

# The Voice

FEBRUARY 2007

# oice

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AMERICAN COUNCIL OF ENGINEERING  
COMPANIES OF TENNESSEE

THE VOICE OF TENNESSEE'S ENGINEERING COMPANIES

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## Decentralized Wastewater Management

by John R. Buchanan, Ph.D., P.E.  
Associate Professor, Biosystems Engineering  
and Soil Science Department  
UT Institute of Agriculture

There is an old joke about engineering professors . . . you ask us for the time of day and we tell you how to build a clock. In that spirit, I found it quite challenging to draft a short article about design guidelines for decentralized wastewater management systems. From a comprehensive perspective, this article will focus on two guidelines, system-sizing and system construction.



John Buchanan

All systems that handle domestic wastewater have two common objectives: they separate humans from their wastes (public health) and they remove the wastes from the water before the water is returned to the hydrologic cycle (environmental health). Both systems share four design elements: *collection* of wastewater, *treatment* of wastewater, *dispersal* of wastewater back into the hydrologic cycle, and *management* of the engineered processes. The primary differences between centralized and decentralized are how these four design elements are sized, constructed, and financed.

### Sizing and Construction

Decentralized wastewater treatment systems are custom-designed for a specific residential development, commercial operation, or small community. The system-sizing upper limit tends to be treated water volume

that can be returned to the hydrologic cycle without causing negative environmental effects. Since most decentralized systems use the soil for final treatment and dispersal, the first design guideline is to determine how much treated wastewater the soil can accept. A professional soil scientist needs to investigate the property and determine if there are areas of suitable soil. The soil scientist will look at slope, soil depth, restrictive layers, soil texture and structure, and landscape position to determine the appropriate loading rate for the site. For example, if it is determined that the soil can handle an application rate of 0.15 gallons per day per square foot (nearly 200,000 gallons per acre per month), and there are three acres of suitable soil, then total water application could be nearly 600,000 gallons per month. Remember, this is total water, which includes precipitation. Thus, if we assume a worst-case month with five inches of net precipitation (136,000 gallons/acre/month), then this site may be able to handle 460,000 gallons of wastewater per month or over 15,000 gallons per day. Furthermore, assuming a daily household wastewater production rate of 200 gallons per home, it can now be determined that this site can manage the wastewater from 75 homes. With this information, the engineer can now design an appropriate collection and treatment system for this location.

Because the upper limit of this wastewater management system is based on soil acceptance, only wastewater should be allowed to enter the collection system. Therefore, the

(continued on page 2)

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# March Brings Engineers Opportunities to Shine

by Bill Johnson, P.E.  
President, ACEC of Tennessee

The waning days of winter will bring Tennessee engineers several exciting opportunities to shine. Of course, I am talking about the



**Bill Johnson**

*Engineering Excellence Awards* banquet, *Engineers' Day on the Hill*, the 3rd Annual Senior Principals' Forum and our Legislative Reception. Clear your calendars for March 5 and 6 and plan to participate in all of these events.

Activities begin on the evening of March 5 with the Legislative Reception. Then on the morning of March 6, it's time for *Engineers' Day on the Hill*. If you have not attended either of these activities in the past, then do all you can to make it happen in 2007. It's an excellent opportunity to meet your local representatives and let them know of concerns dear to our hearts.

The Senior Principals' Forum will be on the afternoon of March 6. This forum helps us

look at what ACEC of Tennessee is doing and identify the paths we need to take to make sure we serve the engineering companies that the organization represents. You should have received a letter from me encouraging you to attend this forum. Please reply with a big "YES!" Remember to submit your ideas for discussion before the meeting, so that we can be sure they are addressed appropriately (bjohnson@arcadis-us.com or ctoler@tnec.org).

Based on what I have heard, I look forward to a large turnout for the *Engineering Excellence Awards* banquet on the evening of March 6. We have many excellent entries, all demonstrating the talents of Tennessee engineers. My thanks to Joe Chester P.E., Chair of the awards program, with engineering firm URS and David Harrell P.E. Co-Chair, with engineering firm Vaughn and Melton. They and their committee have worked hard to put on a banquet with a program second to none.

The theme for March 5 and 6 is opportunity – opportunity for you, for ACEC of Tennessee, and for the engineering profession. I hope to see you in Nashville.

## Decentralized Wastewater Management *continued from page 1*

collection system has to be constructed to prevent ground and surface water from entering the system. Pump tanks, pipes and pipe joints, and service connections must all be watertight. Decentralized wastewater system managers must compare homeowner water usage against treated water volume. If there are significant differences, then the managers need to look for leaks into or out of the collection system.

### Financing

Who pays for construction of the system is another major difference between centralized and decentralized. Generally speaking, all the capital costs for a decentralized wastewater management system are paid up front. A portion of the selling price of each lot in a residential development includes the costs of the

collection, treatment, and dispersal systems. All future costs, which include operation and maintenance, are paid for with monthly sewer bills.

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*Decentralized wastewater management is a management strategy and not a technology.*

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Managers of these systems, whether public or private utilities, are allowed to set user fees based on operating costs, anticipated component replacement costs, regulatory compliance costs, and a reasonable profit margin.

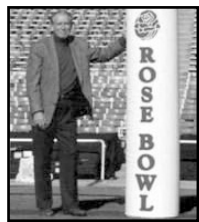
I want to emphasize one final point – “decentralized wastewater management” is a management strategy and not a technology. All the technologies that are used in centralized wastewater systems can be used in decentralized wastewater systems. All wastewater systems must have competent and dedicated managers. The decentralized wastewater management approach is a cost effective means of providing for the public and environmental health in areas with low population densities.

# Be There March 6 for Engineering Excellence Awards

by Joe Chester, P.E.

Chair, Engineering Excellence Awards Committee

With over 29 entries from around the state and a keynote speaker who is guaranteed to both entertain and challenge your thinking, this year's annual statewide *Engineering Excellence Awards* banquet promises to be one of the best ever.



**Dick Burleson**

Entries are from 20 firms throughout the state, ranging in size from 11 full-time employees to global capabilities, and represent nine of the ten possible categories. The keynote speaker is Dick Burleson, famed SEC Football Head Referee, Major General in the U.S. Army Reserves, and

now Vice President of DMJM Harris, one of the largest engineering firms in the nation.

The project accomplishments of our Tennessee engineering community are simply amazing. They include: transit and highway infrastructure restoration; military and legacy war sites clean up and restoration; symphony halls & neighborhood centers; renovations and revitalizations of town centers and court squares; statewide plans, manuals and standards; observatories; parks and brownfields projects; hurricane repairs; airport and river crossings; water availability and intake; wastewater and Infiltration/Inflow studies; and stormwater detention.

This will be the most talked about engineering event of the year. The date is March 6 and the place is the Hilton Nashville Downtown. Plan now to reward the top performers in your firm by making plans for them to attend this grand gala to see "their" projects in the show.

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For sponsorship information, please contact Judy Logue at 615-242-2486 or [jlogue@tnec.org](mailto:jlogue@tnec.org).

## EEA 2007 Entrants

### Building / Technology Systems

I.C. Thomasson Associates, Inc. - *Project:* Schermerhorn Symphony Center, Nashville, TN; *Client:* Nashville Symphony

### Environmental

EnSafe Inc. - *Project:* The Binagadi Challenge: Cold War Legacy Site Cleanup, Baku, Azerbaijan; *Client:* State Oil Co. of the Azerbaijan Republic

### Small Projects

EnSafe Inc. - *Project:* Cost-Saving In Situ Lagoon Closure, Napoleon, Ohio; *Client:* Tenneco, Inc.

TLM Associates, Inc. - *Project:* Lexington Downtown Revitalization, Lexington, TN; *Client:* City of Lexington

Wilbur Smith Associates - *Project:* Sevierville Ultraflow, Sevierville, TN; *Client:* City of Sevierville

### Special Projects

Askew Hargraves Harcourt and Associates, Inc. - *Project:* Tipton County Court Square Renovations, Covington, TN; *Client:* Tipton County

Consoer Townsend Envirodyne Engineers - *Project:* TDOT's New Erosion Control Standards (statewide); *Client:* Tennessee Department of Transportation

Gresham, Smith and Partners - *Project:* Rebirth of the Demonbreun Street Viaduct, Nashville, TN; *Client:* Metropolitan Government of Nashville and Davidson County

Hart Freeland Roberts, Inc. - *Project:* Naked Eye Observatory at MTSU, Murfreesboro, TN; *Client:* Tennessee Board of Regents

Neel-Schaffer, Inc. - *Project:* Music City Star Commuter Rail, Nashville, TN; *Client:* Regional Transportation Authority

### Studies, Research & Consulting

Askew Hargraves Harcourt and Associates, Inc. - *Project:* Munford Centennial Park, Munford, TN; *Client:* City of Munford

EnSafe Inc. - *Project:* Design for the Future: Stormwater Manual Update, Memphis, TN; *Client:* City of Memphis

Hart Freeland Roberts, Inc. - *Project:* NASA Michoud Assembly Facility Hurricane Repairs, New Orleans, LA; *Client:* Marshall Space Flight Center

K.S. Ware Associates, LLC - *Project:* Rolling Mill Brownfield Project, General Hospital Site, Nashville, TN; *Client:* Metropolitan Nashville Development and Housing Agency

PBS&J - *Project:* TDOT 25 Year Long-Range Transportation Plan (statewide); *Client:* TDOT Environmental Bureau

Parsons Brinckerhoff - *Project:* Station Area Planning for the NW I-75 HOV/BRT Project, Metro Atlanta, GA; *Client:* Georgia Regulatory Transportation Authority

Qore, Inc. - *Project:* 21st Century Renaissance Park Development, Chattanooga, TN; *Client:* City of Chattanooga

URS Corporation - *Project:* Modifying the Proposed OSHA Cr+5 PEL for Electroplaters, Washington, D.C.; *Client:* National Association of Metal Finishers

### Surveying & Mapping Technology

PBS&J - *Project:* I-124 (US 27) Interstate Reconstruction Project, Chattanooga, TN; *Client:* Clinard Engineering Associates, LLC

### Transportation

Barge Waggoner Sumner & Cannon, Inc. - *Project:* Gatlinburg Underground Utility / Streetscape Phase IV, Gatlinburg, TN; *Client:* City of Gatlinburg

Florence & Hutcheson, Inc. - *Project:* I-65 Widening from Trinity Lane to Vietnam Veterans Parkway, Nashville, TN; *Client:* Tennessee Department of Transportation

Neel-Schaffer, Inc. - *Project:* Chickamauga Lock Road Relocation Project, Chattanooga, TN; *Client:* US Army Corps of Engineers / Nashville District

TLM Associates, Inc. - *Project:* Beech River Regional Airport, Henderson County, TN; *Client:* Beech River Regional Airport

Wilbur Smith Associates - *Project:* Mississippi River Crossing Feasibility & Location Study, Memphis, TN; *Client:* Tennessee Department of Transportation

### Water & Wastewater

ARCADIS - *Project:* Whites Creek Performance-Based I/I Reduction, Nashville, TN; *Client:* Nashville Metro Water Services

CH2M Hill & Gresham Smith & Partners - *Project:* Walker Springs Wastewater Storage Facility, Knoxville, TN; *Client:* Knoxville Utilities Board

Site Engineering Consultants, Inc. - *Project:* Fleming Farms Decentralized Sewage Treatment, Rutherford County, TN; *Client:* ParkTrust Development, Murfreesboro, TN

TLM Associates, Inc. - *Project:* Raw Water Intake and Pipeline, Parsons, TN; *Client:* City of Parsons

### Water Resources

CDM - *Project:* Dry Branch Stormwater Detention, Franklin, TN; *Client:* City of Franklin

## CALENDAR

FEBRUARY  
18 - 24

Engineers' Week

MARCH  
5

Legislative Reception  
6:00 p.m. - 7:30 p.m.  
Sheraton Nashville  
Downtown

MARCH  
6

Engineers' Day  
on the Hill  
9:00 a.m. - 1:30 p.m.  
State Capitol

3rd Annual Senior  
Principals' Forum  
2:00 p.m. - 5:00 p.m.  
Hilton Nashville  
Downtown

Engineering Excellence  
Awards Banquet  
6:00 p.m. - 9:00 p.m.  
Hilton Nashville  
Downtown

MARCH  
7

Board Meeting/  
ACEC of TN  
Hilton Nashville  
Downtown

MARCH  
17

State MATHCOUNTS  
Competition  
Tennessee Engineering  
Center, Nashville

## Member News

- S&ME, Inc. has announced staff additions in Knoxville and Nashville. Sandy Reagan, who has more than 25 years of environmental experience, has joined the firm's Knoxville office to provide regulatory compliance support, regulatory negotiations and merger and acquisition due diligence support. Don Haynes, who holds BS in Civil Engineering, has joined the Nashville office where he will focus on environmental services. For the past 15 years, he has worked primarily on air pollution analysis and permitting.
- ACEC of Tennessee will publish a joint March / April edition of *The Voice* that will spotlight the Engineering Excellence Awards winners.

# ACEC

AMERICAN COUNCIL OF ENGINEERING COMPANIES  
of Tennessee

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Return Service Requested

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## Welcome, New Member

### Davis Patrikios Criswell, Inc.

7620 Appling Road, Suite 108  
Memphis, TN 38133  
901-377-9984  
901-385-1813 (Fax)  
www.proinspectgroup.com

#### Key Contact:

Marshall F. Davis, PE, President  
mdavis@proinspectgroup.com

Professional Inspections Group is a consulting engineering firm providing civil and structural engineering services. The firm is licensed in nine southeastern states and Rhode Island. The company is a licensed general contractor with employees who are certified professionals in erosion and sediment control.

## Welcome, New Partner Program Member

### Benefit Solutions, Inc.

5722 Hickory Plaza Drive, A-1  
Nashville, TN 37211  
615-833-3078  
615-832-1349 (Fax)

Contact: Wayne Bryant, Chief Executive Officer  
waynebryant@benefitsolutions.cc  
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## FROM THE EXECUTIVE DIRECTOR

# Legislators Convene; March is Time to Connect

by Candy Toler  
Executive Director, ACEC of Tennessee

The 105th General Assembly convened on January 9. Committee leaders and members have been named, offices have been assigned, bills continue to be introduced, and the wheels of the legislature are turning. The Governor presented his budget to the legislators earlier this month. Some of the issues on the horizon are funding education at all levels, smoking and the tobacco tax, and property tax relief for low-income elderly. Although only a few bills were introduced by my deadline, there was one to prohibit the use of chlorine to disinfect water systems.



Candy Toler

ACEC's ability to impact legislation may not be obvious to the public, but it is very important that someone watch out for legislation that will impact public health, safety, and welfare. This is the reason engineers are required to get a license in the first place. Did you know that the State Board of Architectural

and Engineering Examiners was established in 1921?!

### Connect in March

What I call *March Madness* begins with ACEC's legislative reception on March 5. I hope you will join us for the reception Monday evening and then again the next morning at the State Capitol for *Engineers' Day on the Hill*. These are both great opportunities to connect with legislators and inform them of your role in communities across Tennessee to make them safe places to live, work and play. I will let you know more about the issues as legislation is introduced in the next several weeks. Please use the registration form at [www.acectn.org](http://www.acectn.org) or just send me an email ([ctoler@tnec.org](mailto:ctoler@tnec.org)) to notify me that you plan to participate in both events. Be certain to include the names of your state representative and senator.

And *March Madness* continues with the *Engineering Excellence Awards Banquet* in the evening on March 6! (More information about the banquet appears on pages 2 and 3 of this newsletter.) March 5 and 6 are busy, important and fun days for Tennessee's engineers. I hope that you will join us this year.