

Optimum Basin Management Program

Status Report 2006-2: July to December 2006

Status Report 2006 – 2: Covers activities from July 1 through December 31, 2006.

Introduction

This status report covers the period July 1, 2006 through December 31, 2006. The bulk of this report describes the activities that occurred and status of the work conducted for each program element of the Optimum Basin Management Program (OBMP). However, there are additional significant efforts that occurred during the reporting period that include:

- **First Strategic Planning Conference.** Watermaster convened its first strategic planning conference in October 2006. Participants included the Watermaster Board, the parties, Watermaster staff and consultants, invited guests including representatives of Metropolitan Water District and Orange County Water District, regulators and other observer/participants from other groundwater basins.
- **Revision of Watermaster's Groundwater Models.** Watermaster's groundwater models are being revised to incorporate new information obtained through OBMP investigations and monitoring, to extend the planning period from the current 30 year period to 60 years and beyond, and to explicitly incorporate subsidence.
- **Preparation of Grant Applications Related to Desalter Program Expansion.** Watermaster consultants worked with IEUA to develop Proposition 50 grant applications related to expanding the desalters. These applications were tentatively approved for up to \$45 million.
- **Ongoing Work to Prepare the 2006 State of the Basin Report.** The data necessary to prepare the SOB report were collected during the reporting period. The draft SOB will be available in the Spring of 2007.

Program Element 1: Develop and Implement a Comprehensive Monitoring Program

Groundwater Level Monitoring

Watermaster has three active groundwater level monitoring programs operating in the Chino Basin: 1) A semiannual basin-wide well monitoring program, 2) A key well monitoring program associated with the Chino I/II Desalter well fields and the Hydraulic Control Monitoring Program (HCMP), and 3) A piezometric monitoring program associated with land subsidence and ground fissuring in Management Zone 1 (MZ-1). The frequency of groundwater level monitoring varies with each program; depending on the needs of the data analyst. These groundwater level monitoring programs also rely on municipal producers, other government agencies, and private entities to supply their groundwater level measurements on a cooperative basis. Watermaster digitizes all these measurements and combines them into a relational database for general usage. During this period, Watermaster purchased and installed 7 pressure transducers/data loggers at key wells; principally in the northern portions of Chino Basin where more detailed groundwater level data are needed.

Groundwater Quality Monitoring

During this reporting period 53 wells were sampled. Watermaster continues a comprehensive data collection program whereby water quality data from other sources are routinely collected, QA/QC'd, and loaded into Watermaster's database.

Watermaster and the Inland Empire Utilities Agency (IEUA) are working closely with the Appropriative Pool members and their state-certified laboratories to obtain water quality data as an electronic data deliverable (EDD), which can be entered directly into Watermaster's relational database.

Groundwater-Production Monitoring

As of December 2006, Watermaster had installed an additional 12 new meters at active agricultural wells. All active wells (except for minimum user wells) are now metered. Watermaster reads the production data from the meters on a quarterly basis and enters these data into Watermaster's relational database.



Surface Water Monitoring

Water Quality and Quantity in Recharge Basins. Watermaster measures the quantity and quality of storm and supplemental water entering the recharge basins. Pressure transducers or staff gauges are used to measure water levels during recharge operations. In addition to these quantity measurements, imported water quality values for State Water Project water are obtained from the Metropolitan Water District of Southern California (MWDSC) and recycled water quality values for the RP1 and RP4 treatment plant effluents are obtained from IEUA. Watermaster monitors the storm water quality in the eight major channels (San Antonio, West Cucamonga, Cucamonga, Deer Creek, Day Creek, San Sevaine, West Fontana, and Declez) usually after each major storm event. Combining the measured flow data with the respective water qualities enables the calculation of the blended water quality in each recharge basin, the “new yield” to the Chino Basin, and the adequate dilution of recycled water.

Surface Water Monitoring in Santa Ana River (SAR). Watermaster measures the discharge of the river and selected water quality parameters to determine those reaches of the SAR that are gaining flow from Chino Basin and/or, conversely, those reaches that are losing flow into the Chino Basin. These bi-weekly flow and water quality measurements are combined with discharge data from permanent USGS and Orange County Water District (OCWD) stream gauges and discharge data from publicly owned treatment works (POTWs). These data are used in groundwater modeling to assess the extent of hydraulic control.

HCMP Annual Report

In January of 2004, the RWQCB amended the Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin to incorporate an updated total dissolved solids (TDS) and nitrogen management plan. The Basin Plan Amendment includes both “antidegradation” and “maximum benefit” objectives for TDS and nitrate-nitrogen for the Chino and Cucamonga groundwater management zones. The application of the “maximum benefit” objectives relies on Watermaster and the IEUA’s implementation of a specific program of projects and requirements, which are an integral part of the OBMP. On April 15, 2005, the RWQCB adopted resolution R8-2005-0064; thus approving the Surface Water Monitoring Program and Groundwater Monitoring Program in support of maximum benefit commitments in the Chino and Cucamonga Basins. Watermaster and the IEUA completed the 2005 Annual Report, which summarizes the results for those two programs, and submitted it to the RWQCB on April 14, 2006 in partial fulfillment of maximum benefit commitments. Watermaster and IEUA have begun drafting the 2006 Annual Report, which is due in April 2007.

Chino Basin Recycled Water Groundwater Recharge Program

The IEUA, Watermaster, Chino Basin Water Conservation District, and San Bernardino County Flood Control District jointly sponsor the Chino Basin Recycled Water Groundwater Recharge Program. This is a comprehensive water supply program to enhance water supply reliability and improve the groundwater quality in local drinking water wells throughout the Chino Groundwater Basin by increasing the recharge of stormwater, imported water, and recycled water. The recharge program is regulated under RWQCB Order No. R8-2005-0033 and Monitoring and Reporting Program No. R8-2005-0033.

Recharge Activities. Recycled water recharge in the Turner 1&2, and Turner 3&4 Basins began in July 2006. On going recharge activities at Ely, Hickory, and Banana Basins continued during this reporting period.

Monitoring Activities. Watermaster and the IEUA collect weekly and bi-weekly water quality samples from basins that are actively recharging recycled water and from lysimeters installed within those basins. During this reporting period, approximately 600 basin and lysimeter samples were collected. Monitoring wells located downgradient of the recharge basins were sampled every two weeks during the reporting period for a total of about 100 samples.

Construction Activities. Lysimeters and monitoring wells associated with the Banana, Hickory, and Turner Basins were installed in 2005. No other construction activities related to the monitoring of the recharge program occurred during this reporting period. Lysimeters and monitoring wells are expected to be constructed at the RP-3, Declez, and Ely Basins in fiscal year (FY) 2006/07.

Reporting. Watermaster and the IEUA completed the following required reports concerning the recharge program during the reporting period:

- Banana Start-Up Report – October 2006
- Hickory Start-Up Report – Not yet submitted



- Title 22 Engineering Report – March 2006: Addendum 1 Inclusion of Ely Basin in Phase II Recycled Water Groundwater Recharge Project – October 2006
- 2Q06 Quarterly Report – August 2006
- 3Q06 Quarterly Report – November 2006

Land Surface Monitoring

Watermaster developed a multifaceted land surface monitoring program to develop data for a long-term management plan for land subsidence in Management Zone 1 (MZ-1). The monitoring program consisted of three main elements:

- An aquifer system monitoring facility consisting of multiple depth piezometers and a dual bore extensometer.
- The application of synthetic aperture radar interferometry (InSAR) to measure historical land surface deformation.
- Benchmark surveys to measure land surface deformation, “ground truth” the InSAR data, and evaluate effectiveness of the long term management plan.

Following two years of data collection and analysis, Watermaster submitted the MZ-1 Summary Report in October 2005, which contained Guidance Criteria to minimize subsidence and fissuring. The Guidance Criteria included a listing of Managed Wells and their owners subject to the criteria, a map of the so-called Managed Area, an initial threshold water level (Guidance Level) of 245 feet below the top of the PA-7 well casing, and a plan for ongoing monitoring and notification. Since October 2005, the MZ-1 Summary Report and the Guidance Criteria contained therein have been discussed extensively by the parties involved, and were adopted by the Watermaster Board at its May 2006 Meeting .

The MZ-1 monitoring program has continued unabated. Water level monitoring has been expanded to the central regions of MZ-1 with the installation of transducers/data loggers at selected wells owned by the City of Chino, the Monte Vista Water District, and the City of Pomona. This expansion of the water level monitoring program is the initial effort to better understand the mechanisms behind ongoing land subsidence in this region.

Program Element 2: Develop and Implement a Comprehensive Recharge Program

Construction on the Chino Basin Facilities Improvement Project (CBFIP) Phase I was completed by December 31, 2005 at a cost of \$38M; 50% from a SWRCB Proposition 13 Grant, and 25% each from Watermaster and the IEUA. A CBFIP Phase II list of projects was developed by Watermaster and the IEUA, including monitoring wells, lysimeters, recycled water connections, SCADA system expansions, three MWDSC turnouts, and berm heightening and hardening. At a cost of approximately \$10M, these Phase II facilities will be financed through a 50% Grant from DWR and 25% each from Watermaster and the IEUA.

In FY 2005-2006, the CBFIP Phase I facilities were able to recharge 49,000 AF of storm and supplemental water . With the completion of the Phase II facilities in FY 2007-2008, the total recharge capacity will be about 75,000 AF. By the start of FY 2008-2009, most of the basins will be able to operate on a 12 months per year basis, with occasional downtime for silt and organic growth removal. Operations and basin planning are coordinated through the Groundwater Recharge Coordinating Committee (GRCC) which meets monthly.

Program Element 3: Develop and Implement Water Supply Plan for the Impaired Areas of the Basin; and

Program Element 5: Develop and Implement Regional Supplemental Water Program

Construction on the Chino I Desalter Expansion and the Chino II Desalter facilities was completed in February 2006 and an application has been made for \$1.6 M in Proposition 50 funds to add 8 MGD of ion exchange capacity to the Chino II Desalter. As currently configured, the Chino I Desalter provides 2.6 MGD of treated (air stripping for VOC removal) water from Wells 1-4, 4.9 MGD of treated (ion exchange for nitrate removal) water from Wells 5-15, and 6.7 MGD of treated (reverse osmosis for nitrate and TDS removal) water from Wells 5-15 for a total of 14.2 MGD (16,000 AFY). The Chino II Desalter provides 4.0 MGD of ion exchange treated water and 6.0 MGD of reverse osmosis treated water from 8 additional wells for a total of 10.0 MGD (11,000 AFY).

Watermaster has been conducting modeling investigations of various desalter expansion alternatives including the expansion of Chino I and II. The initial work was submitted by Wildermuth Environmental to Watermaster in April 2006. Black and Veatch developed reconnaissance-level engineering plans and costs for these desalter alternatives. Additional modeling work has been completed for a new set of alternatives with the desalter wells located between the Central Avenue fault and Chino I Well No. 5. The latter alternatives can be used to mitigate the Chino Airport plume and meet the hydraulic control objective of Watermaster.

Program Element 4: Develop and Implement a Comprehensive Groundwater Management Plan for Management Zone 1

In October 2005, Watermaster completed the MZ-1 Summary Report, including the Guidance Criteria. Since then the impacted parties have had numerous meetings in an effort to transform the Summary Report into a long-term management plan. The Summary Report and the Guidance Criteria were adopted by the Watermaster Board in May 2006. Presently, additional data are being developed by the impacted parties in an effort to achieve acceptable resolution of issues arising from the Guidance Criteria.

Program Element 6: Develop and Implement Cooperative Programs with the Regional Water Quality Control Board, Santa Ana Region (Regional Board) and Other Agencies to Improve Basin Management; and

Program Element 7: Develop and Implement a Salt Management Program

A Water Quality Committee meeting was held on December 13, 2006 to discuss the status of the investigations of the three major water quality plumes (Chino Airport, Ontario Airport, and Stringfellow Hazardous Waste site) in the Basin. On going discussions are being held with the RWQCB and the San Bernardino County Department of Airports in order to determine the engineering solution and costs for remediating the TCE plume at the Chino Airport. For the Ontario Airport plume, the Potentially Responsible Parties (PRPs) have been working with Watermaster to quantify the depth and extent of the TCE plume so that they can make a recommendation for further action in March 2007. In addition, Watermaster received the preliminary analyses of water samples taken throughout the Basin for perchlorate differentiation. The results are indicative of possible perchlorate contamination from use of specific types of fertilizer in some areas of the Chino Basin. Lastly, Watermaster continued to monitor the activities of General Electric's (GE) remediation at the Flat Iron facility and their efforts to develop a new location for recharge of their treated effluent.

MZ-3 Monitoring Program.

The former Kaiser plume has been incorporated into an overall monitoring program for the MZ-3 area. The MZ-3 monitoring program is also assessing the groundwater quality impairment from total dissolved solids (TDS), nitrate, and perchlorate. The perchlorate may have originated from the Mid-Valley Landfill (in Rialto Basin, across the Rialto-Colton fault) or it may be a non-point source that resulted from the historical application of Chilean fertilizer. Two rounds of quarterly samples were collected from 22 wells, including former Kaiser wells that Watermaster previously renovated: MP2 and KOFS. The MP2 cluster of wells (four depths) was in the heart of the Kaiser plume when the well was constructed; while KOFS was just beyond the leading edge of the plume. MP2 continues to show an impact from the Kaiser plume and the KOFS well is now impacted. Based on the analytical results, locations were identified for two new monitoring wells. Negotiations were successfully concluded with the City of Ontario to locate the two wells in street rights-of-way. Construction of these monitoring wells has now been awarded along with the construction of monitoring wells at recharge basins, so that Watermaster obtained a more competitive bid based on economies of scale.

Ontario International Airport (OIA) Volatile Organic Chemical Plume.

Watermaster met with the consultants to the PRPs on four occasions (September 9, October 5, November 8, and December 18, 2006). As a result of these meetings, Watermaster provided water quality, water level, and well construction data from more than 400 private wells and 200 public wells to the RWQCB, which in turn forwarded the database to the PRPs pursuant to their request. In addition to the database, the PRPs requested that they have access to the Chino Basin groundwater model developed by Wildermuth Environmental, Inc. (WEI). Watermaster and WEI agreed to share their modeling expertise with consultants from the PRPs in WEI's office. After the PRPs have had an opportunity to review the data, the model, and historical aerial

photos, Watermaster will propose to the RWQCB that a follow-up meeting be held in March 2007 to discuss future activities towards characterizing the plume.

Chino Airport VOC Plume.

Watermaster met with the RWQCB, the San Bernardino County Department of Airports, and their consultant Tetra Tech on November 6 and December 20, 2006 to discuss a joint remediation of the VOC plume from the airport. Such a joint remediation would help address other issues in the southwestern portion of Chino Basin such as maintenance of hydraulic control and the provision of high quality drinking water in an area of increasing demand. As a result of these meetings, Watermaster agreed to provide a database containing well construction information, water quality, water levels, and production for wells located southwest of the Chino airport. In addition, Watermaster provided results from sampling all the wells in this location to provide up-to-date analytical data on all the possible contaminants in these wells. Twenty-five wells were sampled by Watermaster in May and June of 2006, laboratory analyses were performed, and releases were obtained from the private well owners. These data are being reviewed with Tetra Tech to begin the engineering of appropriate remedial actions.

Perchlorate Isotope Study.

Neil Sturchio, Professor and Head of the Department of Earth and Environmental Sciences at the University of Illinois at Chicago, has developed a technique for using stable isotopes of chloride and oxygen to distinguish the origin of perchlorate (man-made vs. naturally occurring). There are several per mil shifts in isotopes of both ions between the two sources. He has tested several samples of leachate from fertilizer nitrogen (from the Atacama Desert in Chile) and rocket fuel sources. One of the innovations that Professor Sturchio has developed is the use of a flow-through column with an anion-exchange resin. These bifunctional anion exchange resins were originally developed at Oak Ridge National Laboratory and the University of Tennessee to selectively sorb the pertechnetate ion TcO_4^- (technetium is mobile with a long half-life, much like perchlorate). A resin regeneration step is added to recover the perchlorate ion. The exchange resin is required to concentrate the typically low levels of perchlorate in groundwater so that the perchlorate can be analyzed isotopically. Watermaster sampled 10 wells in Chino and Cucamonga Basins and submitted samples to a commercial laboratory for general mineral, general physical, and perchlorate analyses. The resin columns were sent to Professor Sturchio's laboratory at the University of Illinois and the preliminary results indicate that the perchlorate in groundwater in Chino Basin may derive from fertilizer sources.

GE Flat Iron Remediation.

Finally, with respect to the GE Flat Iron remediation, GE conducted a screening of options for the disposal of treated effluent from their operational pump and treat facilities. Currently, GE discharges their effluent into the Ely Basins, where it percolates back into the groundwater. However, this operation limits Watermaster's ability to recharge recycled water into the Ely Basins and, consequently, Watermaster has asked that GE develop alternative disposal means. As a result of their screening, GE has decided to investigate, in detail, the construction of groundwater injection wells that would be operated in conjunction with their own recharge basin. GE completed their planning in December 2006 and began detailed design based upon the RWQCB's approval of the concept.

TDS and Nitrogen Monitoring Pursuant to the 2004 Basin Plan Amendment

Pursuant to the 2004 Basin Plan Amendment and the Watermaster/IEUA permit to recharge recycled water, Watermaster and the IEUA have conducted groundwater and surface water monitoring programs. Quarterly HCMP reports that summarize data collection efforts were submitted to the RWQCB in July and October of 2006. An annual HCMP report for 2006 will be submitted to the RWQCB in April 2007.

Program Element 8: Develop and Implement a Groundwater Storage Management Program; and

Program Element 9: Develop and Implement a Storage and Recovery Program

In March 2006, Watermaster submitted a proposal to the San Diego County Water Authority regarding SDCWA use of storage in the Chino Basin. Subsequently, in May 2006, Watermaster staff and legal counsel attended a meeting with SDCWA staff to discuss Watermaster's proposal. During the current reporting period, the SDCWA began discussions with the Watermaster to develop a storage and recovery program in the Chino Basin. Watermaster has also begun discussions with the Castaic Lake Water Agency and with the Metropolitan Water District of Southern California (Metropolitan) regarding new storage and recovery programs in the Chino Basin.



The existing Watermaster/IEUA/Metropolitan Dry Year Yield (DYY) program continued on during the reporting period. As of December 31, 2006, about 60,500 acre-ft had been stored in the Basin in Metropolitan's DYY account. The construction statuses of local facilities included in the DYY program for the participating parties are as follows:

- City of Ontario – Wellhead treatment facility: final design began in April 2006. DYY Wells: Drilling on Well No. 45 complete, pump testing on Well No. 47 complete, and drilling on Well No. 46 underway.
- Cucamonga Valley Water District – Six new wells (nos. 39-42, 44, and 45): construction completed for well nos. 39-42 and designs and CEQA documentations completed for well nos. 44 and 45.
- City of Upland – New IX treatment facility constructed and online.
- City of Pomona – Expansion of existing IX treatment facility: construction underway.
- City of Chino Hills – Refurbish Pellisier well and construct new treatment facility: design underway
- Monte Vista Water District – Well No. 31: well construction completed July 2006 and wellhead design is underway. Well No. 33 and treatment facility (joint MVWD/Chino project): Well construction is underway and treatment facility design will commence upon the completion of the well.
- Jurupa Community Services District – Expansion of the Teagarden IX facility completed in October 2006.