# Don Talend: Water Processing Content Portfolio

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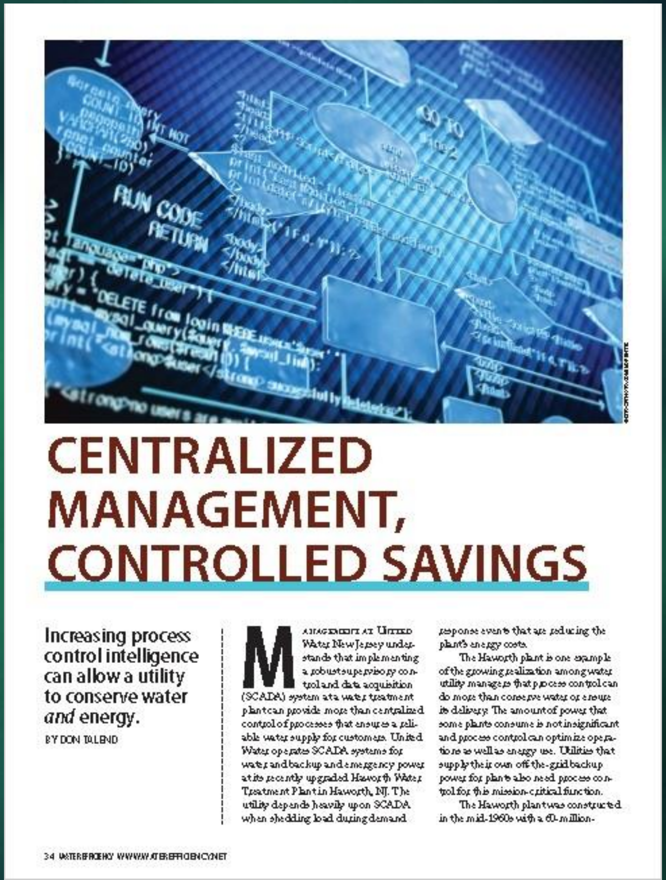
# Contributing Editor, Forester Media

- Forester Media: publisher of sustainable commercial practice information
- Wrote 100-plus long-form technical feature articles for several titles, including:
  - Water Efficiency magazine
  - Stormwater magazine
  - Erosion Control magazine
- Aggregate reach: 2 million+ readers
- Incremental ad revenue increase: $500,000+

# Water Efficiency: Process Control

## Supervisory control and data acquisition (SCADA) systems conserve both water and energy



# CENTRALIZED MANAGEMENT, CONTROLLED SAVINGS

**Increasing process control intelligence can allow a utility to conserve water *and* energy.**

BY DON TALEND

Management at United Water New Jersey understands that implementing a robust supervisory control and data acquisition (SCADA) system at a water treatment plant can provide more than centralized control of processes that ensures a reliable water supply for customers. United Water operates SCADA systems for water and backup and emergency power at its recently upgraded Haworth Water Treatment Plant in Haworth, NJ. The utility depends heavily upon SCADA when shedding load during demand response events that are reducing the plant's energy costs.

The Haworth plant is one example of the growing realization among water utility managers that process control can do more than conserve water or ensure its delivery. The amount of power that some plants consume is not insignificant and process control can optimize operations as well as energy use. Utilities that supply their own off-the-grid backup power for plants also need process control for this mission-critical function.

The Haworth plant was constructed in the mid-1960s with a 60-million-



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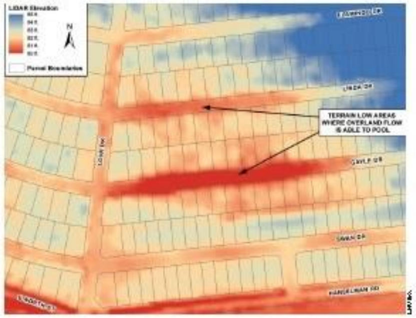
# Stormwater: Data Modeling

## Public works managers use information systems to analyze storm flows and upgrade storm sewer systems

# Data *Goldmines*

Robust information systems optimize improvements.

BY DON TALEND

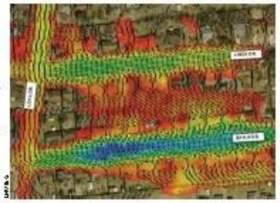



Persistent localized flooding problems in parts of Victoria, TX—located near the Gulf Coast—have prompted the city to use documented residential flooding complaints to identify and prioritize areas in need of in-depth evaluation. To optimize capital spending, the city is not merely using anecdotal flooding evidence to guess at how to possibly resize parts of its drainage infrastructure. Rather, sophisticated modeling efforts were undertaken to assist in identifying causes of the localized urban flooding and to support detailed recommendations for storm drainage system upgrades in locations where they are needed most.

This is one example of how stormwater managers are using robust information systems to analyze the true impacts of storm flows on their storm sewer systems. The decision support provided by these information systems is saving, or has the potential to save, millions of dollars.

Starting in late 2011, the City of Victoria hired LNV Inc.—a Corpus Christi, TX-based multidisciplinary engineering and architectural firm offering drainage and flood control among a range of other services in the civil, structural, transportation, environmental, architectural, surveying, and design/build specialties—to conduct an investigative hydrologic and hydraulic study of the existing storm sewer system within the Mayfair Terrace subdivision in Victoria County.

The basic pre-processing workflow for this project used a geographic information system (GIS) and included data collection, data integration



Top: ArcGIS depiction of LiDAR elevation data
Bottom: Results provided by xpStorm 2D for the 25-year storm event

and analysis, and model building. From there, LNV used XP Solution's xpStorm computer program with two-dimensional (2D) module to simulate one-dimensional (1D) and 2D hydraulic elements. The program assisted the engineers in identifying areas of street and structure flooding and allowed them to compare these areas against flooding complaints from residents.

The data collected during the ground survey included inlet location, type, and size; manhole location; and storm sewer size, type, and depth. Other ground survey data collected were topographic shots of an outfall ditch and culverts, curb shots, and approximate road centerline shots. In all, approximately 2,300 survey shots were acquired during this portion of the data collection. The survey data would be a significant source of data used to build the storm drainage network and outfall ditch within the hydraulic model. LNV also acquired 1/9 arc-second (about a 3-meter resolution) Light Detection and Ranging (LiDAR) elevation data from the US Geological Survey (USGS), which was used to simulate the ground terrain within the hydraulic model.

From there, LNV used computer



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# Water Efficiency: AMI Data

## Water utility managers use automatic metering infrastructure data to identify system leaks and cut water loss

## ALIGNING TECHNOLOGY, STRATEGY

**Realizing the potential of AMI means capturing vast quantities of consumption data—and analyzing the data to achieve business objectives.**

BY DON TALEND

In general, Automatic Metering Infrastructure (AMI) is no longer thought of as the latest technology to come along. But as AMI technology providers improve their data collection capabilities, water utility managers are making increasingly effective use of AMI data. The result is improved conservation at the utility level as it becomes easier to discover leaks—and help customers save money as the utilities make them increasingly aware of their consumption habits.

In this era of economic contraction, much recent talk surrounds the nation's aging infrastructure, including water mains in many industrial cities that were built in the early 20th century. Capstone Metering LLC cites research indicating that distribution systems around the world are losing an average of 26% of treated water totaling almost $14 billion in lost revenues. The United States Geologic Survey estimates that 1.7 trillion gallons of water are lost per year, at a national cost of $2.6 billion per year. For developed countries, non-revenue water often represents 20% of the total water withdrawn from the environment. In developing nations, non-revenue water can account for as much as 50% due to distribution system leaks, theft, and poor measurement techniques.

With tax bases shrinking in many communities, reducing non-revenue water loss is not a matter of choice. Increasingly granular and real-time AMI data are making this more realistic.

John Sala, director of marketing for system software and collection hardware for AMI provider Neptune Technology Group, contends that the real difference between automatic meter reading (AMR) technology and AMI is how the data are utilized. He refers to a presentation he has developed in which he describes how multiple generations of AMR technology have produced one output—a bill—and how AMI allows in-depth data analysis and conservation.

The issues holding water utilities back from implementing AMI are technical in nature, according to Sala. While electric utilities invest significant resources in AMI control communications, controlling multiple systems in water AMI is extraordinarily technology-heavy.

"Utility managers understand the business benefits they want, but they don't



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# Stormwater: Monitoring Systems

## Monitoring and sampling systems offer early detection of pollution in non-point sources

# Stormwater Quality Sentries

**Managers use monitoring and sampling systems that provide trend data to detect pollution early and help prevent major problems.** BY DON TALEND

An often-overlooked nonpoint source of stormwater pollution is roadside ditches. They can collect a wide range of pollutants from fecal coliform bacteria to petroleum hydrocarbons to heavy metals from roads, parking lots, and construction sites and transfer them to watersheds. The King County, WA, Department of Transportation Roads Maintenance Section is experimenting with stormwater treatment best management practices in these ditches and needs to continuously monitor flows through the ditches to determine which best management practices (BMPs) are most effective.

Roadside ditches have dynamic impacts on stormwater pollution levels; in that respect, they are no different from many nonpoint pollution sources. And as with many nonpoint sources, they warrant monitoring and/or sampling so that stormwater management authorities can keep up with rapidly changing conditions and keep emerging problems from developing into catastrophic ones. The example from Washington is just one of how storm water management authorities



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# Water Efficiency: Wastewater Treatment

## Purification systems allow water authorities to supplement natural water supplies

# Organic Growth—in a Manner of Speaking


WHEN NATURAL RESOURCES AREN'T ENOUGH, SOME PURVEYORS SUPPLEMENT WITH RECYCLED WASTEWATER USING LARGE-SCALE TREATMENT SYSTEMS.

By Don Talend

Combine a highly populated county in southern California and the region's climate and ongoing challenges to provide sufficient potable water supplies, and the need to "think outside of the box" arises. The Orange County Water District (OCWD) and Orange County Sanitation District (OCSD) are combining their expertise to undertake an ambitious $481-million Groundwater Replenishment System (GWRS) project that recycles the wastewater from the sanitation district's 21 cities. The world's largest planned indirect potable water reuse project will boost long-term water resources for about 2.4 million people in 21 California cities, including Anaheim, Santa Ana, and parts of Irvine.

Technological advances in water purification are allowing some water authorities such as the OCWD to make good use of wastewater—something that previously was not considered a resource.

By January 2008, the first phase of the GWRS was marked by the startup of a new $300-million, 70-million-gallon-per-day (mgd) water treatment facility in Fountain Valley, CA. The facility replaces a 5-mgd reclamation plant at the site known as Water Factory 21 that was built in the 1970s. The new facility features a submerged membrane system that is upstream from a reverse osmosis (RO) unit and an advanced oxidation system that utilizes ultraviolet (UV) light plus hydrogen peroxide. The $27-million microfiltration system is the largest in the Americas and one of the largest in the world. The project was awarded the 2009 ASCE (American Society of Civil Engineers) Outstanding Civil Engineering Achievement Award, the US Environmental Protection Agency's



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# Industrial WaterWorld: Mine Remediation

## Grading contractor builds passive water treatment system for Pennsylvania project

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# Erosion Control: Wheel Washing

## Systems help contractors adhere to environmental regulations, minimize operating costs and maintain a positive image

### Beyond Compliance–Trackout and wheel-washing systems can improve profitability

Don Talend

Contractors who use trackout cleanup equipment such as automatic wheel-washing systems merely to comply with environmental site regulations may be taking the wrong approach. Plenty of reasons exist for "taking the high road" and adopting these systems—namely minimizing operating costs, which can allow for more competitive bidding, and maintaining a good company image and relations with neighbors adjacent to sites.

Although different portable construction-site wheel-washing systems' dimensions and features vary, they are essentially designed so that trucks are driven across a raised metal platform —typically equipped with walls and, in some cases, rails—while side- and bottom-mounted water sprayers remove mud and debris from tires at a high velocity with the walls reducing spray drift. Programmable controls and sensors run the sprayers, triggering optimal water output for a given truck driving across the platform. These systems have either above- or below-ground washwater storage tanks, with the latter design possessing greater storage capacity to handle a higher truck volume. Typically, these systems are equipped with some means of removing solid material from the washwater, such as a conveyor.

J.P. Lake, vice president of sales and marketing Rain for Rent, a provider of temporary liquid handling solutions and carrier of MobyDick wheel-washing systems, reports that these systems are more commonly used in the Pacific Northwest and in the Northeast compared with other areas. He notes that the National Pollutant Discharge Elimination System (NPDES) permit for construction sites touches on this area, but uniform enforcement has not yet occurred.

According to section 2.1.2.3 of the 2012 construction general permit, "Minimize Sediment Track-Out," contractors must "restrict vehicle use to properly designated exit points" and "use appropriate stabilization techniques at all points that exit onto paved roads so that sediment removal occurs prior to vehicle exit." In regard to mud trackout, contractors must "where necessary, use additional controls to remove sediment from vehicle tires prior to exit." Examples of these additional controls include "wheel washing, rumble strips, and rattle plates."

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# Stormwater: Street & Catch Basin Cleaning

## Overview of available equipment

# Compliance Tools on Wheels

**Stormwater managers have many options to choose from in street sweeping and catch basin cleaning equipment** BY DON TALEND

Two common best management practices (BMPs) that municipalities can use to manage nonpoint-source pollutants under a National Pollutant Discharge Elimination System (NDPES) stormwater permit are street sweeping and catch basin cleaning. Stormwater managers have plenty of equipment options available for these tasks.

Street sweeping equipment, in particular, has seen an evolution in recent years. Johnston North America points out that street sweeping is a nonstructural source control. These types of controls prevent pollutants from entering stormwater flows through the expansion of cleanup programs, such as street sweeping, sidewalk sweeping, cleaning of storm drains, and enforcement actions against illicit dischargers.

EPA and the states have recently focused on small debris particles ($PM_{10}$, or particles with a diameter of 10 microns or less) because heavy metals and other pollutants have been shown to attach to them. These particles become total suspended solids during rainfall and fugitive dust that gets blown around in dry weather. As a result of this emphasis, manufacturers are attempting to facilitate the effective removal of these fines.

Recent efforts to better deal with the tricky challenge of keeping the finest dust out of stormwater have resulted in more than one type of street sweeper. Stormwater managers can choose from among mechanical broom sweepers, vacuum sweepers, regenerative air sweepers, and new dry sweepers.

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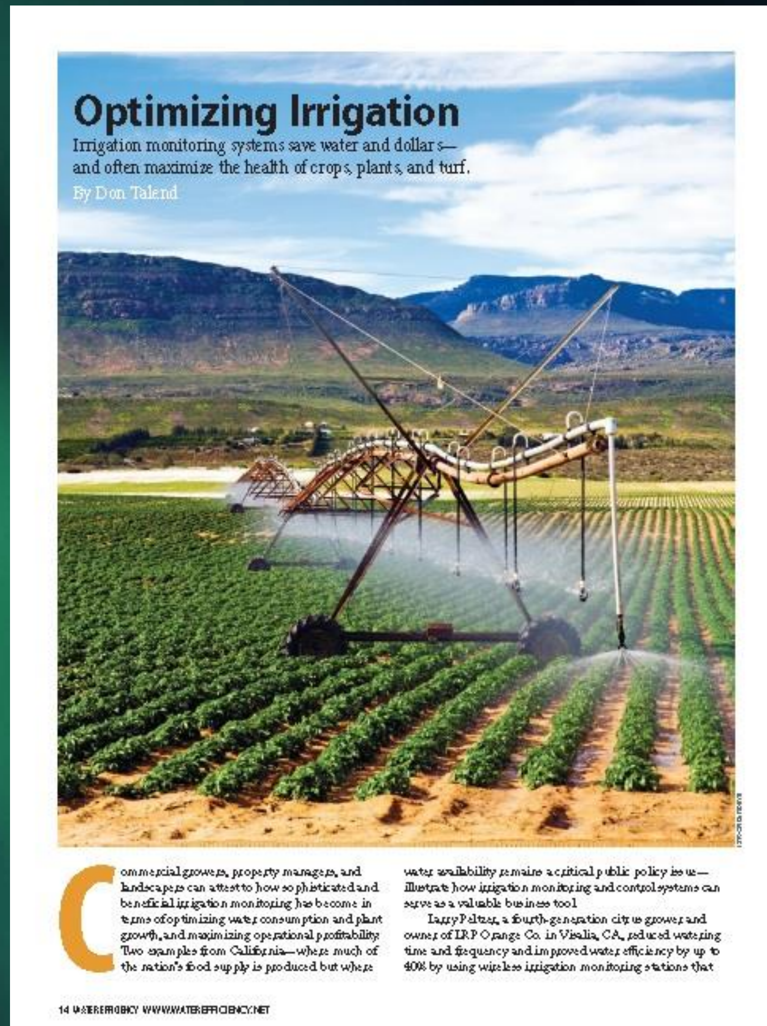
# Water Efficiency: Irrigation Monitoring

## Systems optimize water use, maximize profit



# Optimizing Irrigation

Irrigation monitoring systems save water and dollars—and often maximize the health of crops, plants, and turf.

By Don Talend

Commercial growers, property managers, and landscapers can attest to how sophisticated and beneficial irrigation monitoring has become in terms of optimizing water consumption and plant growth, and maximizing operational profitability. Two examples from California—where much of the nation's food supply is produced but where water availability remains a critical public policy issue—illustrate how irrigation monitoring and control systems can serve as a valuable business tool.

Larry Peltzer, a fourth-generation citrus grower and owner of LRP Orange Co. in Visalia, CA, reduced watering time and frequency and improved water efficiency by up to 40% by using wireless irrigation monitoring stations that



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# Stormwater: Street Sweeping

## Keeping up with maintenance helps public works managers reduce water pollution

# Fine-Tuning *Street Cleaning*

Managers are detecting an increasingly positive effect on pollutant levels.

BY DON TALEND

San Angelo, TX, home of the Concho River that flows through the downtown area and three lakes, is a lot like many cities that sprang up along the banks of a river. Stormwater runoff affects the viability of drinking water and the ecosystem not only of San Angelo, but also of several communities located downstream. The Texas Commission on Environmental Quality (TCEQ) lists the North Concho River on its 2010 303(d) list for a water-quality impairment and cites water-quality concerns for high levels of bacteria and depressed dissolved oxygen (DO). As part of its stormwater quality permit issued in August 2007, the city was required to submit a National Pollutant Discharge Elimination System (NPDES) Phase II stormwater management program by February 2008, with full implementation by August 2012.

Cities such as San Angelo are finding that cleaning streets of oils, grit, trash, and other pollutants is a much more cost-effective way of keeping these materials out of stormwater before it reaches rivers, lakes, and streams than is cleaning out storm drains and catch basins on a regular basis.

San Angelo, population 93,200, has about 1,100 curb miles of streets and more than 70,000 feet of city-owned open storm drains. The city's acquisition of five Tymco Model 600 regenerative air sweepers from August 2010 through December 2011 has been a major part of its initiative to get the river off of the list of impaired water bodies by creating a cleaner stormwater environment before runoff enters these structures instead of cleaning large quantities of pollutants from the structures periodically. Although bacteria and DO levels are not directly affected by street sweeping, they are indirectly connected because the debris and pollutants picked up by street sweepers contain elements such as dead vegetation that grow bacteria and other organisms that use up much of the oxygen in the river.

The city is divided into six districts, each of which is cleaned several times a year—except for both sides of the river in the downtown area, which is cleaned every morning before traffic picks up. "It's an aesthetic issue, but also, street sweepers pick up a lot of material off of the street," says Clinton Bailey, city engineer. He adds that clean streets make the downtown area more of a potential tourist attraction, so the city purchased a smaller Tymco 600 sweeper that is dedicated to this area.

Street cleaning is not a new concept to the city; prior to 2010, three sweeper-type machines were in use. "With regenerative [sweepers], you have a vacuum system," says Doug Kirkham, the city's stormwater superintendent. "With the regular broom system, we were finding that we were sweeping and doing some good, but we were not able to vacuum up the small particles that are embedded into the streets. We found that we were stirring up the dirt and getting some of it, but a lot of it was turning into dust particles and spreading into the air." Kirkham estimates that, prior to the purchase of the Tymco regenerative air sweepers, the city was picking up 200 to 250 tons of pollutants from the streets per month. Since the purchases, the city has begun tracking the total weight of pollutants and is now picking up 400 to 450 tons per month.

Art Gonzales, stormwater inspector for the city, reports that the new machines are making a difference in terms of effectiveness. "I think they do a really good job of picking up smaller particles," he says. One option that the operator relies on is the machine's Broom Assist Head, which loosens dirt before removing it from the surface by using an extra broom installed within the sweeper head that works in conjunction with a blast of air from the blast orifice. When necessary, operators also use the gutter brooms to loosen fine dirt particles that get packed down in the curb line, Gonzales adds.

When the stormwater management plan was implemented, the city cleaned out the storm drains and made necessary repairs. Then the street cleaning program was implemented. "We've gone back in and looked at these storm drains and it's amazing, the difference from what they were to what they are now," says Kirkham, noting that no regular maintenance was performed on the storm drains before the stormwater management plan was implemented. "I can't give all of the credit to the sweepers because some of those storm drains have probably been in the ground for 40 years and there has never been any maintenance on them. Now we've gone in and cleaned them out, and we're finding that they're staying clean. We're keeping the debris off of the streets, and then when we are blessed with the rain, the storm drains are flowing; we don't have debris caught in them."

Kirkham reports that the public does not seem to mind the fact that the street sweepers occasionally clean the pavement. "The response is excellent, I would say. People appreciate the service. We added a stormwater management fee to the water bill, so we have to be out there in the public eye and let them see what we're doing." Currently, however, the cleaning schedule is not determined far enough in advance that residents can be given notice to move their vehicles.

Besides picking up significantly greater quantities of pollutants so that



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