

Optimum Basin Management Program

Staff Status Report 2012-1: January to June 2012



CHINO BASIN WATERMASTER

Optimum Basin Management Program (OBMP)

Highlighted Activities

- As a requirement of Mitigation Measure 4.4-3 from the Peace II Subsequent Environmental Impact Report (EIR), Watermaster, Inland Empire Utilities Agency (IEUA) and Orange County Water District (OCWD) began to develop a Prado Basin Habitat Sustainability Program. Included within this program will be the Prado Basin Habitat Sustainability Adaptive Management Plan, the installation of up to 17 monitoring wells at nine separate sites, and vegetative monitoring.
- Calibration was completed at the Daniels Street horizontal extensometer, which is located across the City of Chino observed zone of surface ground fissuring.
- A location was identified in February 2012, and construction began in April 2012 on the Chino Creek Well Field (CCWF) vertical cable extensometer (located South of Chino Airport).
- The Chino Basin Recharge Master Plan Update Steering Committee continued to meet and to identify additional cost-effective recharge opportunities and projects that could be undertaken in the future. The Steering Committee developed and approved a scope of work and report outline and commenced with the execution of the work. The scope of work was responsive to the October 2010 and December 2011 Court Orders and the December 2011 Board direction. The Steering Committee's final report will include nine sections with technical appendices. The Final Draft of Sections One through Four of the Report was completed and approved by the Watermaster Board on May 24, 2012. These four sections fulfilled the requirements of the June Status Report deadline to the Court, which was filed on May 31, 2012. Work on the remainder of the Recharge Master Plan Update continues expeditiously.
- Watermaster and the IEUA continue to work together toward the creation of a fifth retention facility at the Turner Basin. Following completion in 2014, the expansion project is projected to recharge an addition 300 acre-feet of storm runoff annually.
- In June 2012, the Western Municipal Water District (WMWD) was awarded a \$51 million state grant from the California Department of Public Health for the desalter expansion project under Proposition 50 Chapter 4b.
- During the fiscal year, approximately 9,271 acre-feet of stormwater, 8,634 acre-feet of recycled water, and 23,449 acre-feet of imported water were recharged.

Program Element 1: Develop and Implement a Comprehensive Monitoring Program

Groundwater Level Monitoring

Watermaster initiated a comprehensive monitoring program as part of the implementation of the OBMP. The current groundwater level monitoring program is comprised of about 700 wells. At about 500 of these wells, water levels are measured by well owners, which include municipal water agencies, the California Department of Toxic Substance Control (DTSC), the County of San Bernardino, and various private consulting firms. The measurement frequency is typically about once per month. Watermaster collects these water level data quarterly. The remaining 200 wells are mainly south of the 60 Freeway and assess hydraulic control, land subsidence, impacts from the desalter wells, and are monitored in support of the triennial re-computation of ambient water quality

Important Court Hearings and Orders

- APRIL 10 - COURT OF APPEAL OPINION (REGARDING PARAGRAPH 31)
- JUNE 13 - COURT OF APPEAL REMITTITUR (REGARDING PARAGRAPH 31)
- JUNE 15 - SUPPLEMENTAL ORDER AFTER HEARING ON MOTION FOR APPROVAL OF WATERMASTER RESOLUTION 2010-04
- JUNE 29 - ORDER POST APPEAL (REGARDING PARAGRAPH 31)

Optimum Basin Management Program

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

in the Chino-North Management Zone. Watermaster manually measures water levels at these wells monthly or by using pressure transducers that record data in 15-minute increments. These data are quality control checked, loaded into a relational database, and used to develop groundwater level contour maps and implementation assumptions.

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 consisting of 120 wells which are mostly privately owned agricultural wells in the southern portion of Chino Basin that are otherwise not included in an established sampling program. Twenty of these wells are sampled every year; the remaining wells are sampled every three years. The wells sampled annually are for the continuous monitoring of areas of concern associated with the southern edge of the Archibald South (formerly OIA) volatile organic compound (VOC) plume, the southern region of the Chino Airport Plume, and the Kaiser Steel Plume which includes the two multi-port MZ-3 monitoring wells. Data obtained for the Key Well Quality Monitoring Program are used for the triennial ambient water quality analysis, hydraulic control assessment, the Biennial State of the Basin Report, and to assess the overall health of the Basin.
2. Annual 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 annual sampling are used to analyze the effect of 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).
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. 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. Watermaster's database is used to create detailed maps and for modeling purposes.

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 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 data for State Water Project water are obtained from the Metropolitan Water District of Southern California (MWDSC) and recycled water quality data for the RP-1 and RP-4 treatment plant effluents are obtained from IEUA. 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 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.

Optimum Basin Management Program

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

Hydraulic Control

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 and the Watermaster/IEUA permit to recharge recycled water, Watermaster and IEUA have conducted groundwater and surface water monitoring programs since 2004. During this reporting period, Watermaster measured 445 manual water levels at private wells throughout the Chino Basin, conducted two quarterly downloads at the 112 wells containing pressure transducers, collected 24 groundwater quality samples, 169 surface water quality samples, and 39 direct discharge stream measurements. Quarterly Surface Water Monitoring Program Reports that summarize data collection efforts were submitted to the RWQCB in January and April of 2012. The Chino Basin Maximum Benefit Monitoring Program 2011 Annual Report was submitted to the RWQCB on April 16, 2012.

During this reporting period, as a requirement of Mitigation Measure 4.4-3 from the Peace II Subsequent EIR, Watermaster, IEUA and OCWD began to develop a Prado Basin Habitat Sustainability Program. Included within this program will be the Prado Basin Habitat Sustainability Adaptive Management Plan, the installation of up to 17 monitoring wells at nine separate sites, and vegetative monitoring.

Chino Basin Groundwater Recharge Program

Watermaster, IEUA, the Chino Basin Water Conservation District (CBWCD), and the San Bernardino County Flood Control District (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, 7th Street, 8th Street, Turner, Victoria, San Sevaive, Ely, Hickory, DeClez, RP-3, and Banana Basins this reporting period. Stormwater was recharged at 19 recharge basins across all management zones of the Chino Basin during this reporting period. No imported water was recharged this reporting period.



Recharging the Chino Basin at Upland Basin

Monitoring Activities. Watermaster and IEUA collect weekly water quality samples from recharge basins that are actively recharging recycled water and from lysimeters installed within those recharge basins. During this reporting period, approximately 261 recharge basin and lysimeter samples were collected and 27 recycled water samples were collected for alternative monitoring plans that include the application of a correction factor for soil-aquifer treatment determined from each recharge basin's start-up period. Monitoring wells located down-gradient of the recharge basins were sampled quarterly at a minimum, however, some monitoring wells were sampled more frequently during the reporting period for a total of 87 samples.

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

- 4Q-2011 Quarterly Report, submitted to the RWQCB – February 2012
- 1Q-2012 Quarterly Report, submitted to the RWQCB – May 2012
- 2011 Annual Report, submitted to the RWQCB – May 2012

Optimum Basin Management Program

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

Land Surface Monitoring

In response to land subsidence in the City of Chino, Watermaster submitted the MZ-1 Subsidence Management (MZ-1) Plan to the Court for approval and, in November 2007, the Court ordered its implementation (see Program Element 4: Develop and Implement a Comprehensive Groundwater Management Plan for Management Zone 1). The MZ-1 Plan proposed several monitoring and mitigation measures to minimize or abate land subsidence and ground fissuring in the western Chino Basin. These measures and activities include:

- Continue water level monitoring, within the Managed Area, comparable to that which occurred during development of the MZ-1 Plan.
- Expand aquifer and land subsidence monitoring into other areas of MZ-1, and the Chino Basin, where data indicate a potential concern for subsidence and ground fissuring.
- Construct a horizontal strain monitor (extensometer) across the observed fissure zone.
- Evaluate the potential contribution of groundwater production, in northern MZ-1, on conditions in southern MZ-1.
- Provide for recovery of MZ-1 groundwater levels, while conducting additional testing and monitoring to refine the PA-7 Guidance Criteria.
- Develop an alternative pumping plan for producers impacted by the MZ-1 Plan and post the PA-7 groundwater levels on the Watermaster website to guide its use.
- Construct, and comparison test, vertical and cable extensometers at Ayala Park.
- Evaluate and compare ground-level surveying with Interferometric Synthetic Aperture Radar (InSAR), and recommend future monitoring protocols for both techniques.
- Conduct an ASR (aquifer storage recovery) feasibility study at a City of Chino Hills MZ-1 production well (Well 16).

Watermaster undertook the following monitoring and testing activities called for in the MZ-1 Plan:

- The Watermaster Land Subsidence Committee (LSC) met twice during the period, to assess future monitoring priorities and identify funding support for those activities.
- Compared vertical and cable extensometers at Ayala Park, to validate use of the more cost-effective cable system for application in other parts of the Basin, as necessary.
- Evaluated InSAR data from alternate satellite system, which may be further analyzed to detect potential land surface displacement (subsidence) in early 2012.
- Continued implementation of the MZ-1 Managed Area Monitoring Program with the goals of: (1) refining the Guidance Criteria; (2) confirming existence of the Riley Barrier; (3) testing ASR feasibility in the Managed Area; and (4) evaluating the effect of groundwater production and injection on subsidence and recovery in the fissure zone.
- Completed calibration of the Daniels Street horizontal extensometer across the City of Chino observed zone of surface ground fissuring.
- Identified a location in February 2012 and began to construct the Chino Creek Well Field (CCWF) vertical cable extensometer (located South of Chino Airport) in April 2012. Construction is expected to be completed in July 2012.

Program Element 2: Develop and Implement a Comprehensive Recharge Program

The theoretical average stormwater recharge capacity of the Chino Basin Facilities Improvement Program (CBFIP) facilities is approximately 14,000 acre-feet/yr (AFY) and the theoretical supplemental water recharge capacity is 99,000 AFY. Stormwater recharge during this period was about 6,162 acre-feet. Recycled water recharge during this period was about 4,361 acre-feet. The IEUA and Watermaster recharge permit was amended in fiscal year 2009/10 to allow for underflow dilution and extended the

Optimum Basin Management Program

Program Element 2: Develop and Implement a Comprehensive Recharge Program (Continued)

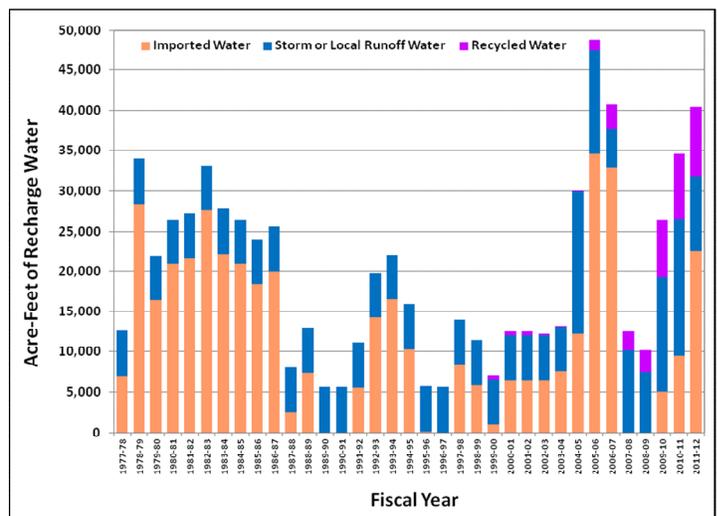
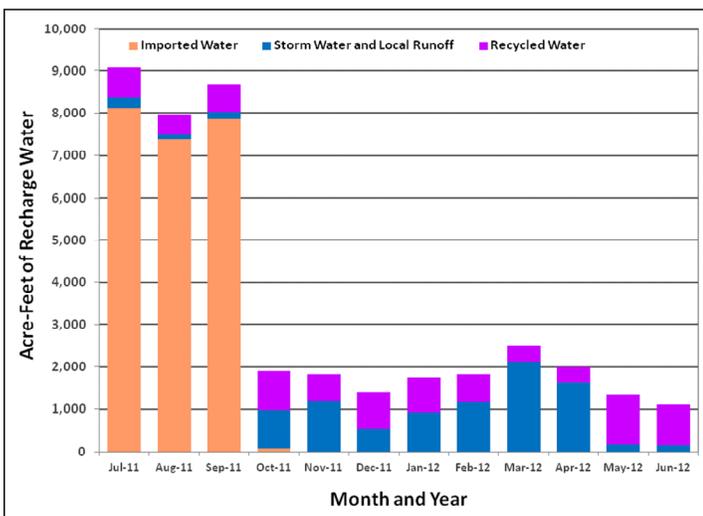
dilution period from a running 60 months to a running 120 months. The significance of this permit amendment was to reduce the amount of imported and storm waters required for dilution. IEUA projects that dilution requirements will likely be met through 2019/20, even if no imported water were available for dilution.

The total amount of supplemental water recharged in MZ-1 since the Peace II Agreement is approximately 37,945 acre-feet, which is 5,445 acre-feet (cumulative) greater than the average annual requirement of 6,500 acre-feet.

Watermaster staff convened a Recharge Master Plan Update Steering Committee (Steering Committee) last fall. The Steering Committee was reformed in January 2012 to include all stakeholders and met seven times during this period. The Steering Committee developed and approved a scope of work and report outline and commenced with the execution of the work. The scope of work was responsive to the October 2010 and December 2011 Court Orders and the December 2011 Board direction. The Steering Committee's final report will include nine sections with technical appendices.

Using updated estimates of stakeholders' groundwater production and projections of replenishment obligations, Watermaster and the parties have evaluated changed circumstances (legislative, regulatory, etc.) that were not addressed in the 2010 RMP Update and how these changes affect the RMP. Based on this evaluation, the Committee has selected agreed upon bookend projected future scenarios for recharge planning. Modeling analyses were performed, predicated on the updated pumping and replenishment projections, estimates of the locations and amounts of recharge required for sustainability, and potential production forbearance. The Committee also conducted an inventory of existing recharge facilities, which included the characterization of recharge basins, recharge capacities and the factors controlling recharge performance. These components comprise the Final Draft of Sections One through Four of the Report, which was completed and approved by the Watermaster Board on May 24, 2012. These four sections fulfill the requirements for the June Status Report deadline to the Court, which was filed on May 31, 2012.

In order to finalize the RMP Update, the parties will next identify the possible recharge mechanisms available to meet current and projected recharge and replenishment needs. This will include the analysis of potential recharge associated with Municipal Separate Storm Sewer Systems (MS4) permits, the identification of areas within the Basin with the potential for production sustainability challenges and other water management challenges that can be addressed by recharge or production management, and the identification of options ensuring production sustainability through the term of Peace Agreements, including increased recharge at existing facilities, new recharge facilities, new recharge sources, adjustment in production patterns, etc. The Committee will also develop the monitoring, reporting, and accounting practices that will be required to estimate local project stormwater recharge and new yield. After the identification of the potential recharge options, the parties will agree upon the methods and criteria that will be used to evaluate each of them. Using these agreed upon methods and criteria, Watermaster's consultants will conduct engineering and economic analyses of each. Based on these analyses, the parties will review and recommend implementation of the selected options, and develop recommended financing and implementation plans for these options.



Optimum Basin Management Program

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 million gallons per day (MGD) of treated (air stripping for VOC removal) water from Well 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 Well 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).

Planning continued between the Chino Desalter Authority (CDA) and the WMWD to expand the Chino II Desalter by 10.5 MGD (11,800 AFY). 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 the hydraulic control commitment associated with Maximum Benefit, will provide additional raw water to the Chino I Desalter, enabling some existing wells to direct production to the expanded Chino II Desalter facility. Watermaster and the CDA demonstrated continued progress on the RWQCB approved project schedule of June 2010, which should be completed sometime in 2015. Existing design contracts for pipeline, well and pump facilities continue to lead toward task and eventual project completion.

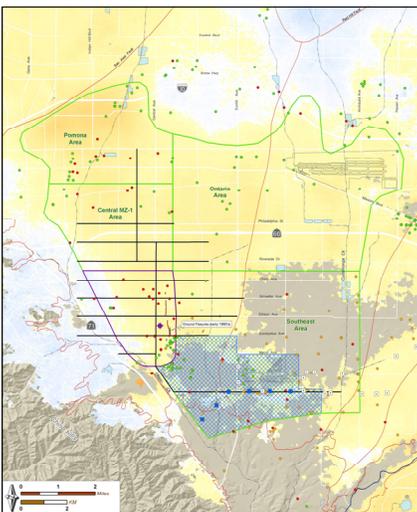
In June 2012, the WMWD was awarded a \$51 million state grant from the California Department of Health for the desalter expansion project.

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

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 (IMP) 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 Basin Subsidence Monitoring Program in Management Zone 1

From 2001-2005, Watermaster developed, coordinated, and conducted an Interim Monitoring Program (IMP) under the guidance of the MZ-1 Technical Committee. 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.

During this reporting period, Watermaster continued implementation of the MZ-1 Plan. Drawdown at the PA-7 piezometer did not fall below the Guidance Level during the reporting period, and very little, if any, permanent compaction was recorded at the Ayala Park Extensometer. The ongoing monitoring program called for by the MZ-1 Plan continues to be implemented.

The MZ-1 Technical Committee has since been expanded to LSC. The LSC met on February 16 and March 22, and continues to implement elements of the MZ-1 Plan including InSAR monitoring and construction of the Chino Creek Well Field Cable Extensometer.

Optimum Basin Management Program

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

Archibald South Plume

In July 2005, The Regional Water Quality Control Board (Regional Board) prepared draft Cleanup and Abatement Orders (CAOs) for six Ontario International Airport (OIA) parties with regard to the Archibald South (trichloroethene [TCE]) Plume. Four of those parties (Aerojet, Boeing, General Electric [GE], and Lockheed Martin, also known as ABGL) formed a group to work jointly on a remedial investigation. Northrop Grumman declined to participate in the group, while the US Air Force, in cooperation with the US Army Corps of Engineers, funded the installation of one of the four clusters of monitoring wells installed by the ABGL.

On October 13, 2011, Erlen & Kalinowski, Inc. (EKI) published a Remedial Investigation (RI) Report on behalf of the ABGL concerning the Archibald South Plume. On November 4, 2011, Geoscience Support Services, Inc. issued its technical report on the Archibald South Plume on behalf of the City of Ontario. Both technical reports were submitted to the Regional Board.

Chino Airport

The County of San Bernardino, Department of Airports is working under Regional Board CAO No. R8-2008-0064. Beginning in 2007, Tetra Tech, the consultant to the County, conducted several off-site plume characterization studies to delineate the areal and vertical extent of the plume. Tetra Tech will be publishing two reports in the next period describing the progress of this work to date: *The Semiannual Groundwater Monitoring Report, Winter and Spring 2012*, and the *Phase I Monitoring Well Installation Report*. Watermaster has collected samples from dedicated monitoring wells and private wells in and around the Chino Airport plume area. The County and Watermaster have been sharing these investigation data so that both parties can utilize a robust data set for plume characterization. Watermaster has also used its calibrated groundwater model to estimate cleanup times and contaminant concentrations in the Chino Creek Well Field. This work will be updated, given new information about the extent of contamination, subsurface hydrogeology, well performance, and the need for habitat sustainability in the Prado Basin.

Other Water Quality Issues

Watermaster continues to track monitoring programs and mitigation measures associated other point sources in the Chino Basin, including: Alumax Aluminum Recycling, the California Institute for Men, Crown Coach, GE Test Cell and Flatiron, Kaiser Steel, Milliken Landfill, Upland Landfill, and the Stringfellow National Priorities List sites.

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

Recent events demonstrate the importance of groundwater storage to the Chino Basin. Watermaster has committed to investigate the technical and management implications of Local Storage Agreements, improve related policies and procedures, and then revisit all existing applications of Local Storage Agreements.

The existing Watermaster/IEUA/MWDSC/Three Valley Municipal Water District (TVMWD) Dry-Year Yield (DYY) program continued during the reporting period. By April 30, 2011, all DYY program construction projects and a full “put” and “take” cycle had been completed, leaving the storage account with a zero balance. Watermaster, IEUA, and MWDSC are negotiating potential amendments to the current contract.