Optimum Basin Management Program

Status Report 2008-2: July to December 2008

CHINO BASIN WATERMASTER

Optimum Basin Management Program

Highlighted Activities

Ongoing work to prepare the Recharge Master Plan. Watermaster held a Strategic Planning Conference in September 2008 followed by a workshop held on November 12, 2008. A working group was formed in the workshop to coordinate the multi-agency effort and is meeting every two weeks to continue the effort. In addition, a website has been developed to post the progress and to share the data (http://rmp.wildermuthenvironmental.com).

- In compliance with the Superior Court's "Order Concerning Motion for Approval of Peace II Documents," dated December 21, 2007, Conditions Subsequent Numbers 1-6 were filed and the Court approved the compliance at the hearing held on November 13, 2008. Condition Subsequent Number 7, which requires Watermaster to prepare and submit to the Court a revised schedule for reconciliation of new yield and storm water estimates for the fiscal year 2000/01 through 2006/07 and a discussion of how Watermaster will account for un-replenished overproduction for that period, was transmitted to the Court on December 23, 2008.

- Chino Basin Facilities Improvement Project (CBFIP) Phase II, a joint effort of Watermaster, the Chino Basin Water Conservation District (CBWCD), Inland Empire Utilities Agency (IEUA), and the San Bernardino County Flood Control District (SBCFCD) to increase the annual recharge of storm, imported, and recycled water and to reduce long-term maintenance costs, has shown a considerable progress in its construction and is expected to be completed by June 2009.

2008 Fall Strategic Conference

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 pressure transducers/data loggers at key wells; principally in the northern portions of Chino Basin where more detailed groundwater level data are needed.

Important Court hearings and orders

- DEC 23 – COMPLIANCE WITH CONDITION SUBSEQUENT #7
- NOV 5 – CVWD'S SUPPLEMENTAL REPLY IN SUPPORT OF MOTION TO DISCONTINUE THE SPECIAL REFEREE
- SEPT 16 – NOTICE OF REASSIGNMENT OF CASE TO JUDGE WADE
- JULY 15 – MOTION TO RECEIVE AND TRANSMIT 30TH ANNUAL REPORT & STATUS REPORT 2007-1

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)

Sampling the Kaiser Plume

"A 10-YEAR-LONG PERIOD OF BELOW AVERAGE RAINFALL, COMBINED WITH A STATEWIDE DROUGHT, CAUSED SERIOUS WATER SUPPLY IMPACTS FOR THE CHINO BASIN WATER COMMUNITY, RESIDENTS AND BUSINESSES."

Deer Creek Channel Sampling

Groundwater Quality Monitoring

Watermaster initiated a comprehensive monitoring program as part of the implementation of the OBMP. The groundwater quality monitoring program consists of the following four components: 1) An Annual Key Well Water Quality Monitoring Program designed to target privately owned agricultural wells in the southern portion of Chino Basin that are otherwise not included in an established sampling program, 2) Quarterly sampling at nine HCMP multi-port monitoring wells strategically placed between the Chino Basin Desalter well fields and the Santa Ana River. Results of the quarterly sampling are used to analyze the effect of the desalter pumping over time by comparing water quality of the native groundwater and the Santa Ana River, 3) Monthly sampling at four near-river wells to characterize the Santa Ana River's influence to nearby groundwater. These shallow monitoring wells along the Santa Ana River consist of two former United States Geologic Survey (USGS) National Water Quality Assessment Program (NAWQA) wells (Archibald 1 and Archibald 2), and two wells (well 9 and well 11) owned by the Santa Ana River Water Company (SARWC), and 4) a cooperative basin wide data collection effort known as the Chino Basin Data Collection (CBDC) program which relies on municipal producers and other government agencies to supply groundwater quality data on a cooperative basis. Watermaster supplements these data with data obtained through its own sampling and analysis programs. These sources include the appropriators, Department of Toxic Substance Control (DTSC), Regional Water Quality Control Board (RWQCB), US Geological Survey (USGS), the Counties, and other cooperators. All water quality data are routinely collected, QA/QC'd, and loaded into Watermaster's relational database.

Groundwater-Production Monitoring

All active wells (except for minimum user wells) are now metered. Watermaster reads the agricultural 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 RP-1 and RP-4 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 the 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 the 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 along with groundwater modeling to assess the extent of hydraulic control.

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)

New inlet gate in San Sevaine Channel to Jurupa Basin

HCMP Annual Report

In January 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 (N) 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 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.

Pursuant to the Basin Plan Amendment and the Watermaster/IEUA permit to recharge recycled water, Watermaster and IEUA have conducted groundwater and surface water monitoring programs. During this reporting period Watermaster measured 713 manual water levels at private wells throughout the Chino Basin, conducted two quarterly downloads at the 134 wells containing pressure transducers, and collected 103 groundwater quality samples, and 218 surface water quality samples. Quarterly Surface Water Monitoring Program reports that summarize data collection efforts were submitted to the RWQCB in July and October of 2008.

THE DRY YEARS, TOPPED BY RECORD-LOW RAINFALL TWO YEARS AGO, BROUGHT NEW CHALLENGES: A DECLINE IN BASIN WATER LEVELS AND LIMITS ON IMPORTED REPLENISHMENT WAETR. FUNDING LIMITATIONS CAUSED BY A SEVERE ECONOMIC DOWNTURN MAGNIFIED THE SUPPLY PROBLEM.

Chino Basin Groundwater Recharge Program

IEUA, Watermaster, CBWCD, and the SBCFCD jointly sponsor the Chino Basin 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 Basin by increasing the recharge of storm water, imported water, and recycled water. The recharge program is regulated under RWQCB Order No. R8-2007-0039 and Monitoring and Reporting Program No.R8-2007-0039.

Recharge Activities. On-going recycled water recharge occurred in the Brooks, 8th Street, and Ely Basin this reporting period.

Monitoring Activities. Watermaster and 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 218 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 62 samples.

Construction Activities. Lysimeters and monitoring wells associated with the 7th and 8th Street Basins were installed in the first half of fiscal year (FY) 2007/08. There have been no further construction activities since that time.

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

- 2Q08 Quarterly Report, submitted to the RWQCB – August 2008
- 3Q08 Quarterly Report, submitted to the RWQCB – November 2008

San Sevaine Basin #5 during December storm

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)

Land Surface Monitoring

The MZ-1 Subsidence Management Plan (MZ-1 Plan) was approved by Watermaster in October 2007, and was approved by the Court in November 2007 which ordered its implementation (see Program Element 4: Develop and Implement a Comprehensive Groundwater Management Plan for Management Zone 1). The MZ-1 Plan calls for a number of activities with the goal of minimizing or completely abating the future occurrence of land subsidence and ground fissuring in Chino Basin. Some of these activities include:

Stormwater captured in Victoria Basin

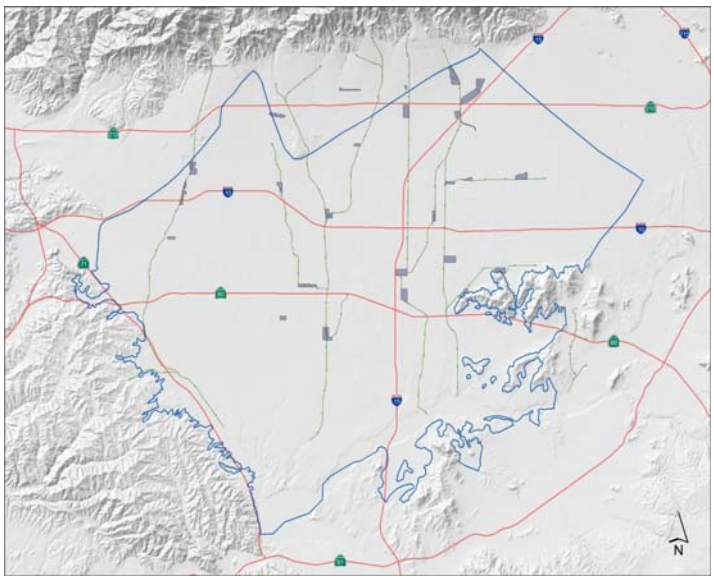
- Continuing the scope and frequency of monitoring within the so-called Managed Area (southwest MZ-1) that was conducted during the period when the MZ-1 Plan was being developed.
- Expanding the monitoring of the aquifer system and land subsidence into other areas of MZ-1 and Chino Basin where the data indicate concern for future subsidence and ground fissuring.
- Detailed monitoring of horizontal strain across the historical fissure zone.
- Further evaluating the potential contribution of pumping in the central and northern portions of MZ-1 on groundwater conditions in the central and southern portions of MZ-1.
- Conducting additional testing and monitoring to refine the Guidance Criteria.
- Developing alternative pumping plans for the MZ-1 producers that are impacted by the MZ-1 Plan.
- Constructing and testing a lower-cost extensometer facility at Ayala Park.
- Evaluating and comparing ground-level surveying and InSAR, and recommending future monitoring protocols for both techniques.
- Conducting an ASR (aquifer injection and recovery) feasibility study at a production well owned by the City of Chino Hills within the Managed Area.

New cable extensometer at Ayala Park in Chino

During this reporting period, Watermaster began implementation of some of these activities called for in the MZ-1 Plan, which included:

- The continuation of detailed water-level monitoring at wells within the Managed Area and at wells in central MZ-1.
- Replacement of five (5) water-level-recording transducers at wells where these transducers have failed after about seven years of reliable service. Installation of two (2) transducers at newly-discovered wells within the Managed Area.
- The continuation of monitoring and maintenance at the Ayala Park Extensometer Facility.
- Planning and coordination between the City of Chino Hills and Watermaster on the ASR pilot test at a well owned by the City. A DWR grant to support this project was increased from $214,000 to $250,000.

Program Element 1: Develop and Implement a Comprehensive Monitoring Program (Continued)



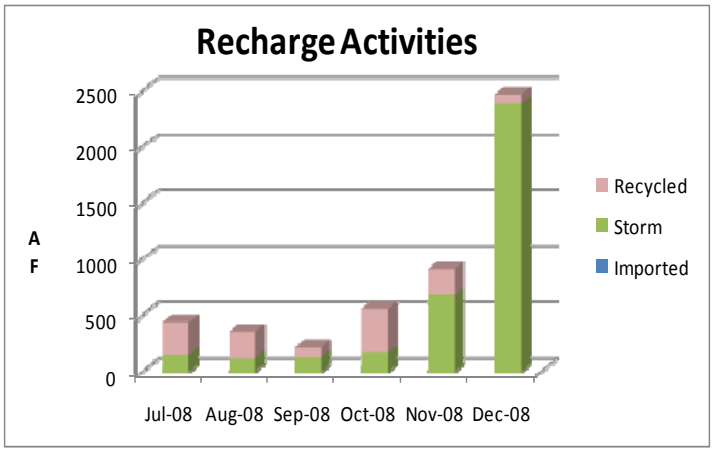
Recharge Basins

- Installation of a lower-cost pair of cable extensometers within two piezometers at Ayala Park to test this technology for possible application in other parts of the basin. Data collection began at this experimental facility during the reporting period.
- Collection of InSAR data from radar satellites during all six months of the reporting period, which will be analyzed for land surface displacement during the next reporting period.
- Collection of ground-level-survey data across MZ-1 during November 2008, which will be analyzed for land surface displacement during the next reporting period.

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-percent from a SWRCB Proposition 13 Grant, and 25-percent each from Watermaster and IEUA. A CBFIP Phase II list of projects was developed by Watermaster and IEUA, including monitoring wells, lysimeters, recycled water connections, SCADA system expansions, three MWDSC turnouts, and berm heightening and hardening. At a cost of approximately $10.5M, these Phase II facilities were financed through a 50-percent Grant from DWR and 25-percent each from Watermaster and IEUA.

In FY 2007/08, the CBFIP Phase I facilities were able to recharge approximately 13,000 AF of storm and recycled water. With the completion of the Phase II facilities by June 2009, the total recharge capacity will be about 96,000 AF. By the start of FY 2009/10, most of the basins will be able to operate on a 12 months-per-year basis with combinations of storm, imported, and recycled water, with occasional downtime for silt and organic growth removal. Operations and basin planning are coordinated through the Groundwater Recharge Coordinating Committee (GRCC), which met quarterly during this reporting period.



Because of the drought and Delta water quality, water supply, and environmental issues, MWDSC has been unable to provide replenishment water to southern California since May 1, 2007. This greatly restricts Watermaster's ability to recharge recycled water, since the California Department of Public Health requires that four parts of diluent water (imported or storm water) be blended with each part of recycled water. Watermaster and IEUA are working closely with DPH and the Regional Water Quality Control Board to reduce the blend ratio. For this reporting period, just under 5,000 AF of storm and recycled water have been recharged.

Preparation of the Recharge Master Plan update is in underway, in satisfaction of Condition Subsequent No. 5. On March 28, 2008, the initial meeting of the Recharge Master Plan group occurred. A detailed outline of the scope and content of the Recharge Master Plan update was filed with the Court for approval on June 30, 2008. Progress reports on the completion of the updated plan are to be submitted on January 1, 2009 and on July 1, 2009, with the final updated Recharge Master Plan due to the Court by July 1, 2010. The Recharge Master Plan update was the primary focus of the Strategic Planning Conference held in late September 2008.

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 of the Chino I Desalter Expansion and the Chino II Desalter facilities was completed in February 2006. As currently configured, the Chino I Desalter provides 2.6 MGD of treated (air stripping for VOC removal) water from Wells Nos. 1-4, 4.9 MGD of treated (ion exchange for nitrate removal) water from Well Nos. 5-15, and 6.7 MGD of treated (reverse osmosis for nitrate and TDS removal) water from Wells Nos. 5-15 for a total of 14.2 MGD (15,900 AFY). The Chino II Desalter provides 4.0 MGD of ion exchange treated water and 6.0 MGD of reverse osmosis treated water from eight additional wells for a total of 10.0 MGD (11,200 AFY).

Rubber Dam in action

During the reporting period, negotiations continued between the Chino Desalter Authority (CDA) and Western Municipal Water District (WMWD) to allow WMWD to join the CDA and to expand the Chino II Desalter by 10.5 MGD (11,800 AFY). The CDA approved WMWD membership in November 2008. Planning and engineering investigations related to the expansion are ongoing. The expansion will be completed in 2013. Raw water will be drawn from existing CDA II wells, and possible additional new wells if needed. In addition, a new Chino Creek Desalter Well Field, required for hydraulic control, will provide additional raw water to the Chino I Desalter, enabling existing Well Nos. 13, 14, and 15 to shift production to the expanded Chino II Desalter facility if needed.

Program Element 4: Develop and Implement a Comprehensive Groundwater Management Plan for Management Zone 1 and Management Zone 3

MZ-1 Management Plan

Because of the historical occurrence of pumping-induced land subsidence and ground fissuring in southwestern Chino Basin (southern MZ-1), the OBMP called for the development and implementation of an interim management plan for MZ-1 that would:

- Minimize subsidence and fissuring in the short-term,
- Collect information necessary to understand the extent, rate, and mechanisms of subsidence and fissuring, and
- Formulate a management plan to reduce to tolerable levels or abate future subsidence and fissuring.

Chino Desalter I Feed Pumps and RO Membranes

From 2001-2005, Watermaster developed, coordinated, and conducted an Interim Monitoring Program (IMP) under the guidance of the MZ-1 Technical Committee, which is composed of representatives from all major MZ-1 producers and their technical consultants. The IMP was an aquifer-system and land subsidence investigation focused in the southwestern region of MZ-1 that would support the development of a long-term management plan to minimize and abate subsidence and fissuring (MZ-1 Plan). The IMP involved the construction of highly-sophisticated monitoring facilities, such as deep borehole extensometers and piezometers, the monitoring of land surface

Program Element 4: Develop and Implement a Comprehensive Groundwater Management Plan for Management Zone 1 and Management Zone 3 (Continued)

displacements through traditional ground-level surveys and remote-sensing techniques, the detailed monitoring of the aquifer system with water-level-recording transducers installed at an array of production and monitoring wells, and the purposeful stressing of the aquifer system through multiple controlled pumping tests.

The investigation methods, results, and conclusions are described in detail in the MZ-1 Summary Report, dated February 2006. The investigation provided enough information for Watermaster to develop Guidance Criteria for the MZ-1 producers in the investigation area that, if followed, would minimize the potential for subsidence and fissuring during the completion of the MZ-1 Plan. The Guidance Criteria included a listing of Managed Wells and their owners subject to the criteria, a map of the so-called Managed Area, and an initial threshold water level (Guidance Level) of 245 feet below the top of the PA-7 well casing. The MZ-1 Summary Report and the Guidance Criteria were adopted by the Watermaster Board in May 2006. The Guidance Criteria formed the basis for the MZ-1 Plan, which was approved by Watermaster in October 2007. The Court approved the MZ-1 Plan in November 2007 and ordered its implementation. Watermaster continued implementation of the MZ-1 Plan at the start of this reporting period (see Land Surface Monitoring under *Program Element 1: Develop and Implement a Comprehensive Monitoring Program*).

MZ-3 Monitoring Program

Watermaster performed a groundwater investigation to characterize groundwater levels and quality in Management Zone 3 (MZ-3) of the Chino Basin. The OBMP Implementation Plan states that MZ-3 is hydrologically out of balance and that new storm water and supplemental water recharge will be required to keep MZ-3 in balance. The blend of storm water, imported water, and recycled water used in the future to hydrologically balance MZ-3 must be of a quality to protect beneficial uses and comply with the proposed Title 22 regulations for planned recharge projects that use recycled water. Watermaster drilled, installed, developed, and sampled two nested, multiple-depth piezometers in the projected path of the Kaiser Steel plume, which is an immediate threat to potable supply wells – potable supply wells owned by the City of Ontario and Jurupa Community Services District. The monitoring program also incorporated four quarters of sample collection and analyses from 22 wells in MZ-3 to assess other groundwater quality issues, including 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. Watermaster completed and submitted the final report to the California Department of Water Resources (DWR) in December 2008, in partial fulfillment of the AB303 Grant requirements.

Program Element 6: Develop and Implement Cooperative Programs with the Regional Water Quality Control Board, Santa Ana Region (RWQCB) and Other Agencies to Improve Basin Management; and Program Element 7: Develop and Implement a Salt Management

Ontario International Airport

Watermaster coordinated with EcoGeo and GeoTrans, Inc. regarding the drilling schedule for the Ontario International Airport (OIA) monitoring wells and Watermaster technical input on

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 (Continued)

THE DROUGHT GRIPPING CALIFORNIA IS DIFFERENT THAN ANY WE HAVE EXPERIENCED BEFORE, CAUSED BY A CONFLUENCE OF ISSUES THAT CANNOT BE SOLVED BY RAINFALL ALONE. IF THE CALLS FOR WATER CONSERVATION SEEM LIKE BUSINESS AS USUAL, THINK AGAIN. THIS IS NOT A CASE OF THE COMMON DROUGHT.

well design. Watermaster reviewed the proposed MW-1 well design from GeoTrans and prepared for and participated in a conference call on July 9, 2008 to discuss the proposed MW-1 well design. Watermaster reviewed and approved the proposed zone test plan for MW-2, including the RWQCB's requested modifications to the initial MW-2 well design and prepared for and attended an onsite meeting at MW-2 on August 28, 2008. Watermaster worked with the RWQCB and EcoGeo concerning the proposed location of MW-4 to help delineate the source of the OIA trichloroethylene (TCE) plume.

Perchlorate Source Assessment in MZ-3

Watermaster completed perchlorate and other water quality and water level data from the Fontana Water Company, West Valley Water District, and the Mid-Valley Landfill (GeoTracker). QA/QC'd the data and uploaded these data into Watermaster's database.

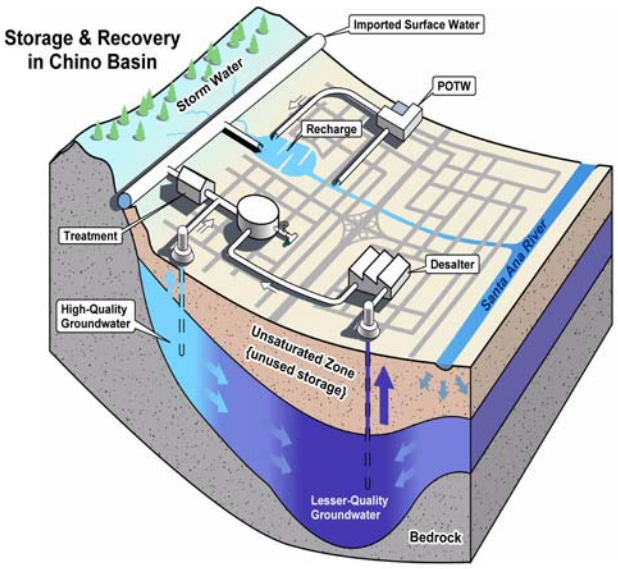
Acquisition of Monitoring Wells in MZ-3

Watermaster opened a dialog with Alcoa concerning the acquisition of their offsite wells (AOS No. 1, 2, and 3). These wells would assist Watermaster and the Jurupa Community Service District (JCSD) in monitoring groundwater elevations and groundwater quality in that portion of the Chino Basin.

Program Element 8: Develop and Implement a Groundwater Storage Management Program; and Program Element 9: Develop and Implement a Storage and Recovery Program

The existing Watermaster/IEUA/Metropolitan Dry-Year Yield (DYY) program continued during the reporting period. The construction statuses of local facilities included in the DYY program for the participating parties are as follows:

- City of Ontario – Wellhead treatment ion exchange (IX) facility: construction continued and is anticipated to be completed by February 2009. DYY Wells: Equipping Well Nos. 44 and 52 began in March 2008 and is now completed.
- Cucamonga Valley Water District – Five new wells (Nos. 39-43): construction and equipping is now completed.
- City of Upland – New IX treatment facility complete and online.
- City of Pomona – Expansion of existing IX treatment facility is complete and online.
- City of Chino Hills – Refurbishing the Pellisier well did



Program Element 8: Develop and Implement a Groundwater Storage Management Program; and Program Element 9: Develop and Implement a Storage and Recovery Program (Continued)

not yield the results the City was hoping to achieve. As a result, in January 2008, the DYY grant money and shift obligation was transferred to MVWD's Well No. 32.

- Monte Vista Water District – Well No. 31: well construction completed July 2006 and well equipping was completed in September 2008. Well No. 32 is completed. Well No. 33 and treatment facility (joint MVWD/Chino project): Well construction was completed in early 2008; the treatment facility construction was completed in November 2008.
- JCSD – Expansion of the Teagarden IX facility is completed and the system is online.

Due to the current drought conditions throughout the state of California, Metropolitan has not provided water for the DYY account since April 2007. As of June 30, 2008, about 86,000 AF had been stored in the Basin in Metropolitan's DYY account. On May 1, 2008, Metropolitan called for the parties to begin withdrawing water from the DYY account in the amount of 33,000 AF per 12-month period. At the end of the calendar year, the account balance was 56,092 AF.

In February 2008, the DYY Expansion Project was initiated by IEUA and Watermaster to evaluate increasing the DYY storage account. The purpose of the DYY Expansion Project was to determine the facilities needed to store up to 150,000 AF and to recover up to 50,000 AFY. The recovered water would be served during dry years in-lieu of imported water from Metropolitan. The expansion project evaluated the technical, financial, and institutional framework for individual projects to move forward, groundwater modeling results evaluating material physical injury, and California Environmental Quality Act (CEQA) requirements. The CEQA process was completed in December 2008 with the submission of the Notice of Determination to the State Clearinghouse. Negotiations related to actual projects and the amount of expansions are ongoing.