate their performance in Pennsylvania soils and climate conditions. The technologies must be capable of serving residential properties of single-family homes or small community systems with peak flows of less than 2,000 gallons per day.

Hepner said once the six technologies have been chosen, sites on the DVC campus will be selected. Three full-scale systems of each of the selected six technologies will be constructed. A total of 18 systems will be constructed.

Currently, Hepner said the treatment technologies being investigated are labeled primary, secondary, and soil-based (see chart below). He added that combinations of these technologies may be considered.

In addition, renovative thickness, soil water conductivity, slope, construction cost, and maintenance are considerations.

Site selections will be completed by November 1995 with construction being completed by summer 1996.

Once constructed, the systems will be monitored for approximately three years. Researchers will be gathering information on parameters, such as biochemical oxygen demand, nitrates, phosphates, coliform bacteria, and solids.

Hepner said at the end of the monitoring period, the performance of each technology will be evaluated and conclusions drawn about its applicability to wastewater treatment in Pennsylvania.

Progress to Date

Currently, the researchers are reviewing 250 articles and compiling information into a computer database for research purposes, according to Hepner. Weekly meetings are conducted to review articles and assess various technologies.

Team members also have been keeping abreast of the latest wastewater technologies by attending seminars and presenting their proposed projects at various association meetings.

Based on a literature review and discussions with the research team and others, several areas of focus have been determined, including nutrients, wetlands, disinfection, bacteria, virus, and international alternatives.

Hepner said the state DER is involved in the process as well. "DER is funding the project and working with us. If DER finds some of these things to be useful, it will go through the normal regulatory process to incorporate these technologies into the regulations. "It may be a parallel process. I don't think DER will have to wait until the project is completely finished to adopt these technologies," he continued. "They will be looking at these systems and collecting data throughout the entire process."

Team Members

Several academic departments and 12 undergraduate students are involved in this interdisciplinary demonstration project. In addition to Hepner, representatives from DVC include Ron Johnson, ecologist; Jim Miller, microbiologist; Charles Weber, analytical chemist; Janet Klaessig, literature search specialist; and Ken Lee, computer specialist.

Other team members include Joe Valentine, soil scientist, and Steve Yates, P.E., both of Del Val Soil and Environmental Consultants, Inc., of Doylestown; and Robert L. Cunningham, Ph.D., emeritus professor of soil genesis and classification at Penn State University.

Founded in 1896, DVC is a private, state-aided college offering bachelor of science degrees to approximately 1,300 undergraduate students in 15 different majors. It is located in central Bucks County.

For further information about the research and demonstration center's onsite project, call Larry Hepner at (215) 345-5277.

Proposed System Classification

PRIMARY	SECONDARY	SOIL-BASED
septic tank	intermittent sand filter	wetland
aerobic tank	recirculating sand filter	spray
	peat filters	low-pressure pipe
	biological filters	drip trickle
	nitrate removal	at grade
	phosphate removal	sand mound
	disinfection	

Considerations: Renovative thickness, soil conductivity, slope, construction cost, maintenance

Information provided by the Research and Development Center for On-Lot Sewage Disposal Systems.

Technology

Ecological Technology Demonstrates Advanced Treatment

by Nancy Gover
Small Flows *Editor*

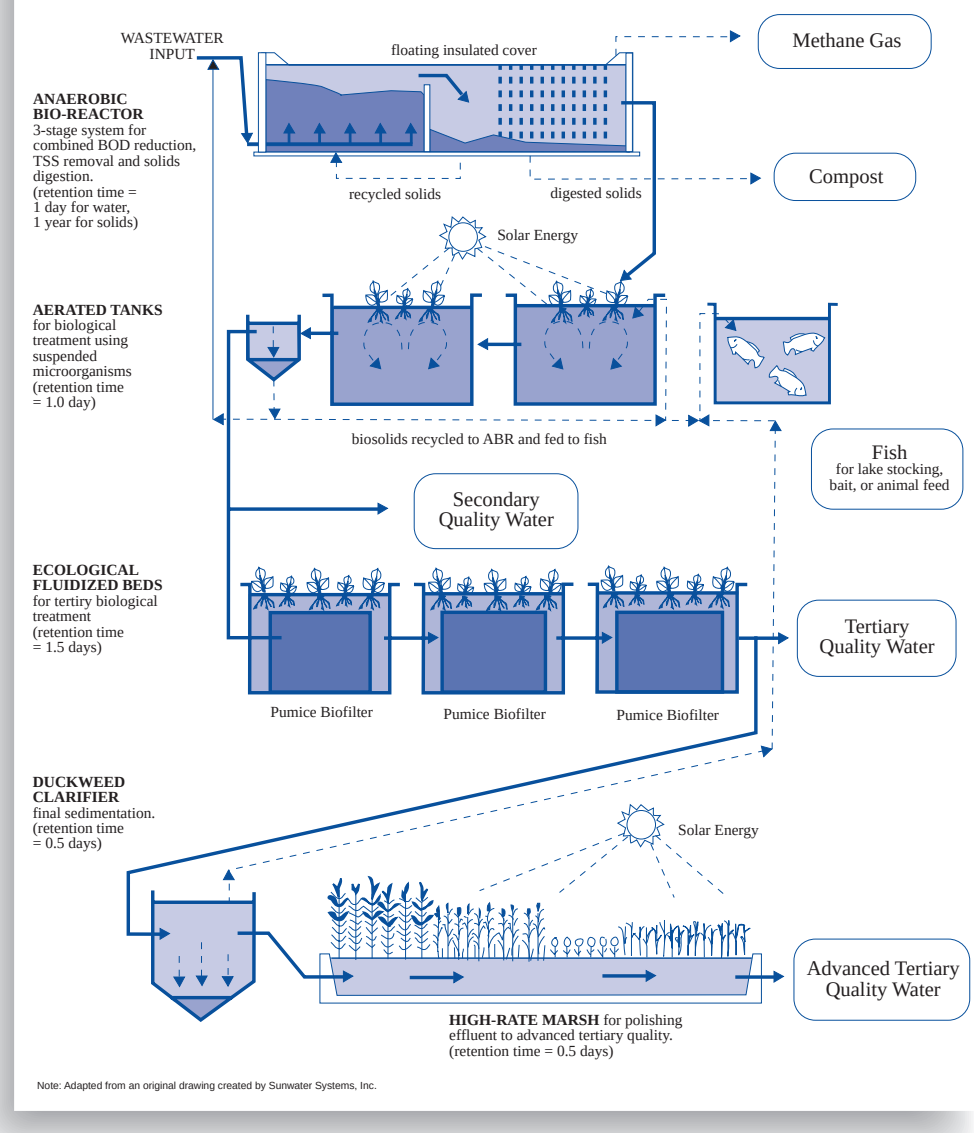
Frederick, Maryland, is the site of a $421,000 five-year demonstration project funded by the U.S. Environmental Protection Agency (EPA). The wastewater treatment project consists of a greenhouse facility that treats 40,000 gallons per day from the nearby Ballenger Creek Sewage Treatment Facility.

Sometimes called an Advanced Ecologically Engineered System for Wastewater Treatment, the facility utilizes a four-step process that incorporates successively more diverse ecosystems of plants, algae, and selected microorganisms as the waste moves downstream. (See diagram.)

Screened and degritted sewage first flows into an upflow anaerobic sludge bed, also called an anaerobic bio-reactor, where organic constituents are subject to bacterial breakdown that occurs in the absence of oxygen.

Advanced Ecological System

A demonstration project of an innovative ecological wastewater treatment technology in Frederick, Maryland.
The system is designed and managed by Ocean Arks International. The project is funded by the U.S. Enironmental Protection Agency.



Note: Adapted from an original drawing created by Sunwater Systems, Inc.

Effluent then flows into a series of aerated tanks containing suspended microorganisms and surface plants that continue the bacterial breakdown. In the third step, effluent flows to a submerged pumice filter containing surface plants and suspended microorganisms, where tertiary treatment continues. Accumulated sludge settles out and is removed in the clarifier before the effluent enters a constructed wetland for polishing.

The goal of the project is to determine whether the method is reliable and cost effective by comparing it to conventional technology in terms of capital costs and operations. The first year of the project was devoted to construction. Operation and monitoring will continue for another four years.

The system will be monitored for biochemical oxygen demand, total suspended solids, total phosphorus, ammonia, and nitrate. Other parameters include metal analysis and organic compounds.

Coordinated by the Massachusetts Foundation in Marine and Polymer Sciences, in cooperation with Frederick County, the project is designed and operated by Ocean Arks International, a nonprofit organization founded by John Todd, Ph.D.

For further information about the facility, contact Stanley G. Serfling, operations manager, at (301) 695-3104.

Primer Outlines Role of EPA's OWM

The *Office of Wastewater Management Primer*, a 27-page booklet from the U.S Environmental Protection Agency (EPA), is now available from the National Small Flows Clearinghouse (NSFC). This recently released report outlines the role of the EPA's Office of Wastewater Management (OWM) in the control of wastewater and water pollution throughout the U.S.

The OWM supervises programs that contribute to the well-being of the nation's waters and watersheds. Using programs and initiatives, the OWM promotes compliance with the Clean Water Act.

The OWM has several primary functions, including the direction of the National Pollutant Discharge Elimination System (NPDES) Permit Program, which includes storm water management and the control of combined sewer and sanitary sewer overflows. It also oversees a pretreatment program that emphasizes control and prevention of water pollution from industrial facilities; management of the sludge, or biosolids, and the permitting program.

OWM also administers the State Revolving Fund (SRF) and the Clean Water Act, Section 106, and 104(b)(3) grant programs for environmental infrastructure investment; as well as the completion and closeout of the wastewater Construction Grants Program.

The *Primer* reports on the OWM programs that address issues concerning the nation's water and watersheds. Solutions to the problem of polluted water are divided into six categories, including regulatory programs, financial flexibility and support, pollution prevention initiatives, outreach and training, environmental justice, and technological assistance programs.

Each section of the *Primer* gives a brief description of regulations, programs, and EPA participation relevant to solving the problem of water pollution. A small section on primary and secondary treatment processes for wastewater also is included.

The *Primer* contains addresses and phone numbers for more detailed information on water and wastewater programs and the EPA. EPA's internet address is also listed.

To order a free copy of the Office of Wastewater Management Primer, *call the NSFC at (800) 624-8301, and request Item #WWBLGN62. A shipping and handling charge applies.*

Texas A&M University Studies Constructed Wetlands

by Jeremy Canody
NSFC Staff Writer

A group of researchers at Texas A&M University has been awarded a $300,000 grant to investigate the use of constructed wetlands for onsite wastewater treatment in Texas. An additional $200,000 will be matched by local funding in association with the university. The goal of the study is to evaluate the use of modified constructed wetlands in the various climatic regions of Texas, ranging from semi-tropical to cold climates.

The grant was awarded through the urban Section 319 program, which is administered by the Texas Natural Resource Conservation Commission for the U.S. Environmental Protection Agency.

The modified subsurface flow wetlands will be designed to have a smaller length to width ratio, using a wider bed and shallower depth, compared to designs that are commonly used today. Researchers modified the design of the traditional style to decrease the hydraulic loading at the entrance of the constructed wetland. This is intended to reduce the risk of clogging the bed media.

Project Director Bruce Lesikar said researchers will be looking at the use of constructed wetlands in relation to nitrogen transformation. The onsite wastewater systems will be monitored for nitrogen and ammonia removal by Richard Weaver, a university professor who will be using labeled nitrogen, which has one more non-radioactive isotope than regular nitrogen.

Researchers feel that using a shallower depth and adding more plants (including soft tissue, flowering varieties) provides a more proportional surface area and will allow wastewater to contact more of the plant roots, increasing treatment. The project will also include technology transfer where researchers will develop facts sheets on how to design, install, maintain, and operate a wetland system. A video will also be developed.

Researchers at Texas A&M University are evaluating the performance of subsurface flow constructed wetlands in the varied climatic regions of Texas.

There will be four project sites throughout Brazos County and the Houston Gulf Coast area. The various climatic project sites include placing constructed wetlands in the semi-tropical area of the lower Rio Grande Valley, in an area west of San Antonio with a more moderate climate that receives occasional freezes, and in a colder area southwest of Fort Worth that receives regular freezes annually.

Lead investigator Guy Fipps said they will be monitoring the different plant variations that can survive in each project location and will be testing different application rates for drip irrigation as well. He also said the group will be monitoring the rates of microbial action in the different climates at the project sites.

The project is scheduled to last from September 1995 to August 1998.

The urban Section 319 program, through which the grant was awarded, was added to the Clean Water Act in 1987 by Congress to supplement states' ongoing nonpoint source management programs. Section 319 promotes a watershed approach to nonpoint pollution control.

For more information on the project, contact Lesikar, project director, at (409) 845-7453, or Guy Fipps, lead investigator, at (409) 845-7454.

Project Looks at Onsite Alternatives that Protect Gulf

by Nancy Gover
Small Flows *Editor*

The Mobile County, Alabama, Health Department is administering a project aimed at demonstrating alternative onsite technologies in environmentally sensitive areas near oyster reefs that have been closed due to fecal contamination.

The project, which is funded under a $150,000 U.S. Environmental Protection Agency (EPA) Gulf of Mexico Program Grant, is evaluating several alternative onsite wastewater treatment and disposal options. Using designs provided by the University of South Alabama, the project includes seven constructed wetlands, five intermittent sand filters, and two pressure drip disposal systems.

The goals of the project are:
1) to demonstrate that the elimination of human pollutants by alternative onsite technologies can result in improvements in receiving water quality, and 2) to determine performance, reliability, and economic feasibility of each alternative technology.

The project began in October 1993, and construction was completed during the summer of 1995. Sampling will be completed in May 1996. Effluent, surface water, and groundwater are being monitored for fecal coliform, biochemical oxygen demand, ammonia, and nitrate. Pre- and post-installation water samples are being coordinated with the Seafood Branch of the Alabama Department of Public Health.

The project sites are located in a coastal, residential development in southern Alabama that is representative of much of the Gulf Coast area. Lots are adjacent to canals that discharge into Portersville Bay off the Gulf of Mexico.

The EPA established its Gulf of Mexico Program in 1992 to address factors related to water quality degradation. One component of the program was the restoration of the Gulf Coast's shellfish growing waters.

According to the EPA, 57 percent of the approximately three million acres of shellfish-growing waters in the Gulf of Mexico are permanently or conditionally closed to harvesting, in many cases due to fecal contamination. Many of the elevated levels of fecal coliform are of human origin or result from man's activities, including failed onsite wastewater treatment systems.

For further information about the project, titled "Onsite Sewage Management in Support of the Gulf of Mexico Program to Restore Shellfish Growing Waters," contact Charles M. Shirk, project officer, Mobile County Health Department, at (334) 690-8166, or Kevin D. White, Ph.D., project engineer, Department of Civil Engineering, University of South Alabama, at (334) 460-6174.

Alaskan Small Systems Course is Available

by Jeremy Canody
NSFC Staff Writer

The Alaska Department of Environmental Conservation (ADEC) and Arasmith Consulting Resource Publications (ACRP) have introduced a correspondence course developed specifically for Alaska's small wastewater system operators.

Introduction to Alaska Small Wastewater Systems is a course that provides owners and operators of small public wastewater systems with a basic understanding of the principles of collecting, treating, and disposing of domestic waste in a safe and effective manner.

ACRP spokesperson Julie Cone explained that although the course was originally designed for Alaska, other states have found it useful and are beginning to approve the course for certification for their wastewater operators. Oregon has already approved the course and Washington is currently considering it.

Cone said ACRP originally designed the course as a four-day classroom study but modified it into a correspondence course because of the vast distances between the small Alaskan communities. "Making it a correspondence course eliminates having to fly all over the state," Cone said.

Course designer Skeet Arasmith explained that Alaska has unique wastewater needs due to the extremely cold conditions, the remoteness of many areas, and the hundreds of small communities with populations of less than 300.

He further explained that the high cost of traveling within Alaska's boundaries figured in the decision to develop a correspondence course. "There are very few roads to get from town to town in Alaska," Arasmith explained. He said many travelers are limited to traveling by ferry or plane.

The text was developed as a four-day training course, a correspondence course, and a stand-alone reference. All the necessary information needed for Operator-In-Training and Level I Wastewater Treatment and Collection exams can be found in the reading material.

The course and text materials are focused on those Alaskan communities with a population of less than 500, although Entry Level through Level II operators at various treatment facilities of any size can benefit from the material.

Included with the course material is a 518-page textbook with more than 330 graphics designed to allow the user to quickly find important information. A participant's guide developed for use in conjunction with the manual can also be purchased.

Each lesson begins with the course objective and emphasizes key words used throughout the lesson. The course is divided into 11 lessons, some of which include characteristics of wastewater, disinfection, safety, wastewater treatment and collection systems, and sludge treatment and disposal. In addition, the text explains how each of these pertain to rural Alaska. Each lesson ends with a question-and-answer worksheet.

The correspondence course is completed by reading through each lesson and answering the worksheet questions at the end. Answers to the worksheets are supplied in the participant's guide. The corresponding multiple choice test is then completed on a computer form and mailed to ACRP Publications where it is graded and results are returned. The course takes an estimated 40 to 60 hours to complete, depending on the student's background and experience.

Those completing the course are eligible to earn five continuing education units (CEUs) assigned by the ADEC. Each participant will receive a certificate recognizing the CEUs earned and the date of completion.

The cost for the manual and enrollment in the course is $130. It costs $85 to receive only the correspondence course and $47 for the manual.

For further information about the course, call (503) 928-6199. To place an order, write to ACRP Inc., 1298 Elm St. SW, Albany, OR 97321.

Adapted from a drawing in *Introduction to Alaska Small Wastewater Systems*, published by Arasmith Consulting Resource Publications.

EPA Offers Environmental Problem-Solving Guide

A new, U.S. Environmental Protection Agency (EPA) guide offers small communities information about environmental issues along with suggestions for dealing with problems.

The free document, *Environmental Planning for Small Communities—A Guide for Local Decision Makers*, presents a process for creating and implementing a comprehensive environmental plan, which may help local officials create an integrated approach to protecting the environment and meeting their community's needs.

The guide contains information about finding solutions to domestic wastewater problems. A chart included in it provides a thumbnail overview of alternative sewer systems, small diameter gravity sewers, small diameter pressure sewers (septic tank effluent pumps and grinder pumps), and vacuum sewers.

The chart lists descriptions of the systems, their applications, advantages and disadvantages, and costs when compared with conventional systems.

It also contains information about industrial wastewater and pretreatment requirements and regulations that may apply to wastewater before it is discharged into a public sewer system.

The 154-page book offers officials the opportunity to plan ahead for environmental problems, which can severely impact a community that does not have the financial resources to meet all of the regulatory requirements at once.

Appendices are provided that include information on regulations, assessing risks, and where to turn for additional help.

The guide was produced by EPA's Office of Research and Development and the Office of Regional Operations and State/Local Relations.

To order a free copy of Environmental Planning for Small Communities—A Guide for Local Decision-Makers, *call the NSFC at (800) 624-8301 and order Item #WWBKGN60. A shipping and handling charge will apply.*

viewpoint

Mayor Describes Solutions for STEP Sewers

Dear Editor:

The Spring 1995 issue of *Small Flows* (page 15) contained a letter to the editor asking how the cost of a small-diameter effluent pump (STEP) sewer was dealt with in other communities.

Montesano, Washington, had to deal with this problem in the late 1980s. The city had about 1,100 sewer connections to a gravity system. The existing collection system leaked and a new treatment plant was needed. In reviewing the plant's capacity, it was noted that its summer flow of 350,000 gallons per day exceeded 11 million gallons during rainfall events in the winter.

The city decided to look for an alternative to the leaky collection system and new treatment plant. A STEP system was decided upon to replace the aging gravity system.

Right from the start, the city council took the position that the pump and STEP tank were an integral part of the collection and treatment system and belonged to the city. (This idea also led to community support of the system.) All onsite improvements were not grant-eligible (building sewers, electrical panels, and hookups). The city absorbed these costs up front to make connections user-friendly.

For new construction, the owners must install the tank and pump to city specifications at their expense. Once a system is accepted by the city, the city maintains the onsite components. An easement is required for each tank. The city subsidized only existing customers and all future connections must pay the onsite improvements as well as hookup fees to defray offsite improvements.

Doug George
Mayor
Montesano, Washington

Editor's Note: For more information on the Montesano, Washington STEP system, see the related article in the October 1992 issue of Small Flows.

Firm Plays Lead Role in Wetland Landscape

Dear Editor:

Campbell Okuma Perkins Associates (COPA) is a firm of landscape architects with offices in Albuquerque and Santa Fe, New Mexico. Our firm was the prime consultant for the Los Padillas Elementary School project featured in the Summer 1995 issue of *Small Flows*. The features illustrated in the article, such as the evaporation pond and the entry gate, were entirely designed by our firm.

I would greatly appreciate it if you would provide proper credit for this project in the next issue of *Small Flows*. While the constructed wetlands are an integral part of the project, the entire master plan, along with development of the aesthetic, educational, and interpretive aspects (the outdoor classroom, trails, botanic exhibits, pond, and pond details, etc.) were all designed by this office.

Not being properly recognized for our work is not unusual, but in this case our office devoted an inordinate amount of time to this project above and beyond our fee, due to our willingness to make presentations to students and the community, to address problems to ensure the system was working properly, and in general, to assist in producing a product unique in the state.

I would certainly appreciate proper credit for our role in this project, as it represented a very challenging effort on our part which went well beyond our contractual responsibilities.

Craig Campbell
Campbell Okuma
Perkins Associates
Santa Fe, New Mexico

Pollution Prevention Not Complete without Graywater

Dear Editor:

I just read two pages in *Small Flows* espousing "preventing pollution through efficient water use" (Spring 1995, pages 10–11) and I didn't read a single thing about graywater use.

Graywater use results in numerous benefits, such as reducing the amount of water that must be treated at the treatment plant, thereby decreasing the amount of chemical-laden discharge from that plant. If the house is on a septic system, graywater use will remove about half the water from it, thereby doubling the leachfield's useful life. As we all know, source contamination is the single largest cause of water pollution, and failed leachfields are the worst offenders.

By creating plant life, graywater use also increases oxygen production and carbon monoxide absorption, enhances erosion control with healthy root systems, promotes local cooling with evapotranspiration, and provides dust maintenance with the added moisture. Resulting green zones provide fire protection.

For these reasons and more, including serious water conservation, the Uniform Plumbing Code and the California Plumbing Code have been changed to allow graywater use, and many other states have been or are now working on changes to their own codes to allow graywater use. Graywater use is not exactly a new issue.

I feel that *Small Flows*' failure to mention graywater use as a method of pollution prevention, at this stage of everybody's awareness, is hardly worthy of a journal wishing to be known as a leader in its field.

Stephen William Bilson
Chairman and Chief
Executive Officer
ReWater Systems, Inc.
Palo Alto, California

Editor's response: We agree that graywater reuse is a means of pollution prevention. It is is specifically mentioned on page 11 of that issue in a list of pollution prevention tips for individuals: "Encourage employers to explore the use of recycled graywater or reclaimed wastewater."

Graywater reuse is also implied by any and all of the suggestions that require reducing water use (conservation) as a means of pollution prevention. We certainly did not intend to neglect or negate its importance.

ASTM Calls For Papers for Onsite Symposium

The American Society for Testing and Materials (ASTM) has issued a call for papers and posters for its 1997 Symposium, "On-Site Characterization and Design of On-Site Septic Systems."

A 250–300 word abstract, along with the ASTM Paper Submittal Form, must be submitted for both papers and posters by December 15, 1995. Manuscripts must not be of a commercial nature, nor can they have been previously published.

Authors of accepted papers will be notified by February 16, 1996. The symposium will be held January 16–17, 1997, in New Orleans, Louisiana.

For more information, or to obtain a submittal form, contact Dorothy Savini, symposia operations, at (610) 832-9677.

The National Small Flows Clearinghouse, established by the U.S. Environmental Protection Agency under the federal Clean Water Act (CWA) in 1977 and located at West Virginia University, gathers and distributes information about small community wastewater systems. *Small Flows* is published quarterly.

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Editor, *Small Flows*
National Small Flows Clearinghouse
West Virginia University
P.O. Box 6064
Morgantown, WV 26506-6064
1-800-624-8301

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viewpoint

A Prescription for Performance-Based Codes: A Second Opinion

by Richard J. Otis, P.E.

Editor's Note: This article and the one at the top of the facing page are responses to Anthony B. Smithson's essay about prescriptive versus performance-based regulatory codes that appeared in the Summer 1995 issue of Small Flows.

Richard J. Otis, P.E., is vice president of environmental management at Ayres Associates, Inc., a Madison, Wisconson, environmental consulting firm. Kevin Sherman, Ph.D., M.P.H., R.S., is an environmental specialist III with the Florida Department of Health and Rehabilitative Services in Tallahassee, Florida. Both are involved in the move toward development of performance-based codes, a regulatory approach that advocates evaluating onsite systems against defined and measurable standards.

Anthony B. Smithson's well-reasoned article, "A Prescription for Performance-Based Codes," that appeared in the last issue of *Small Flows* (Summer 1995) provides a needed regulator's perspective into the promise and pitfalls of performance-based codes.

While Smithson avidly supports the concept, he raises serious and valid regulatory concerns that must be deliberated and dealt with if the performance-based code movement is to succeed. However, the "prescription" he offers to overcome his concerns requires some evaluation. Since I have been somewhat outspoken in support of codes based on performance, I would like to respond from my perspective as a design engineer.

In our enthusiasm to develop and adopt performance-based codes, we easily lose sight of what a performance-based code is. A performance-based code is a codified approach to judge system performance against a defined and measurable standard. System compliance is determined by whether the system meets the performance standard established for the property the system serves, according to codified procedures. Performance-based codes are nothing more nor nothing less.

Prescriptive codes do not tell us what or how to measure system performance. They only prescribe system design. The result has been that regulations are both restrictive and often arbitrary. They have relegated system design to nothing more than fitting prescribed "black boxes" on sites with specific site requirements with which we have experience and are comfortable. Appropriate engineering of systems to fit the site characteristics, using known scientific principles, is effectively discouraged.

Adoption of performance-based codes does not necessarily mean that the door is thrown wide open to any and all potential alternatives. That is just one extreme on a broad spectrum of possibilities. Another extreme would be to limit accepted alternatives to prescribed designs that have tried-and-true records that meet the performance standards. Where a given code falls on the spectrum will be up to the regulatory agency. How the regulatory agencies decide to establish reasonable and credible performance standards is, I believe, the crux of the issue and where we must concentrate our debate.

Will all involved parties—owner, site evaluator, designer, contractor, operator, and regulator—have increased responsibilities? Of course! But the difference will be that each party will have defined, but limited, responsibilities. Ultimate responsibility for system siting, design, operation, and performance must rest with the owner.

While the evaluator, designer, contractor, and operator may have responsibilities to the regulatory agency for any required certifications, the degree of responsibility each has for a given system will be negotiated with the owner. The regulatory agency has the responsibility for promulgating a reasonable and credible code that establishes defensible standards and monitoring procedures. The regulator's responsibility is to enforce the code.

I can understand why regulators would fear additional responsibilities falling on their shoulders under performance-based codes. Existing prescriptive codes have not defined responsibilities well. As a consequence, regulators have accepted most of the responsibility for system siting, design, construction, and operation.

The codes are written with the implicit assumption that the property owner will not take responsibility for the operation of the system. Also, many codes still allow untrained or unlicensed people to site, design, and construct the systems. Therefore, the regulator often is placed in the position of having to field check the site evaluation (or perform it!), check the design for conformance (and sometimes revise it!), inspect the construction, and work with the property owner if failure is reported.

The regulator is put in the position of providing consumer protection by correcting foreseeable problems that other players may create. Without the ability to revoke operating permits or licenses, there is little recourse to prevent the same players from repeating their errors or omissions in the future.

Performance-based codes, with their requirements for licensing and renewable operating permits, force those involved to accept their responsibilities. The responsibilities of the regulator consequently become more focused on education and enforcement.

This sounds straightforward and easy, but I know it is not. The regulator and the agency will have a greater administrative burden placed on them. Licensing programs will have to be developed and administered. A renewable operating permit system will increase monitoring and enforcement activities. Public and service provider education will be needed.

How will these and other new responsibilities be handled by an overcommitted staff, as Smithson asks? They can't be! As citizens, we must decide whether we want to insist that onsite systems perform satisfactorily to meet desired environmental and public health goals. If we do, we must realize that the costs will increase. I don't believe that it is a question of whether we are *able* to pay, it is more a question of whether we are *willing* to pay.

Smithson proposes that a merger of prescriptive and performance codes will assuage many of the concerns that regulators have over performance-based codes. I agree the two can be compatible. There is no reason that prescribed designs that have proven to meet the established performance standards cannot be part of a performance code.

The key distinction I make here is that prescriptive designs become part of a performance-based code framework, rather than performance-based designs become part of a prescriptive code framework. If we don't make this distinction and insist on the former, codes will become nothing more than a series of prescribed alternatives subject to the same restrictions and arbitrariness we are against.

An Open Invitation to Our Readers

Would you like to contribute to the "*Small Flows* Forum?" There is no need to wait for an invitation. We're looking for your essays and opinions.

For further information, or to propose an idea, contact Nancy Gover,* Small Flows *editor, at (800) 624-8301, extension 522.

viewpoint

A Prescription for Performance-Based Codes: Another Perspective

by Kevin M. Sherman, Ph.D., M.P.H., R.S.

I was very intrigued by Anthony Smithson's comments on the future of performance-based codes in the last issue of *Small Flows*. Like Smithson, I am a regulator who is passionate about the future of onsite wastewater issues. Based on the tremendous interest performance-based codes are generating in the development of onsite wastewater communities nationally, I feel a number of points in his essay need to be addressed.

First of all, I believe Smithson's fears that performance-based codes will replace prescriptive codes are unfounded. I believe that the majority of systems in a jurisdiction can, and will, continue to be installed under a well-documented and thoroughly researched prescriptive code. Performance-based standards will not replace their prescriptive counterparts, but rather augment them in difficult or unusual sites.

However, the implementation of performance-based codes will still cause tremendous growing pains in every segment of the industry. Regulators must begin to consider and question the concepts behind each of the standards we enforce.

For example, in Florida we call for 24 inches of unsaturated zone treatment to fully nitrify the effluent and to filter out fecal coliform, pathogenic bacteria, and viruses. Our research results indicate that the removal efficiences of a prescriptive installation are extremely high (Sherman and Anderson, 1991; Anderson, Lewis, and Sherman, 1991). A performance-based code desperately needs baseline information such as this to have a target to shoot for.

Another painful realization for regulators is that a prescriptive code does not, by virtue of its conservative assumptions, guarantee performance. The only thing it does "guarantee" is a permit.

I am not in any way denigrating the code Smithson is using in Lake County, Illinois. What we all have to realize is that somewhere in the U.S., regulators are enforcing codes that have no unsaturated zones or surface water setbacks. The vast array of diametrically opposed code provisions and inconsistency between codes written for various jurisdictions demonstrates the weakness of prescriptive codes.

As Smithson implies, lack of current information, appropriate training, and staff are recurring problems in all regulatory agencies. However, I do know of a rope that Smithson can use to get the help he and the rest of us need. It is called the National Onsite Wastewater Recycling Association (NOWRA).

NOWRA is a meeting place for the best minds in this field. Regulators, academics, practitioners, designers, and product manufacturers are encouraged to interact as equals. I know of no better arena to meet the challenge that performance-based codes will surely pose for all of us.

New NSFC Guide to Products and Services Available

The *National Small Flows Clearinghouse's (NSFC) 1995 Guide to Products and Services* will be available soon, says Vernon Deal, NSFC resources center supervisor.

This updated guide contains complete descriptions of the NSFC's nearly 300 products that range from educational videos and brochures to technical design manuals and case studies of small community and onsite wastewater treatment systems.

The new guide includes more than 50 new products, says Deal.

It also reflects the NSFC's recent change in its pricing structure to make product prices more uniform.

The guide will be available in October. However, it will be mailed only to those NSFC customers who have placed product orders in the past year. It will also be available upon request.

According to Deal, the cost to mail the guide to everyone on the NSFC's mailing list would be prohibitive.

Please call the NSFC at (800) 624-8301 to reserve your free copy of the new guide.

Information Needed for Onsite Design Manual Update

The U.S. Environmental Protection Agency (EPA) requests your help in revising its *Onsite Disposal System (OSDS) Design Manual* (EPA #625/1-80/012).

Published in 1980, the widely used design manual has become the industry standard. However, much has changed over the intervening 15 years, including system designs, issues, and operating methods.

In the first phase of the OSDS manual update project, the EPA is gathering information about systems and methods introduced since 1980.

The EPA is drawing on the experiences of those in the onsite field to provide some of the documented information required for the revision. Examples of appropriate topics include:

- innovative systems with proven application developed since 1980, including peat systems, anaerobic filters, and pre-engineered, or "package," treatment plants;
- new disinfection techniques, such as ultraviolet and ozone, and the new nutrient removal treatment systems;
- the value of water conservation and wastewater system modification as demonstrated by water savings, cost, performance, and reliability data; and
- cost, reliability, and performance information for drop boxes, diversion valves, pumps, and other onsite equipment.

This information should be in the form of technical papers, articles, or other valid scientific formats. For example, documented monitoring data for a specific onsite system or published documentation on operation and maintenance would be appropriate.

Please send material to Robert Goo, 4503F U.S. EPA, 401 M. St., S.W., Washington, DC 20460. Information must be submitted no later than November 17, 1995.

The OSDS update is a joint project of EPA's Office of Wetlands, Oceans, and Watersheds and the Office of Research and Development, with assistance from other federal, state, and private groups. The National Small Flows Clearinghouse is a member of the project's advisory committee.

Busy NSFC Staff Exchanges Ideas, Information

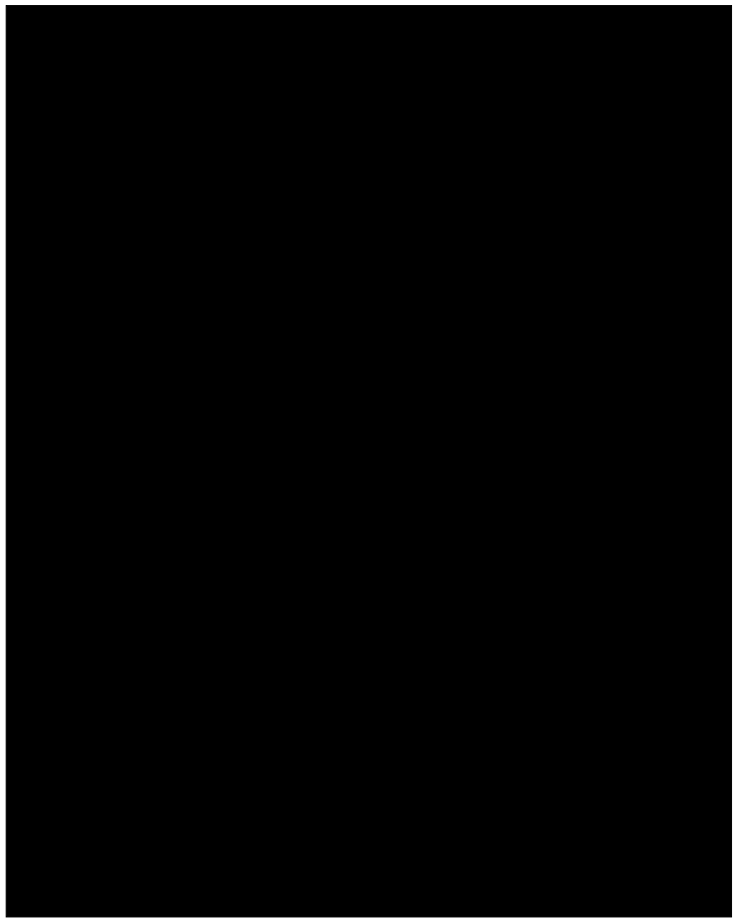
by Chris Berry
NSFC Staff Writer

Summer and early fall activities have kept the National Small Flows Clearinghouse (NSFC) busy lately. From Seattle, Washington, to Miami Beach, Florida, the outreach and technical service staff have been exchanging information with new and old customers, while gathering new information that will help keep you on the cutting edge.

Peter Casey, P. Eng., NSFC program coordinator, attended the West Virginia Rural Water Association's Infrastructure Funding Workshop in Clarksburg, West Virginia August 10. The purpose of the workshop was to examine new arrangements for funding West Virginia's public water and wastewater projects.

During August 8–11, Mike Salkovick, information systems specialist, and Mark DeVault, database specialist, attended MACWORLD Expo '95 in Boston, Massachusetts. Salkovick and DeVault learned about the latest technologies, including hardware, software, networking, and database management. They plan to apply their newfound knowledge to updating NSFC's computer information system.

August 16–20, Brad Maust, system operator of the Wastewater Treatment Information Exchange Bulletin Board System (WTIE–BBS) headed to Tampa, Florida, to attend the Online Networking Exposition and Bulletin Board System Convention '95. The exposition, which featured both software and hardware, will help Maust enhance the services currently offered by the WTIE–BBS.



Patricia Miller, Ph.D., NODP technical coordinator (far left), makes a point for Mark Whittaker, R.S. (center) and Rick Hertges, R.S. (right) during the August 30 dedication of the NODP demonstration project site located at Chestnut Ridge Park in Monongalia County, West Virginia. A monitoring well for a soil absorbtion system is shown in the foreground. *Photo by Betsy Noullet.*

Jennifer Hause, technical assistance specialist, learned how to troubleshoot operation problems while attending the West Virginia Environmental Training Center's "Optimizing Clarifier Performance and Flow Measurement" workshop. Hause will share the information she gained during the August 28–29 session in Ripley, West Virginia, with NSFC staff and with callers who request help with their clarifier and flow measurement problems.

Patricia Miller, Ph.D, was quite busy in her dual roles as NSFC outreach coordinator and National Onsite Demonstration Project (NODP) technical coordinator. Miller, along with Craig Jowett, Ph.D., P.E., a member of the NODP expert panel, and Ted Loudon, Ph.D., P.E., of Michigan State University, visited NODP sites in Benzie County, Michigan, June 27–28.

There, they examined proposed field sites to determine which systems were best suited for them. Included among the system options were several phosphorus removal technologies.

In July, Miller returned to Michigan to attend the National Sanitation Foundation's (NSF) Joint Committee on Wastewater Technology Meeting in Ann Arbor. The group met for several days and completed their revisions to Standard 40, which defines standards and testing for aerobic treatment units. The entire committee will now review the final draft. While there, Miller also participated in two task groups that discussed revisions to standards for waterless toilets and graywater systems.

Miller was a featured speaker at the U.S. Environmental Protection Agency's (EPA) Region 7 Small Community Nutrient Removal Workshop in Kansas City, Missouri, on August 16. She presented information about the nutrient removal technologies being used in NODP sites. Following the workshop, she visited facilities of the Kansas Water Research Institute.

After returning from Missouri, Miller gave a presentation about the NSFC and Wastewater Issues in West Virginia to West Virginia University's Council of International Programs (WVCIP). Ibolya Gazdag, the Hungarian engineer who visited the NSFC last year, was part of the WVCIP exchange program.

On August 30, Miller assisted members of the Monongalia County Health Department in hosting a dedication at the Monongalia County NODP site at Chestnut Ridge Park in Monongalia County, West Virginia (see related article on page 1). Miller and Casey also met with representatives from the Monongalia County Health Department to discuss establishing a county revolving fund for malfunctioning onsite systems.

While such funds exist elswhere, Miller points out, they are more commonly created at the state level. She says creating such a fund at the county level could serve as a model for other communities.

Miller and Casey traveled to Tacoma, Washington, during September 15–17, where they attended the National Onsite Wastewater Recycling Association's (NOWRA) Fourth Annual Conference and Exhibit: Marketing Onsite Technology. While there, they displayed and distributed NSFC materials, and collected information about new technical issues, activities, and manufacturers.

Miller also represented NSFC at NOWRA's Education Committee and Technical Practices Committee meetings. She participated in a NOWRA field trip to the Washington Onsite Training Facility and

Continued on next page

Small Flows Surveys Being Tabulated

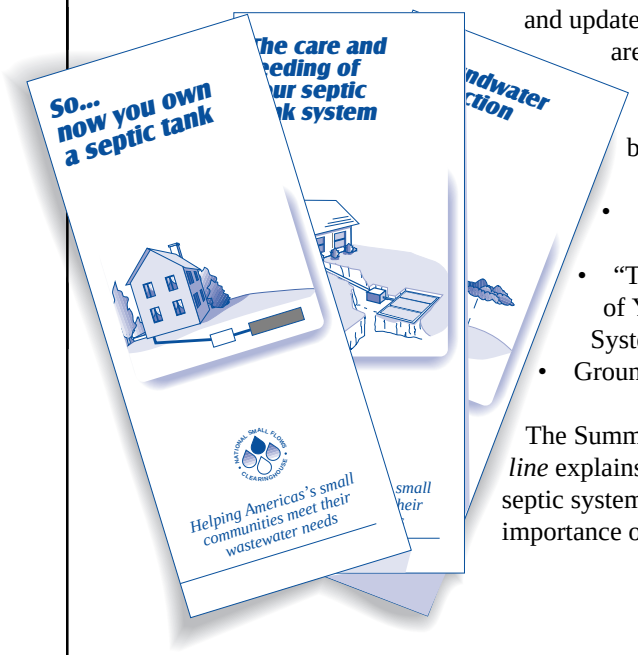
We had hoped to share the results of the *Small Flows* readership survey with you in this issue of our newsletter, but we've had such a good response to the survey that we are still tabulating the results.

The survey, which appeared in the Spring 1995 issue of *Small Flows*, has generated more than 2,000 responses. Chris Berry, student intern for *Small Flows*, has spent many hours compiling the results and hopes to wrap up this monumental task soon. She reports that the comments, which came from all over the world, have been overwhelmingly positive.

We thank our readers for providing us with this feedback and we look forward to sharing the results in the next issue of the newsletter.

Septic System Information Available

A series of educational brochures about septic systems and two special issues of the *Pipeline* newsletter that explain septic system operation and maintenance are available from the National Small Flows Clearinghouse (NSFC). Orders for single or multiple copies are accepted.



The NSFC's series of three brochures recently has been revised and updated. In addition, they are now professionally printed instead of photocopied. The brochures include:

- "So . . . Now You Own a Septic Tank,"
- "The Care and Feeding of Your Septic Tank System," and
- Groundwater Protection."

The Summer 1995 issue of *Pipeline* explains the advantages of septic systems, how they work, the importance of site evaluations, alternative septic system and drainfield designs, cost information, and resources for more information.

The Fall 1995 issue of *Pipeline* focuses on how homeowners should care for their septic tank systems. It includes information on regular inspections, proper use and disposal of waste through the system, and water conservation.

To order copies of the brochures or either issue of *Pipeline*, please call the NSFC at (800) 624-8301. Up to 10 copies are free except for shipping and handling charges. Orders of 11 or more will be charged a fee of 15¢ each to cover printing plus shipping and handling charges.

Busy NSFC Staff Exchanges Ideas, Information

Continued from previous page

visited several onsite systems in the Seattle-Tacoma area.

For the National Groundwater Foundation's "Priming the Pump: A Water Festival Workshop," Miller donned her "Dr. Doo Doo" attire and presented several workshops to explain the function of septic tank systems. Festival organizers and teachers from all over the U.S. and some foreign countries attended the festival, held in Nebraska City, Nebraska, September 22–23.

Miller represented the NSFC at a meeting of the Consortium Institutes for Decentralized Wastewater Treatment in Seattle, Washington, on September 17. Activities there included creating a directory of research funding sources, discussing the creation of new funding sources and the opening of new state training centers; and identifying potential speakers for several upcoming conferences.

NSFC staff members had a chance to meet with Steve Hogye, the new project officer assigned to the NSFC from the EPA's Office of Wastewater Management in Washington, D.C., when he toured the NSFC facilities August 14–15. Hogye met with the staff to discuss the status of various projects and services of the NSFC and visited the Monongalia NODP site.

Tricia Angoli, technical assistance specialist; Brock McCracken and Andrew Lake, graduate research assistants; Miller; Casey; and Hause visited Seattle, Washington, September 18–19. They attended the University of Washington's Eighth Northwest Onsite Wastewater Treatment Short Course and Equipment Exhibition where they showcased NSFC products and services and obtained information from manufacturers and new activities in onsite wastewater. Miller also met with several members of NODP's expert panel to discuss work on that project.

From September 21–October 6, Angoli got to know Colorado. She visited six small towns—Brush, Las Animas, Alamosa, Golden, Durango, and Glenwood Springs—to give presentations comparing Colorado's onsite regulations with those of other states.

Colorado is one of 15 states that the NSFC is making a concentrated effort to provide with technical assistance because these states have not traditionally used NSFC services as frequently as other states. Colorado requested that the NSFC visit and teach their small communities more about onsite regulations. Angoli will make a similar presentation in Kentucky in the future.

Another busy bunch from NSFC, including Nancy Gover, *Small Flows* editor; Jeanne Allen, senior information assistant; Casey; Hause; Lake; and Clement Solomon, technical assistance specialist, will be traveling to Miami Beach, Florida, October 21–25. They will be attending the Water Environment Federation's 68th Annual Conference and Exposition '95, the largest gathering of wastewater treatment professionals in the country. The group will exhibit the NSFC's products and services in an effort to find more customers and will collect information from exhibits and technical sessions to enlarge the NSFC's information repositories.

Todd Olson, technical assistance specialist, is processing responses to the NSFC's recent survey to update the NSFC's Manufacturers/Consultants Database. To date, he has received over 400 responses and plans to do a follow-up mailing to those who have not yet responded. Manufacturers or consultants who do not respond to the second mailing will have their free listing deleted from the database.

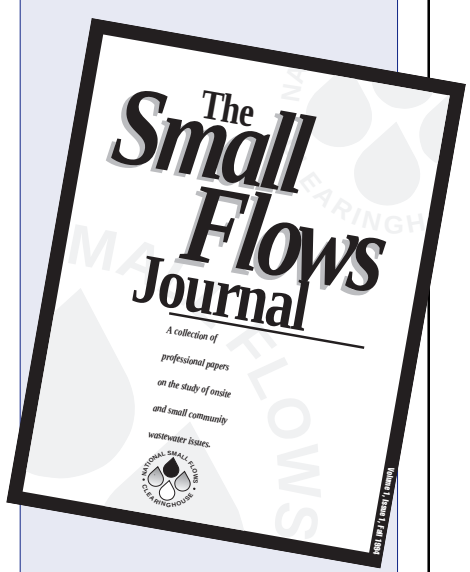
Rob Whitmore, graphic arts designer, returned to the NSFC in July to assemble the new edition of the *NSFC's Guide to Products and Services*. The guide will be available in October, so call the NSFC at (800) 624-8301 to request a free copy.

New Small Flows Journal Due Out Soon

The National Small Flows Clearinghouse is currently planning the second issue of The *Small Flows Journal* scheduled for this fall. *The Small Flows Journal* is a juried technical journal devoted specifically to small community wastewater issues (i.e., communities with populations less than 10,000 or communities handling less than one million gallons of wastewater flows per day).

Subscriptions to *The Small Flows Journal* are free and can be ordered by contacting the National Small Flows Clearinghouse at (800) 624-8301 or writing to the National Small Flows Clearinghouse, West Virginia University, P.O. Box 6064, Morgantown, WV 26506-6064.

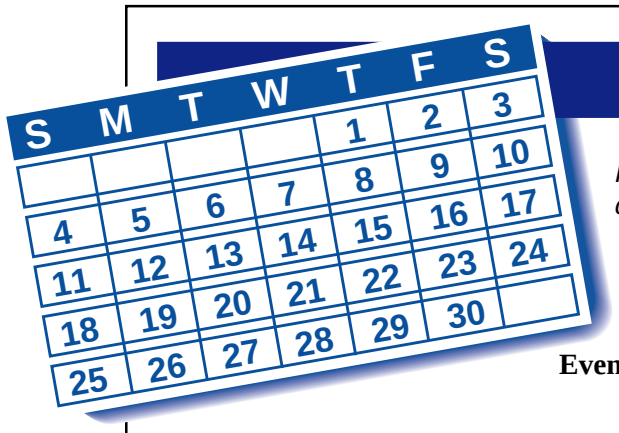
For information about manuscript submissions and publication deadlines, contact Cathleen Falvey, editor, at (800) 624-8301, ext. 526, or write her at the address above.



NSFC News

events

Calendar of Events



If your organization is sponsoring an event that you would like to have promoted in this calendar, please send information to the Small Flows *Editor.*

OCTOBER

Event: American Society of Civil Engineers' "Wastewater Treatment with Advanced Integrated Wastewater Pond Systems and Constructed Wetlands"
Date: October 16–18
Place: Phoenix, AZ
Phone: (800) 548–2723

Event: *Inside EPA* and *Risk Policy Report*'s Risk Assessment 1995: Where Does The Great Risk Debate Stand Now?
Date: October 17–18
Place: Arlington, VA
Phone: (800) 424-9068

Event: University of Florida's Center for Training, Research, and Education for Environmental Occupations' Mechanical Maintenance
Date: October 17–19
Place: Gainesville, FL
Phone: (904) 392-9570 ext. 112

Event: The Groundwater Foundation's 1995 Fall Symposium, "Source Water Protection: Making the Connection from Aquifer to Tap"
Date: October 18
Place: Lincoln, NE
Phone: (402) 434–2740

Event: Water Environment Federation's 68th Annual Conference and Exposition: WEFTEC '95
Date: October 21–25
Place: Miami Beach, FL
Phone: (703) 684–2400

Event: University of Florida's Center for Training, Research and Education for Environmental Occupations' "Introduction to Backflow Prevention"
Date: October 23
Place: Gainesville, FL
Phone: (904) 392-9570, ext. 112

Event: University of Florida's Center for Training, Research, and Education for Environmental Occupations' Management and Supervision for Water and Wastewater Operators
Date: October 25–26
Place: Gainesville, FL
Phone: (904) 392-9570 ext. 112

Event: Third Annual Virgin Islands Nonpoint Source Pollution Conference
Date: October 26–27
Place: St. Thomas, U.S. Virgin Islands
Phone: (809) 778-9838

Event: University of Florida's Center for Training, Research, and Education for Environmental Occupations' Preventative Maintenance Management for Water and Wastewater Facilities
Date: October 30
Place: Gainesville, FL
Phone: (904) 392-9570, ext. 112

Event: Environmental Management and Research Association of Malaysia's Third International Specialized Conference on Design and Operation of Small Wastewater Treatment Plants for Tropical and Subtropical Regions
Date: October 30–November 1
Place: Kuala Lumpur, Malaysia
Phone: 60-3-7177588 (Intl.)
Fax: 60-3-7177596

NOVEMBER

Event: American Society of Civil Engineers' "Wastewater Treatment with Advanced Integrated Wastewater Pond Systems and Constructed Wetlands
Date: November 1–3
Place: Kansas City, MO
Phone: (800) 548–2723

Event: North American Lake Management Society's 15th Annual Symposium: "Aquatic Ecosystems Stewardship"
Date: November 7–10
Place: Toronto, Ontario, Canada
Phone: (905) 336-4758

Event: American Water Resource Association's 31st Annual Conference and Symposium, "Advances in Development and Use of Models in Water Resources"
Date: November 5–9
Place: Houston, TX
Phone: (703) 904-1225

Event: The Association of Energy Engineers' Environmental Technology Expo
Date: November 8–10
Place: Atlanta, GA
Phone: (404) 447-5083, ext. 224

Event: U.S. Environmental Protection Agency and U.S. Department of Agriculture's "U.S. Small Community Wastewater Collection, Treatment, and Reuse Technologies Exhibition and Seminar for North Africa and the Middle East"
Date: November 27–December 2
Place: Tunis, Tunisia
Fax: (202) 720-1891

DECEMBER

Event: Ad Hoc Task Force for Decentralized Wastewater Management's "Managing Small-Scale, Alternative and Onsite Wastewater Systems: Opportunities, Problems, and Responsibilities"
Date: December 1-2
Place: Worcester, MA
Phone: (617) 566-8600

Event: Kentucky Onsite Wastewater Association's Annual Kentucky On-Site Conference
Date: December 5–7
Place: Louisville, KY
Phone: (502) 769-1601, ext. 144

JANUARY

Event: Illinois Association of Local Environmental Health Administrators' 14th Annual On-Site Waste Treatment Conference
Date: January 18–19
Place: Decatur, IL
Phone: (217) 348-0530

Kentucky Association Promotes Onsite Industry

by Chris Berry
NSFC Staff Writer

The Kentucky Onsite Wastewater Association (KOWA), incorporated in May 1995, is a professional organization dedicated to promoting the use of onsite technology for the wastewater industry.

The idea for the association was born in February 1994 when Kentucky held the state's first meeting for certified inspectors. "The inspectors had been calling for an annual meeting," explained Theo B. Terry III, president of KOWA. From this meeting stemmed the desire to organize a conference for installers, manufacturers, and septic tank pumpers.

Due to Kentucky's large rural population, approximately 17,000 new onsite systems were installed during the last fiscal year. "A rough estimate is that 50 percent of the population in Kentucky is served by onsite systems," said Terry.

A fledgling organization, KOWA hopes to establish uniform performance standards in Kentucky for the design, installation, and servicing of onsite systems, as well as to educate the general public about the need for regularly scheduled service and maintenance of onsite systems.

People engaged in the manufacture, installation, repair, or maintenance of onsite sewage systems, or the supply, distribution, and sale of components used when manufacturing, installing, repairing, or maintaining onsite systems, as well as people with a common interest in KOWA's objectives, are eligible to join the association as voting members. People seeking to expand their knowledge of onsite wastewater recycling can join the KOWA as nonvoting members.

The KOWA is sponsoring the Annual Kentucky Onsite Conference in Louisville, Kentucky, December 5–7. The program committee invites papers, posters, and demonstrations to be considered for presentation. This conference is aimed at defining the onsite program in Kentucky and addressing other related concerns.

Tricia Angoli, technical assistance specialist from the National Small Flows Clearinghouse, will be among those speaking at the conference. She will speak on the topic, "Nationwide Perspective on Regulations and the Kentucky Position."

For more information on the conference or to register, write the Kentucky Onsite Wastewater Association at 1222 Woodland Drive, P.O. Box 2609, Elizabeth, KY, 42702.

For more information on the Kentucky Onsite Wastewater Association, call Rick Molohon at (502) 769-1601.

Wastewater Exhibition in Tunisia Slated for Late November

by Chris Berry
NSFC Staff Writer

The U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture are sponsoring a wastewater seminar and exhibition in Tunis, Tunisia, North Africa, November 27–28. The exhibition will introduce the region to low-cost collection, treatment, and reuse of wastewater from small communities and assist private U.S. environmental technologies in establishing themselves in North Africa and the Middle East.

"The U.S. Small Community Wastewater Collection, Treatment, and Reuse Technologies Exhibition and Seminar for North Africa and the Middle East" (SWC) is intended to help the region cope with its inadequate water supply and sanitation problems, which restrict economic development and result in a high incidence of disease.

Presently, North Africa and the Middle East consume only three to 50 percent as much water as that consumed in the U.S. Permanent regional development is threatened by an increase in demand for fresh water and the deterioration of the quality of available water. In the next 30 years, the area's population will double, increasing the already large demand on water supplies.

The SWC is sponsored through the U.S. Technology for International Environmental Solutions (USTIES), which is a part of President Clinton's Environmental Technology Initiative. USTIES strives to increase the exports of U.S. environmental products by using U.S. private sector technologies and expertise to address environmental problems abroad.

Wastewater collection, treatment, and reuse methods and expertise appropriate for small communities (populations less than 10,000) will be exhibited at the SWC. U.S. manufacturers and consulting firms specializing in relevant technologies and expertise are encouraged to participate in the exhibition to assess the region's market and business climate. Participants will be provided with display space, translators, and the opportunity to meet with North African and Middle East officials and technical experts in the water resources field.

The SWC will be held in tandem with Himeya '95—The Third International Exhibition of Environmental Protection Technologies, scheduled for November 29–December 2. Both the SWC and Himeya '95 will be held at the same location. By scheduling the exhibitions together, participants will be able to maximize exposure to interested parties in North Africa and the Middle East since display space and translation service will be provided at both events.

For more information on the "U.S. Small Community Wastewater Collection, Treatment, and Reuse Technologies Exhibition for North Africa and the Middle East" contact Lyn Figueroa, U.S. Department of Agriculture, Foreign Agricultural Service, at (202) 720-1891. Exhibit space will be limited and provided on a first-come, first-served, basis.

Septic Systems Are Legal Issue in Home Sales

by Kent Seitzinger
NSFC Legal Advice Columnist

As with many of these columns, this one must start with a disclaimer: The following subject matter may be regulated and/or controlled by specific state laws. This article cannot possibly explore any or all of those state laws and regulations. What this article does explore are the various common law concepts and the general rules that apply to many states relative to legal issues involving home sales where the home uses a septic system.

Typically, the concern that arises in the sale of a home with a septic system is whether or not the system is functional. What is a functional septic system? Virtually everyone would agree that one test of whether a system functions is: If you flush the toilet, does it work? Most would also agree on the second test of system function: After you flush your toilet, does a wet area show up in your yard?

Most agencies regulating public or environmental health would also agree on a third test, while most others would never give it a thought: Is the septic system effluent that percolates into the ground from the subsurface absorption area adequately treated before it enters the groundwater?

In addition to these questions, there are a variety of more subjective and less certain areas where questions might arise. For example, if the lawn over the subsurface absorption area is very green and lush, but there is no moisture present, what is its significance? If a system has hardware usually not found in a septic system (e.g., a pump), does that matter? Does one have to disclose when the septic tank was last pumped?

The best answer to all of these questions is that *full disclosure* is always the best practice. With that said, however, a closer look at the issues reveals just how difficult the practical answers are. And, what are the various responsibilities of the participants in such a transaction? There are the real estate agencies: usually one for the seller and—more often these days—also an agent for the buyer. Then there are the sellers and buyers. Sometimes there are various home inspectors.

It is beyond the scope of this article to examine the potential issues for each of these participants. Consequently, the discussion relates generally to the responsibilities of participants from the seller's side, such as the seller's agent and the sellers themselves.

It should also be noted that the general practice in the community regarding such transactions, as well as the level of sophistication of the regulatory agencies and consultants, may play a role in precisely what rules apply to these situations. Another issue that complicates this analysis is the buyer's level of sophistication.

For example, in a small, semi-rural community, knowledge about septic systems might be common. Folks moving into a rural area from a large metropolitan area may know nothing about septic systems and may not even have a clue that the system is an issue. After all, in the city you simply paid your monthly bill and when you flushed your toilet, everything disappeared!

All of these issues, of course, have to be viewed in the appropriate context. Here, the hypothetical situation is one in which an individual is selling a home that uses a septic system. The seller usually wants the sale to be expeditious, wants as little hassle as possible, and wants to get the best selling price possible. On occasion, the concept of full disclosure may be the antithesis of these goals. However, while not fully disclosing certain information may assist the seller in attaining these immediate goals, it may also eventually precipitate an expensive lawsuit.

Probably the best rule of disclosure is to discuss the matter with both a knowledgeable real estate agent and an attorney from the local community. A general rule-of-thumb is to place yourself in the position of the buyer and ask yourself the question, "If I had been the buyer and had particular information not been given to me prior to the purchase [given the fact that someone was aware of it at that time] would that have changed my decision to purchase the property?"

If the home has had a history of plumbing fixtures that drained

Continued on next page

WATS Q & A

Editor's Note: The following question was received over the National Small Flows Clearinghouse's WATS line. If you have a question, please call (800) 624-8301.

What is the difference between the Wisconsin Mound and a mound system?

The mound, an elevated onsite soil absorption system, was first developed in the late 1940s by the U.S. Department of Health, Education, and Welfare for an area in North Dakota. This particular mound system was termed the "NoDak" after its state of origin, and was developed to overcome failure of conventional septic tank soil absorption systems in slowly permeable soils.

The original NoDak evapotranspiration mound design consisted of an above-ground gravel mound with distribution pipes running its length and width. Commonly installed as a circular mound, these systems were covered with topsoil and seeded with grass.

The Clark County Soil Conservation District in Wisconsin adapted and modified the NoDak system to meet its requirements for a system that would perform adequately in the state's varying soil and site conditions and in its harsh climate. During the early 1970s, the Wisconsin mound system was developed for use where site characteristics restricted the use of conventional soil absorption systems and to overcome many of the NoDak system's limitations.

The original Wisconsin mound design consisted of gravel trenches set into a mound of sand. The distribution pipes were placed within the gravel trenches. The wastewater was also pressure dosed. A soil cover and "cap" provided climatic protection and vegetative cover for the mound.

In 1980, the Wisconsin mound system was incorporated into the state's code as an alternative system. Since then, several states have adopted the Wisconsin mound design, with or without modification, to fit their local topographic and climatic conditions.

A version of the original NoDak adapted by West Virginia in 1975, called the West Virginia Evapotranspiration (WVET) mound system, consisted of a coarse layer of sand in addition to the gravel fill. The WVET was typically oval in shape and pressure dosed, allowing the wastewater to be distributed uniformly along the length of the mound.

With all mound systems, a septic tank or other form of primary treatment and dosing chamber precede the elevated-fill mound. The septic tank allows for removal of some of the settleable solids and some degradation of solids. The dosing tank houses either a pump or siphon system that distributes the secondary effluent evenly throughout the mound's gravel trench. This reduces settleable solids, greases, and fats. The wastewater is further treated as it percolates through the sand mound and the unsaturated natural soil.

Despite design variations, all elevated soil absorption systems are raised hills or "mounds" of fill containing trenches. The raised area provides additional surface area for soil absorption and provides more height, which increases the depth to limiting factors.

The main objective behind the development of these elevated soil absorption systems was to overcome specific site restrictions, such as slowly permeable soils, shallow soils over bedrock, and high water tables.

If you would like to obtain additional information on the mound system, call the National Small Flows Clearinghouse at (800) 624-8301, and request the Mound Package. The package includes articles that discuss siting, design, and construction of mounds; performance evaluations of mound systems; and inspecting and troubleshooting mounds. The package is free until January 1, 1996. At that time there will be a charge of $7.50. A shipping and handling charge will apply.

Booklet Guides Native Americans Implementing NPDES

Federally recognized Native American tribes that need guidance for implementing a National Pollutant Discharge Elimination System (NPDES) or sewage sludge program need to look no further than a handbook offered by the U.S. Environmental Protection Agency (EPA).

NPDES and Sewage Sludge Program Authority: A Handbook for Federally Recognized Indian Tribes, a 33-page booklet, now is available from the National Small Flows Clearinghouse (NSFC). It explains the NPDES and sewage sludge programs, the steps required to obtain a permit, and the authority to operate an NPDES or sewage sludge program.

According to section 518 of the Clean Water Act, Native American tribes are eligible for "treatment in a similar manner as a state" regarding the operation of wastewater and sewage sludge programs.

The Handbook for Federally Recognized Indian Tribes explains how permits can be issued (under the NPDES program by the EPA or authorized states or tribes) for wastewater treatment or industrial facilities, mining operations, and many animal feedlots.

The booklet examines the advantages and possible disadvantages to obtaining tribal authorization for the programs, as well as how a tribe can obtain technical assistance. It provides a list of EPA regional headquarters and NPDES program coordinators.

NPDES and Sewage Sludge Program Authority: A Handbook for Federally Recognized Indian Tribes *is available by calling (800) 624-8301, and requesting Item #WWBLRG42. The item is free. A shipping and handling charge will apply.*

Septic Systems Are Legal Issue in Home Sales

Continued from previous page

improperly, this should be investigated and disclosed. If the subsurface absorption area is wet or sewage is leaking onto the ground, that must be disclosed. It may also be wise to disclose any known unusual circumstances, such as the existence of a pump, aerobic treatment tank, or other similar devices. The age of the system, the locations of various components, and other general information about the system, such as the last time the septic tank was pumped, is also appropriate.

Far less certain are such issues as the description of a system (e.g., is it necessary to tell someone that your system is an alternative or experimental one?). This is particularly true because such labels are more frequently a political issue than a technical one. Other questionable areas include the known general conditions that affect site suitability in the community, the history of local system problems, and the need to indicate whether the property contains an area reserved for system replacement.

My recommendation is for a seller and buyer to make sure that they have competent and knowledgeable people assisting them with the transaction. If you are the seller, when in doubt—disclose. If you are the buyer, when in doubt—ask! If you are a real estate agent, take the time to learn about septic system issues sufficiently so you can protect both yourself and the seller or buyer.

Constructed Wetland Book Illustrates 17 Successful Sites

People interested in constructed wetlands will be eager to acquire a copy of the U.S. Environmental Protection Agency's (EPA) new book on the subject.

Constructed Wetlands for Wastewater Treatment and Wildlife Habitat: 17 Case Studies, is a full color, 174-page book now available from the EPA Office of Wastewater Management.

Case studies from the 17 constructed wetlands detail the background, site description, operation and management, performance, and benefits of each of the sites located in Alabama, Arizona, California, Florida, Illinois, Michigan, Mississippi, Nevada, Oregon, and South Carolina. A list of additional sources of available information for each site is included.

Along with the obvious benefits of improved water quality, the constructed wetlands discussed in this the book also serve as congregational and breeding areas for many types of endangered and rarely seen wildlife.

Included with several of the case studies are charts and graphs detailing the quality of effluent and design criteria of the wetlands, as well as the different types and numbers of wildlife visiting the area.

Many of the wetlands are used to educate the public about the benefits of constructed wetlands through programs, nature hikes, and hands-on activities. Some of the projects even offer areas for passive recreation, such as fishing.

Several of the constructed wetlands have been honored with awards, including the American Consulting Engineers Council Grand Conceptor Award and Council Award, the Ecological Society of America Special Recognition Award, and the Ford Foundation Award for Innovation in a Local Government Project.

Each case study was prepared by individuals who were either directly involved with the project or very familiar with it. The format of Constructed Wetlands allows the individual case information to be easily understood by people unfamiliar with the technical details of wetlands and has been used as a handout for visitors to some of the project areas.

Constructed Wetlands for Wastewater Treatment and Wildlife Habitat: 17 Case Studies, *is available from the Superintendent of Documents. To order, call (202) 512-1800, and order S/N 055-000-00489-7.* You may also fax your order to (202) 512-2250, or visit a U.S. Government Bookstore in your area. (Check your yellow pages for a store near you.) *The book costs $14 ($17.50 foreign), including shipping and handling.*

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National Small Flows Clearinghouse
West Virginia University
P.O. Box 6064
Morgantown, WV 26506-6064