

Water Reuse & Recycling: The Way of the Future

By Paul Overbeck

Throughout North America, communities large and small are facing water supply challenges due to increased demand, undependable weather conditions ranging from drought to uncontrollable flooding, depletion and contamination of groundwater and dependence on a single source of supply.

Recognizing a Need

The inhabitants of the U.S. desert southwest and visionary politicians from past decades recognized the scarcity of water in their region and understood the necessity of water to support growth and prosperity. In the first half of the 20th century, this meant a control and containment strategy fueling the construction of hundreds of dams. The guarantee of consistent water supply and electricity lead to agricultural development of arid lands, establishment of light and specialized industries and the resultant rapid population growth

coupled to economic development.

Past investments are not keeping up with industrialization, rising populations and resulting demands for agricultural products. Demand is stretching the limits of supply in many geographic areas. This is not only evident in Arizona, Nevada, Utah, New Mexico and California, but also in Georgia, Florida and other coastal states due to recent drought conditions. Local, state and federal government policy makers and regulators are facing new difficulties in meeting everyone's demands for water.

Large-Scale Commitment

In early May, the Florida House voted to phase out treated sewage discharge into the ocean from Broward, Palm Beach and Miami-Dade counties. This will save water and shut down a source of ocean pollution once complete in 2025. The measure will save 300 million gal of water that are currently dumped into the ocean each day, an amount equal to the projected growth of potable water needs over the next 20 years for southern Florida.

To meet this legislation, the counties will need to add membrane, ozone and ultraviolet (UV) treatment processes for suspended solids, organics and pathogen reduction to achieve a

higher quality level than is possible with today's conventional treatment.

These processes are already used successfully as part of reclaim systems in Gwinnett County, Ga., Scottsdale, Ariz., and Orange County, Calif., to name a few. The finished product will be used for watering lawns and golf courses, leaving fresh water sources for drinking water production.

Surprising Locations

Some innovation has come from unusual places, including recycling wastewater from high rises and sports stadiums where isolated plumbing systems allow the collection of wastewater for treatment and reuse for irrigation. The ability to make low-volume treatment and reuse possible has been the development of compact and efficient packaged treatment technologies.

The first onsite water reclamation system in a multifamily residential building in the U.S. can be found in the Solaire Building in Battery Park, N.Y. The 27-story, 293-unit building designed in 2000 and completed in 2003 is the first green building of its kind in the country. The showers, sinks, dishwashers, washing machines and all 750 of the building's toilets deliver up to 25,000 gal of sewage to the treatment and reuse system installed in a 1,500-sq-ft room within the parking area each day.

The treatment process includes settling to remove the largest solids before collected wastewater enters a membrane bioreactor, where bacteria digest most organic matter. This kind of organic digestion takes place in most standard wastewater treatment facilities; what makes membrane treatment effective is the high surface area to process the flow in a small footprint.

Challenges from uncertain water supplies drive creative approaches to reuse





The Solaire has reduced water consumption and discharge by 48% and 56% respectively while adding about 0.5% to the cost of the building. At current sewer and water rates, the Solaire's water reuse system will take up to 12 years to pay for itself.

Ozone is added to the membrane system effluent with a pressurized contacting system to remove low residual color and light odor. This pressurized flow then goes through UV treatment as a secondary process to microbial inactivation by ozone

and to reduce any ozone residuals before the water is boosted into the building reuse line and is then available to be used for cooling tower make-up, irrigation in the adjacent park and to refill each of the 750 toilets throughout the building.



A larger 250,000-gal-per-day system using membrane bioreactors, ozone and UV has been in operation at Gillette Stadium in Foxboro, Mass., home of the New England Patriots. This installation incorporates a 500,000-gal collection tank to allow processing during the week after busy weekend events.

Where Do We Go From Here?

Challenges from uncertain supply and the rising cost to acquire water, one of our most precious resources, are driving creative approaches to reuse at many levels. This is a global issue of concern, not a problem facing only the U.S. Water reuse helps local and international communities

increase high-quality water supplies, improve reliability, protect public health and safeguard the environment. Advanced oxidation and disinfection technologies have become an integral part of the reuse process to meet these goals. *wqp*

Contact the International Ozone Association for details on ozone use in water reclamation and reuse at www.io3a.org, and visit www.batteryparkcity.org/concept/green for details on green building programs.

Paul Overbeck is executive director of the International Ozone Association. Overbeck can be reached at 480.529.3787 or by e-mail at pauloverbeck@io3a.org.

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Water Quality Association
International Headquarters & Laboratory
4151 Naperville Road
Lisle, Illinois 60532-3696 USA
Telephone 630 505 0160
Facsimile 630 505 9637
Web site www.wqa.org
A not-for-profit organization

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