

SPRING 2009

illinois

# ENGINEER

PUBLISHED BY THE ILLINOIS SOCIETY OF PROFESSIONAL ENGINEERS

## GREYWATER: THE NEXT BIG THING IN RECYCLING

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# GREY *water*

## *The Next Big Thing in Recycling*

by Dan Naumovitch

Recycling has come a long way in our society. Once it was practiced primarily by the eco-minded who thought it a moral imperative to preserve natural resources and protect the natural environment. Today, putting the aluminum cans in a blue bin instead of the black trash bag is no longer considered an act of higher environmental consciousness, it's just the routine way we take out the trash each week.

Proponents of the reuse of treated wastewater have taken note. Knowing the fright that the word "wastewater" instills in the public, they're trumpeting the potential of water recycling. If that old soda bottle can be salvaged and used again, why can't the water that's flushed down the toilet?

Paul R. Anderson, P.E., PhD, is one of the state's leading proponents for the reuse of treated wastewater. An associate professor of environmental engineering at the Illinois Institute of Technology, Anderson began looking into how efficient water is being used in the state around six years ago, in response to projections that Illinois would be facing a shortage in the coming decades.

"Although there are many solutions to consider for that problem, one of the simple ones is to reuse water more efficiently," Anderson said. "Instead of using it once and throwing it away, make use of treated wastewater in appropriate applications."

The National Environmental Services Center outlines appropriate applications for water reuse and categorizes them into five groups. Urban reuse includes irrigation of public spaces, along with fire protection in industrial facilities. Agricultural reuse is mainly for irrigation of non-food crops. Recreational reuse involves impoundments such as lakes and ponds. Environmental reuse provides wetland enhancement

or sustains stream flows. Finally, industrial reuse is for such applications as cooling or for heat pump systems.

Anderson's research into water reuse includes a project that he developed for the National Center for Environmental Research. It involved creating a decision model for determining urban water use. The model considers the incentives and barriers to reuse, broken down into five categories: regulatory, human and environmental health, technology, policy and economic.



Anderson said that he recently finished up a study funded by the USEPA that examined the costs for taking treated wastewater and returning it for reuse by industry in the Chicago area. His conclusion, for the time being anyway, is that the economic incentive is lacking at this time.

"For people who get water from the City of Chicago, it's going to be a really difficult thing to do just based on economics because the cost of water in Chicago is incredibly inexpensive," he said.

Since cheap water is the result of abundant water, some may question the motivation for Anderson's work, at least as it focuses on the Chicago area.

The population in the northeastern portion of the state is projected to rise by 35 percent by 2040. Although this area draws a significant portion of its water from the fifth largest lake in the world, a 1967 U.S. Supreme Court decree limits the amount of water that can be pumped from Lake Michigan to no more than 3,200 cubic feet per second.

"I think it's inevitable. It's going to happen," Anderson said of the day when Illinois starts to experience water shortages.

The dilemma facing wastewater reuse in Illinois today is similar to that for the development of alternative fuels. Although everyone recognizes that water and oil are expendable resources, as long as they remain relatively cheap, there's limited incentive to conserve or seek alternatives.

"This kind of reuse idea is very common in arid states: Arizona, California, Texas. We haven't had enough drought and water demand problems," Anderson said.

Drought and water shortages have led to some dramatic developments, at least by Illinois standards, in the western United States.

Last year, Orange County, California opened the world's largest wastewater recycling plant. The plant distills 70 MGD of pre-treated sewer discharge, enough to meet the drinking needs of 500,000 people. The water reportedly exceeds standards for potable water, although regulations still require that it be filtrated down into the aquifer before being offered for public use.

Further north in California, the Sacramento Regional County Sanitation District feels so highly about their effluent that they want to offer it up for sale. In response to a statewide drought, city officials are seeking state regulation changes that would allow them to sell the treated wastewater to a third party, who would in turn recycle the water and make it suitable for drinking.

In the desert, municipalities are even competing with its residences for use of their wastewater. A 2005 plan to install a second set of pipes in new homes being built

in northeast Phoenix so that gray water from washing machines and showers could be used for irrigation was nixed by the city's Water Services Department. The city didn't want to reduce the flow to a reclamation plant that discharged treated water to irrigate larger open spaces.

While they may not be selling or fighting over effluent in Illinois, it is being put to good use on more and more projects.

When the Village of Richmond was faced with replacing their wastewater treatment plant, that dated back to the 1920s, they used the opportunity to enact the first approved water reuse ordinance in the state.

Due to state regulations on nonattainment, the village was going to have to discharge the effluent from the new plant to an outflow that would require it to be piped through the southern section of town. Village officials decided to take advantage of the new distribution infrastructure required by using it to offer the treated water to businesses for non-potable uses.

The ordinance includes language proposing to "encourage, and in specific instances require, municipal water supply users to use municipal treated wastewater for specific uses meeting Illinois Environmental Protection Agency permitting criteria and public health standards for a non-potable water supply."

"As a community they took this proactive approach and said there's a better way to use this water and they're looking at taking treated wastewater and make it available for a number of different applications in the community," Anderson said.



*"Instead of using it once and throwing it away, make use of treated wastewater in appropriate applications." - Dr. Paul Anderson*

One of those applications is for a local golf course, which will receive the reused water at no cost for ten years and then pay 25 percent of the going price for fresh water.

In Plano, the city worked closely with city staff, residents and environmental groups when preparing plans to expand their treatment plant from 0.95 MGD to 2.44 MGD. Designed by Walter E. Deuchler Associates, Inc. (WEDA), the resulting improvements include biological phosphorous removal and the reuse of UV disinfected effluent on the plant site and at a nearby golf course. The city was able to reach an agreement with the golf course to accept the effluent, which is conveyed through a 30-inch pipe, for irrigation.

John Frerich, P.E., manager of the municipal engineering group for WEDA, explained how the solution benefited the golf course, the utility and the environment.

"Since the golf course doesn't have to use municipal or well water for irrigation, it saves them money, and preserves the groundwater as a resource for other uses. In addition, by using the effluent for irrigation, the pollutant loads that are normally discharged to the nearby creek are reduced helping to preserve the quality of the creek," Frerich said.

He added that the public, environmental groups and regulatory agencies have been receptive to providing treated effluent for irrigation of golf courses and other recreation facilities.

Crawford, Murphy & Tilly, Inc. (CMT) completed a wastewater collection and treatment plant project for the Village of Norris. For years this community of 200 had been trying to replace their failing septic system. As part of the solution, CMT designed a 12-acre spray irrigation system that discharges treated wastewater on a field where turf grass is grown.

"The beauty is that it does not discharge to a water body, thus no NPDES discharge permit was required," said Ted Geitl, P.E., CMT senior engineer.

A major factor that made the Norris and Plano projects economically feasible is that both found a use for the effluent within proximity of where it was treated. In situations where the treated wastewater will need to be distributed a greater

distance, infrastructure costs associated with secondary distribution systems will factor in.

Acknowledging the fiscal realities, Anderson thinks the time has come to start preparing incrementally for the day when water will become a more valuable commodity in Illinois.

"What it's going to take is a cooperative planning among the utilities so that if someone comes to replace a street or electrical line they could at that time collaborate and put in secondary distribution system. That kind of piggybacking will go a long way to cutting down on the costs of some of these things," he said. If these considerations take hold and an attitude of recycling becomes ingrained, perhaps people look back to today and wonder why we ever threw away all of that perfectly good wastewater.

*"The population in the northeastern portion of the state is projected to rise by 35 percent by 2040."*

