

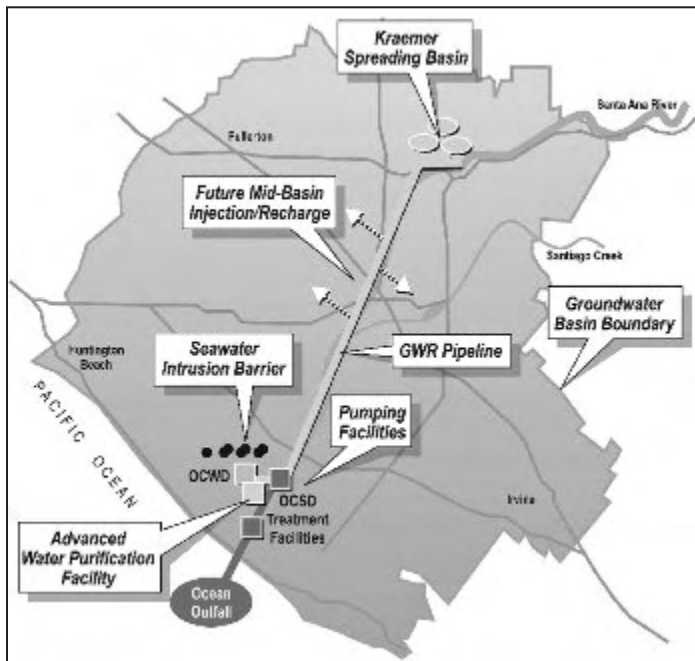
Cities of the Future: An Integrated Approach to Water Reclamation

by Paul R. Brown

As cities and urban areas grow, they are facing water resource management challenges that call for new approaches and innovative technologies, particularly in water scarce areas like the Southwest.

Orange County, California, has long been a pioneer of water reclamation and recycling, having developed a water reuse project in the 1960s that grew into the well known Water Factory 21. However, after nearly three decades of success, WF21 could not keep up with the demands prompted by population increases, area droughts and increasing environmental concerns.

To address these needs, OCWD (Orange County Water District) hired CDM, a consulting, engineering, construction, and operations firm, to design an innovative Groundwater Replenishment (GWR) System – the largest purification project in the world dedicated to producing potable water from treated wastewater. A model of sustainability, the system removes bacteria, emerging contaminants, chemicals, and viruses from highly treated effluent through microfiltration (MF), reverse osmosis (RO), and ultraviolet light (UV). Following treatment, the purified water is injected into a seawater barrier to prevent saltwater intrusion or percolated into groundwater basins before becoming drinking water for about 500,000 people.



The Groundwater Replenishment (GWR) System advanced water treatment facility in Fountain Valley, California, pumps purified water to groundwater basins and seawater intrusion barriers in Orange County. This map represents the Orange County Water District's 350-square-mile service area.

Collaborative Approach, Creative Solutions

Through collaboration among public officials, community groups, and utility managers, it is possible to implement solutions that go

beyond basic expectations. This unique solution was born out of collaboration between the Water District and the Orange County Sanitation District (OCSD). OCSD was looking into building a second ocean outfall to handle peak storm flow and around the same time, OCWD was seeking to expand WF21 to meet drinking water needs.

Building on a relationship that began in the 1970s, the GWR System was an optimal solution for both utilities as it maximizes a previously wasted resource and indefinitely delays the need for a second ocean outfall. Through an agreement, the water purification facility will treat clarified secondary effluent to drinking water standards for use in the seawater barrier and for recharge of the groundwater basin. During peak wet weather periods, the GWR System will treat the wastewater with MF and UV and discharge it to the Santa Ana River. As OCWD General Manager Michael Markus, PE, explained, "They [OCSD] have always been very supportive of reclamation. This project essentially builds on that partnership ... it is a real success story element of this project."

That spirit of partnership served as a cornerstone of this project – not just between two utilities, but also between the OCWD and the engineering design team who worked closely together. Due to its magnitude, the project was broken down into approximately 11 components, each led by a design team member paired with an individual from OCWD.

continued on page 39



The stainless steel air manifold connects to each MF membrane module with a flexible hose. During the MF backwash operation, air is forced through holes in the bottom of the membrane modules, gently agitating or scouring the surface of the membranes to remove debris.



During the reverse osmosis step, applied pressure allows water to pass through tiny membranes filtering out pesticides, pharmaceuticals, and any remaining bacteria. With unwanted contaminants left behind, the resulting water is 100 percent virus free.

Photo by Steve Crise, courtesy of American Water Works Association



Eight Reasons TASKMASTER® GRINDERS Are the World's Best...

If you're tired of grinder maintenance and thought grinders were all built the same, here's important information.

There is one grinder that is so reliable and effective, it is truly superior --the TASKMASTER. Here's eight reasons this unit is the world's best.

2

**With 1/6th
the Parts,
Maintenance
is Far Easier.**



3

**Higher Strength
Design**



4 Higher Precision

The cutters are more precise and also sharper because they are fully machined and precision ground.

5

**A New Era
of Reliability**

6

**No
Re-tightening
Required-Ever!**



8

**25% Stronger
Bearings**

7

Superior Seal Technology

This is the industry's most durable seal design featuring: a labyrinth seal, rugged tungsten carbide mechanical seal faces, hardened stainless steel seal glands and no machine housing wear parts.

**Call Toll Free:
1-800-932-0599**

Represented By:

Bendlin Incorporated

855 Valley Rd
Clifton, NJ 07013
Ph: 973-574-0000
Fx: 973-574-0020
bendlininc@aol.com

Siewert Equipment

175 Akron Street
Rochester, NY 14609
Ph: 585-482-9640
Fx: 585-482-4149
jconnolly@siewertequipment.com
Attn: Jerry Connolly

**Make Your Next Grinder a
TASKMASTER!**

see the difference.....



www.franklinmiller.com



Photo by Steve Criss, courtesy of American Water Works Association

Following reverse osmosis (pipes in foreground), water is sent to the ultraviolet light disinfection phase (in background above pipes) where UV light combines with hydrogen peroxide to create an advanced oxidation reaction that breaks down any organic compounds.

“We had to have close collaboration with the CDM designers,” said Markus. “It started during the preliminary design stage when we started mapping out how to manage and break down the various elements of the project and continued throughout the project.”

Beyond the Basic Benefits

In addition to providing high quality drinking water to the residents and businesses within the service area of 2.3 million people and 350 square miles, the GWR System has environmental and social benefits.

Not only is OCWD creating a reliable water supply from a previously wasted local resource, it is also drastically reducing the amount of effluent discharged to the Pacific Ocean. Recycling wastewater requires less energy than previously used to import costly water from Northern California and the Colorado River. Recycled water also reduces the salinity of the groundwater, minimizing cleaning costs and extending the life of water heaters, boilers, and plumbing fixtures, which economically benefits the community.

CDM Senior Project Engineer R. Bruce Chalmers, PE, was thrilled by his involvement. “For an environmental engineer, this is the job of a lifetime. We are turning a previously wasted resource into a new source of water for 144,000 families. The blend of technical challenges and knowing that you are working on something that not many people in the world have done, is just incredible,” said Chalmers.

Outreach Nullifies Public Concerns

While similar water reclamation systems have been controversial in nearby San Diego and Los Angeles, Orange County has embraced the creative solution. The OCWD conducted an extensive outreach program to inform the public about the safety and effectiveness of the system. Markus explained that public education was a key

continued from page 37

component of the program. “We made a concerted effort to be transparent and educate the public. We garnered the support of local officials in all the cities that were using the water as well as state and federal legislators. We also got support from public health stakeholders and area environmental organizations.”

That public education and outreach seems to have paid off. So far, the feedback and attention has been overwhelmingly positive. The GWR System is setting the benchmark for similar treatment facilities around the world. Australia recently unveiled a project in Queensland that uses the same technology and the country is already planning others. To date, the GWR System has been visited by professionals from Singapore and China,

and similar plants are underway in Singapore and Miami, Florida.

As a precedent-setting project, Markus sums it up: “With this plant coming online, it will certainly act as a springboard for this type of project to be built all over the world. Wherever there is a water problem, it really just makes sense to recycle.”

Paul R. Brown, AICP, MS, MBA, is CDM Executive Vice President for Global Market Development. He directs CDM’s strategy, brand, marketing, and sales management worldwide. Brown has over 30 years of experience and, most recently, was president of CDM’s Public Services Group, which serves state, regional, and local governments across the United States. He is a certified planner in the American Institute of Certified Planners and holds an MBA from the Wharton School of the University of Pennsylvania. He may be reached at: brownpr@cdm.com. For company information, visit the website: www.cdm.com.



Photo by Steve Criss, courtesy of American Water Works Association

As part of Orange County Water District’s commitment to public outreach, area citizens, local government officials and water industry stakeholders joined OCWD executives and staff as well as the CDM design team at the official GWR dedication ceremony in late January 2008.