

Lysimeters Assess Regulatory Compliance with Recycled Water Recharge

By Mark Wildermuth¹, Joseph LeClaire¹, and Andy Campbell²

A safe and reliable water supply is and will continue to be the top priority facing Southern California water agencies because of the rapid urban growth in the region. The Southern California Association of Governments (SCAG) reports that Southern California's population increased by over 12 percent from 1990 to 2000 and an increase of 26 percent for the "Inland Empire."

The Inland Empire Utilities Agency (IEUA) and the Chino Basin Watermaster (Watermaster) are working together with the Chino Basin Water Conservation District and the San Bernardino County Flood District, to expand and improve 19 recharge basins to enhance the agencies' ability to capture and recharge stormwater, recycled water, and imported water. These sources of water supply will be recharged into the Chino groundwater basin and will ensure the stakeholders that the region is drought-proofed to the greatest extent possible. Richard Atwater, the CEO and General Manager of IEUA states, "IEUA will continue to strive to make its service area less dependent on imported water. By working together with our local retail water agencies, we will ensure that our communities continue to have high quality, reliable water supplies with very competitive water and sewer rates."

IEUA has spent and is committed to spending about \$75 million dollars for recharge basin enhancement and expanded recycled water projects. These projects will produce 95,000 acre-feet of new water annually, enough to meet the needs of 300,000 new residents.

Meanwhile, the Watermaster is progressively and actively implementing the Basin's Optimum Basin Management Program (OBMP), which includes extensive monitoring, further developing recharge capabilities, storage and recovery projects, managing salt loads, developing new yield such as reclaimed and stormwater recharge, and continuing to work with other agencies and entities to enhance this significant natural resource. Kenneth Manning, the CEO of the Chino Basin Watermaster says that "a centerpiece of the OBMP is an enhancement of the Basin recharge capacity, so that high quality stormwater and available recycled water can be retained in the Chino groundwater basin."

The Chino Basin Recycled Water Groundwater Recharge Program is being permitted with oversight from two California state regulatory agencies: the Regional Water Quality Control Board, Santa Ana Region (Regional Board) and the State Department of Health Services (DHS). The DHS has been developing Draft Regulations for the Recharge of Recycled Water. Early versions of these proposed regulations required the project proponent to drill and install monitoring wells in the recharge "mound" beneath the recharge basin to demonstrate compliance - reduction of total organic carbon and total nitrogen to concentrations specified in the permit. A groundwater mound is the local rise of the water table above its natural level resulting from a localized source, such as a recharge basin.

Mark Wildermuth, CEO of Wildermuth Environmental, Inc. (WEI) and a consultant to IEUA and Watermaster recommended that the DHS consider permitting the use of lysimeters to monitor compliance with the recharge permit, because it would be a more cost-effective means rather than "mound-monitoring wells." It would be necessary to drill and install mutipiezometer or nested wells due to the fluctuation in the water table which would add additional costs to the project.

WEI installed these lysimeter directly in the bottom of the recharge basin to ensure that samples collected are truly representative of the recharged water. The lysimeter has two tubes that run up the casing to the lysimeter head assembly. Conduits route the tubes to lysimeter head assemblies that were constructed on the top of the recharge levee. A vacuum is applied to the lysimeter through the tubing leading from the lysimeter to the ground surface and the negative air pressure created inside the lysimeter draws pore water into the lysimeter through the porous, stainless steel section of the lysimeter. The pore water is brought to the surface by applying positive pressure to the lysimeter through a second tube. At the surface the pore water is collected in a collection bottle.

After months of sampling, IEUA and Watermaster found a consistent 70 to 80 reduction in TOC concentrations from the recycled water at the surface to the deepest (25 feet) lysimeter due to processes related to soil-aquifer treatment (SAT). Total nitrogen concentrations from IEUA's advanced treatment plants are extremely low and already meet permit requirements.

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