

notes from the underground

ASSOCIATION OF GROUND WATER AGENCIES NEWSLETTER

Fall 2006



OCWD Receives Landmark Award

A GWA member agency the Orange County Water District (OCWD) has received the California Historic Civil Engineering Landmark award. The district was recognized for conserving surface flows of the Santa Ana River and managing the groundwater basin in central and northern Orange County since its inception in 1933. The district also was acknowledged for its leadership in the development of visionary water reuse projects, such as Water Factory 21 and the Groundwater Replenishment System.

On behalf of ASCE, Carl Nelson, Fred Meier and Bob Bein presented the award to the OCWD board of directors. Bein, former national president of the ASCE and president of local Orange County civil engineering firm RBF Consulting, addressed the board remarking, "During my term as ASCE National President, I was privileged to travel the nation and, in fact, the world, dedicating outstanding civil engineering landmarks of the millennium, such as the Boulder Dam, Golden Gate Bridge, Empire State Building and the island airport in Osaka, Japan. But none of these has given me as much pleasure as being here tonight to dedicate our own home-grown Orange County Water District as an outstanding state civil engineering landmark."

In the mid-1960s, OCWD began a pilot-scale reclamation project that developed into the now famous Water Factory 21. The project was born out of a need to protect Orange County's groundwater basin from seawater intrusion.

A semi-desert arid region that only receives an average of 13 to 15 inches of rainfall annually, yet sustains a population of approximately 2.5 million people, Orange County needed a better way to protect its groundwater basin from the ocean. Water Factory 21 was created to purify highly treated sewer water. In October of 1976, the first purified water was injected into the coastal barrier, creating a pressurized hydraulic mound of fresh water that prevented the seawater from moving into the groundwater



basin. The project was a great success and was eventually replicated in the Los Angeles area for their seawater barriers. Water Factory 21 ran efficiently for almost 30 years, protecting groundwater and replenishing aquifers from which 50 percent of the county's water is drawn.

Continued on page 2



CONTENTS ▶ FALL 06


- Pg. 1..... OCWD Receives Landmark Award
- Pg. 2.... Public Celebration Held for Recycling Project
- Pg. 3.... Mojave Water Agency Proves that Partnerships Work
- Pg. 4.... EMWD Utilizes Desalination Recovery Enhancements
- Pg. 5.... Kern County: Filled to the Brim
- Pg. 6.... News Drops
- Pg. 7.... OCWD's Laboratory Design Nearly Complete

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OCWD Award

Continued from page 1

Water Factory 21 was recently demolished to make room for the new Groundwater Replenishment System (GWR System), which will use even better water technology to purify water for an expanded seawater barrier and to provide water to refill the groundwater basin. The new GWR System will be 14 times the size of the old Water Factory 21. The GWR System is a joint project of OCWD and Orange County Sanitation District (OCSD) and will begin producing near distilled-quality water in 2007. The GWR System takes highly treated sewer water currently wasted into the ocean and purifies it using the same technologies that purify baby food, fruit juices, medicines and bottled water.

Bein recognized the commitment OCWD has made to water resource efforts: "First Water Factory 21, now the Groundwater Replenishment System has led the way to doubling the safe yield of the basin and securing a sustainable seawater intrusion barrier. These are just a few of the most significant, state-of-the-art water world advancements that the OCWD leadership has not only conceived, but implemented." The Orange County Water District is currently under review for historic recognition at the national level. Local ASCE leadership is working to secure national designation for the district. The California Historic Civil Engineering Landmark plaque awarded to OCWD will be permanently placed during the 2007 grand opening of the Groundwater Replenishment System (former home of Water Factory 21). 



Bob Bein

Public Celebration Held for Recycling Project

A GWA member agency the Water Replenishment District of Southern California (WRD), the City of Los Angeles Department of Public Works and the Los Angeles Department of Water and Power (LADWP) joined forces in September to celebrate and hold a public open house for the Harbor Water Recycling Project at the Terminal Island Treatment Plant (TITP) Advanced Wastewater Treatment Facility (AWTF). The project saves hundreds of millions of gallons of potable water and is a combined effort by multiple agencies, water industry experts and environmental leaders.



"The Harbor Water Recycling Project is a prime example of how Southern California can use high-quality treated water to meet many of our region's water needs," commented LADWP Board President Mary D. Nichols. "It decreases the city's dependence on imported water and at the same time helps reduce the amount of wastewater discharged into the bay."

The Terminal Island Treatment Plant Harbor Water Recycling Project provides advanced treated recycled water and will replace 50 percent of the imported water to the Dominguez Gap Seawater Barrier. The facility supplies treated water to protect the drinking water of the region and to protect the West Basin groundwater area from seawater contamination. Using recycled water for the Dominguez Gap Barrier saves approximately 2.5 million gallons per day of potable water—enough potable water to serve more than 16,000 people per day.

"The Harbor Water Recycling Project is an essential part of what the Water Replenishment District calls the Water Independence Network (WIN) Program," noted WRD Director Rob Katherman. "Our objective under the WIN Program is to eliminate the use of

Continued on page 3



Recycling Project


Continued from page 2

imported water for replenishment and virtually eliminate its use for barrier injection by 2015.”

Also speaking at the event were State Water Resources Control Board Vice Chair Gerald Secundy, City of Los Angeles Bureau of Sanitation Executive Director Rita Robinson, and Heal the Bay

Executive Director Mark Gold. Former Executive Director of Policy for the Mono Lake Committee, Frances Spivy-Weber, served as the emcee for the program.

The celebration was attended by members of the public, as well as by environmental community members, water and government

officials, industry experts and agency representatives. Following the program of speakers, event attendees were invited to tour the facility to learn more about the state-of-the-art microfiltration and reverse osmosis processes for treating recycled water at the Harbor Water Recycling Project. 

Mojave Water Agency Proves that Partnerships Work



For three straight years, AGWA member agency Mojave Water Agency (MWA), a State Water Contractor located in the north desert region of San Bernardino County, has participated in a unique partnership viewed as an efficient and cost-effective way to achieve MWA's strategic goal relating to water conservation and public outreach. Known as the Strategic Partners Program, MWA works with Barstow College, Copper Mountain College, Victor Valley College, the Lewis Center for Educational Research, and the Mojave Desert Resource Conservation District to encourage consumers to practice water conservation.


The program is a win-win for MWA as well as the partners. The partners provide services or programs that MWA is unable to offer either because it doesn't

have the expertise or the staffing. The program also allows the partners to communicate with residents that MWA would likely not reach through existing channels.

For example, Victor Valley College hosted workshops covering landscape basics, habitat gardening, trees and shrubs of the high desert and firescaping. Barstow College offered both the master gardener course and included a water conservation component to its Biology 1 class. In addition, Barstow College expanded its demonstration garden by 13,000 square feet with more than 200 new plants, shrubs and trees. The garden also saw installation of a new decorative rock display (see photo).

The program is a win-win for the partners because MWA provides much-needed resources that would otherwise not be made

available, the agency said. Four of the five partners each gave a PowerPoint presentation to the MWA Board of Directors on July 13, describing their achievements this past year. The partners have already presented their plans for what they hope to achieve in the coming fiscal year.

Founded in July of 1960, Mojave Water Agency serves approximately 4,900 square miles of the High Desert in San Bernardino County, including the communities of Adelanto, Apple Valley, Barstow, Hesperia, Joshua Tree, Landers, Lenwood, Lucerne Valley, Newberry Springs, Victorville, Yermo and Yucca Valley. Its mission is to manage the region's water resources for the common benefit to assure stability in the sustained use by the citizens it serves. 

EMWD Utilizes Desalination Recovery Enhancements

Historical agricultural use and naturally occurring conditions have resulted in total dissolved solids (TDS) concentrations as high as 14,000 mg/L in the Perris South and Menifee management zones, located in the service area of AGWA member agency Eastern Municipal Water District (EMWD). As a result, groundwater production has diminished and groundwater levels have risen in these management zones. In the adjacent Lakeview Management Zone, water levels have declined and the high TDS groundwater is migrating into the management zone, degrading its high-quality groundwater.

Back in 1995, EMWD adopted the West San Jacinto Groundwater Basin Management Plan in accordance with statutes in the water code that were enacted by the state with the adoption of Assembly Bill 3030 in 1992. Two elements of the plan are recovery of degraded groundwater to be blended with imported water and recovery of brackish groundwater using demineralization/other treatment technologies.

Eastern implemented the Perris Basin Desalination Program (PBDP) to decrease dependency on costly and potentially unreliable imported water and to recover high TDS groundwater from the Perris South, Menifee and Lakeview management zones. Eastern has constructed and is operating two desalination plants and nine extraction wells. Brackish groundwater is extracted and

treated using reverse osmosis technology. The treated water is blended with groundwater to a usable domestic level product water of approximately 500 mg/L TDS and then integrated into the domestic delivery system. The



brine is disposed of via the approximately 22-mile-long Temescal Valley Regional Interceptor (TVRI) line, a non-reclaimable waste pipeline connecting EMWD to the Santa Ana Regional Interceptor (SARI) line. The SARI line transports brine to Orange County sanitation facilities for treatment and ultimate discharge to the ocean.


Eastern's brackish groundwater contains high levels of silica, calcium, sulfates, iron and barium. A third desalination plant and three more extraction wells are in design. Eastern has the need for export of non-reclaimable waste for salinity management. These three elements of the PBDP will ultimately produce brine in excess of EMWD's capacity in the SARI line. The Santa Ana Watershed Project Authority

(SAWPA) has indicated that there is no available capacity for purchase in the SARI system, and the cost of treatment and disposal is expected to increase exponentially in the future. For EMWD, as a land-locked entity, the need for disposal of

brine for salinity management is critical, as is the need to isolate and export non-reclaimable waste for better water resources management.

Eastern applied for—and in 2005 received—a grant from the State of California Department of Water Resources to conduct a pilot study to evaluate increased recovery and brine volume reduction. The Desalination Recovery Enhancement and Concentrate Management Study fully characterized

EMWD's brine concentrate and determined the silica speciation and polymerization characteristics of EMWD's brine. A chemical precipitation/softening process for the removal of sparingly soluble salts and silica from the primary RO concentrate was developed. Pilot-scale facilities were constructed including a chemical precipitation/softening plant, secondary RO plant, and Electro-dialysis Reversal plant.

Eastern is currently operating these pilot-scale facilities and collecting data for analyses through November 2006. The data collected will be analyzed to ultimately identify recovery levels and overall brine volume reduction and develop capital and operating cost estimates for full-scale facilities, through March 2007. 



Kern County: Filled to the Brim

“Filled to the brim” could describe water banking in Kern County, as recharge operations continue for the twenty-first consecutive month. Recharge is the process of allowing the water on the surface of the ground to infiltrate through the soil to the water stored below ground. The high flows of all three main sources of surface water—which include the State Water Project (SWP), Central Valley Project and local Kern River, coupled with releases from Isabella Reservoir—have enabled water managers to store large amounts of water underground. Last year was a record recharge year of over 1.3 million acre-feet (af) in local facilities, and this year is following a similar pattern. In fact, as of Sept. 16, 2006, approximately 317,000 af of water have been delivered to the Kern Fan banking groundwater projects.

“I am grateful to my predecessors for their foresight and initiative to establish banking programs,” said Lawrence P. Gallagher, AGWA member agency Kern County Water Agency (KCWA) board president. “We

should be able to store amounts of water similar to last year for future use in Kern County.”

Thanks to unusually heavy rains, the Department of Water Resources (DWR) increased the water allocation from the SWP from 90 to 100 percent of contracted amounts. While DWR approved allocations of 100 percent of the SWP contractors’ requests in 1999, this is the first time that DWR has approved an allocation that is 100 percent of the full contracted amount.

On the federal side, the U.S. Bureau of Reclamation approved water deliveries for the Friant Division of the CVP at 100 percent of Class 1 water. Water from Millerton Lake above Fresno, known as Friant Section 215 water, and Article 21 water from the State Water Project (SWP), were being recharged in Kern County until April 28, 2006, when the U.S. Army Corps of Engineers (Corps) began mandatory releases of Kern River water from Isabella Reservoir. The Corps increased Isabella Reservoir releases because it was concerned

Continued on page 6

News Drops

- ▶ Timothy F. Brick, the longest tenured member of the board of directors of the Metropolitan Water District of Southern California, was elected Oct. 10 as chairman of the agency's board, which oversees the major water importer and wholesaler for 18 million people in six southland counties. Brick, a Pasadena resident who has represented the city on Metropolitan's board since June 1985, was elected to a two-year term as chairman, taking office in January 2007. He replaces Wes Bannister, one of four representatives of the Municipal Water District of Orange County, who has served as Metropolitan chairman the past two years.
- ▶ A new rule issued Oct. 12 by the US Environmental Protection Agency (EPA) seeks better contaminant oversight by utilities that supply water from underground sources, according to an Oct. 12 press release. According to the press release, groundwater systems will now be subjected to triggered monitoring if a current treatment method does not remove 99.9 percent of viruses; all systems will have to comply with the new rule by Dec. 1, 2009. The rule outlines risk-targeting strategies, including checking for significant deficiencies through regular sanitary surveys of public water systems; triggered source water monitoring; and the monitoring of systems that treat drinking water and ensure the removal of pathogens, the press release said.
- ▶ The groundwater situation in many parts of China is deteriorating due to excessive exploitation and increasing pollution, experts have warned. More than 79 billion cubic meters of fresh groundwater are tapped annually in northern China, accounting for 51.5 percent of the total exploitable groundwater resources, Zhang Zonghu, an academician of the Chinese Academy of Engineering, said at the 34th Congress of the International Association of Hydrogeologists (IAH). At the same time, 26.7 billion cubic meters of groundwater is tapped in the south each year, accounting for only 13.2 per cent of the exploitable reserves, he said. As a result, many places have suffered from environmental damage such as ground settling and depression, salt-water intrusion in some coastal regions, and desertification in the hinterland, Zhang said. To reverse the situation, China has brought the study of groundwater into its national economic development plan, the researcher noted.

Kern County


Continued from page 5

about the level of seepage that is occurring at high reservoir storage conditions.

The Corps has recently been updating a study to evaluate seismic (earthquake) risks at Isabella Reservoir. While conducting the study, the Corps became concerned that the natural seepage through the auxiliary dam may be increasing above historic amounts. Seepage is the process of water moving through the soil, which is common in earthen dams such as Isabella. The Corps began increasing the reservoir outflow from 1,500 cubic feet per second (cfs) on April 29, 2006, to 4,500 cfs by May 8, 2006, and the Friant releases into the Kern River channel were stopped.

The Corps restored control of Isabella Reservoir to the Kern River Watermaster on June 26, 2006. During the mandatory release period, approximately 66,000 af of water were delivered to the Kern Fan banking projects. Additional mandatory release water was delivered to other Kern County recharge projects to meet irrigation demands. However, the water released during the mandatory period exceeded the recharge capacity and irrigation demands, resulting in 102,000 af flowing into the Kern River-California Aqueduct Intertie (Intertie).

"All local water agencies are working together to maximize opportunities to store this water," said KCWA general manager Jim Beck.

Kern County Water Agency was created in 1961 by a special act of the State Legislature and serves as the local contracting entity for the State Water Project. The Agency participates in a wide scope of management activities, including water quality, flood control and groundwater operations to preserve and enhance Kern County's water supply—the main ingredient for the well-being of an economy. 

OCWD's Laboratory Design Nearly Complete



The design of a new, 39,000 square-foot, \$24 million water quality laboratory at Orange County Water District (OCWD)'s Fountain Valley headquarters is nearly 90 percent complete, according to the agency. The new highly sustainable (green) laboratory will house the equipment and personnel needed to test and ensure the quality of groundwater used by approximately 20 city and other retail water agencies. Groundwater provides nearly 70 percent of the water needed for the 2.3 million water users in north and central Orange County. Current plans are to have the laboratory completed and ready for occupancy by fall of 2008.


Approval of the laboratory building design by the City of Fountain Valley Planning Department came in late July—a month that proved to be quite successful for OCWD's laboratory. Earlier in the month, the lab received stellar results for its mandatory performance evaluation held by the State of California. The "final exam" conducted annually for laboratories is designed to test the competency of each state-certified method used by laboratory staff. The

high markings solidified OCWD's reputation for unparalleled data analysis; 2006 marked the fourth straight year the lab's two divisions (organic and inorganic) met state requirements.

The benefits of OCWD providing water quality testing for its retail water agencies that use groundwater includes consistency of testing, reliability of water quality tests, and ease of reporting water quality data to state and other regulatory agencies.

The new facility replaces a 32-year-old building and several add-on portable trailers that the district has outgrown. Rehabilitating the old laboratory to meet seismic and other safety requirements in addition to expanding the facility would have been more costly than building a new facility, which is needed to meet current and future water quality testing requirements.

The two-story, steel-framed laboratory building will house approximately 30 chemists and lab technicians, 10 water-quality monitoring personnel and all the equipment needed to do more than 350,000 analyses of approximately 18,000 water samples taken each year. Constantly striving to meet or exceed

health and safety needs and improve water quality, the OCWD water quality laboratory looks and tests for new chemicals of concern and to meet ongoing regulatory requirements. The new water quality laboratory also will support the new water quality testing requirements for Orange County's Groundwater Replenishment System—the largest water purification project of its kind in the world. 

OCWD Water Quality Laboratory Green Facts

DESIGNER: RNL Design of Los Angeles

STRATEGY: Build a new laboratory incorporating key strategies from LABS 21 (a federal government program to promote better laboratory design)

OVERALL STRATEGIES INCLUDE:

- ▶ Use of passive and aggressive strategies to ensure energy, water and material conservation
- ▶ Improve indoor environmental quality
- ▶ Reduce environmental impact from construction phases throughout the life of the facility

KEY DESIGN STRATEGIES:

- ▶ Optimal solar orientation
- ▶ Excellent day lighting
- ▶ High performance glazing and building envelope insulation
- ▶ Locally manufactured materials with high recycled content and low emission of volatile organic compounds
- ▶ Selection of highly energy efficient HVAC (heating, ventilating and air conditioning) equipment
- ▶ High performance lighting and lighting control systems such as daylight and occupancy sensors
- ▶ Low flow plumbing fixtures
- ▶ Use of recycled water produced onsite for landscape irrigation