Optimum Basin Management Program

Staff Status Report 2016-2: July to December 2016



CHINO BASIN WATERMASTER

Highlighted Activities

Optimum Basin Management Program

- During this reporting period, Watermaster manually measured 400 water levels at about 80 private wells throughout the Chino Basin, conducted two quarterly download events at about 170 wells containing pressure transducers, collected 46 groundwater-quality samples from private and dedicated monitoring wells, and collected four surface-water quality samples.
- Development and planning continues between the Chino Desalter Authority (CDA) and Watermaster to expand the Chino Desalters to an ultimate raw-water production capacity of 40,000 acre-feet per year. During the reporting period, the CDA continued with the land acquisition process for the future construction of Well II-12 and continued construction of a raw-water pipeline to plumb three desalter wells (II-10, II-11, and II-12) into the Chino-II Desalter.
- As a requirement of Mitigation Measure 4.4-3 from the Peace II Subsequent Environmental Impact Report (SEIR), Watermaster, the Inland Empire Utilities Agency (IEUA), and the Orange County Water District (OCWD) continued to develop a Prado Basin Habitat Sustainability Program (PBHSP). During this reporting period, the Prado Basin Habitat Sustainability Committee (PBHSC) adopted the final Adaptive Management Plan in August 2016. A PBHSC meeting was convened in November 2016 to kick-off the PBHSP for fiscal year 2016/17 and preparation of the first Annual Report. The first Annual Report of the PBHSC will be completed by June 2017. Additionally, Watermaster collected two rounds of quarterly groundwater-quality samples and conducted two quarterly downloads of pressure transducers that measure water levels at the eighteen PBHSP monitoring wells.
- Watermaster continued implementation of the Northwest MZ-1Work Plan, including the
 installation of transducers within wells in the Study Area to measure and record piezometric levels.
 Watermaster worked with the Monte Vista Water District and the City of Pomona to determine
 the best way to modify their facilities and SCADA systems to better monitor groundwater
 production and levels. Watermaster also worked with the cities of Chino, Pomona, and Upland,
 and acquired the remaining necessary technical information through a monitoring and testing
 program. Watermaster worked with the cities of Chino, Pomona, and Upland, and the Golden
 State Water Company to collect quarterly groundwater levels and production data.
- Watermaster and the IEUA are continuing to implement the 2013 Amendment to the 2010 Recharge Master Plan Update (2013 RMPU) pursuant to the October 2013 Court Order authorizing its implementation. During this reporting period, Watermaster and the IEUA continued developing agreements to construct the storm and supplemental water recharge projects listed in Table 8-2c of the 2013 RMPU report, to prioritize the construction of these projects relative to the availability of grant funding, and to plan subsequent implementation. Preliminary Design Reports were developed for eight of the chosen projects during the reporting period.
- During this reporting period, stormwater recharge was approximately 4,579 acre-feet, recycled water recharge was approximately 7,085 acre-feet, and imported water recharge was approximately 4,260 acre-feet.
- Watermaster began its evaluation of the Safe Yield in 2013. The Watermaster parties concluded a facilitated process and developed an agreement to implement the recalculated Safe Yield. This proposed agreement was filed with the Court on October 23, 2015 with a motion recommending that the Court reset the Safe Yield of the Chino Basin at 135,000 acre-feet per year. The hearing on this motion was scheduled for December 18, 2015 but was continued to September 23, 2016.

Important Court Hearings and Orders

- <u>September 23, 2016</u> Hearing re 2015 Safe Yield Reset Agreement, Amendment of Restated Judgment, Paragraph 6
- SEPTEMBER 28, 2016 NOTICE OF RULING ON WATERMASTER'S MOTION REGARDING 2015 SAFE YIELD RESET AGREEMENT, AMENDMENT OF RESTATED JUDGMENT, PARAGRAPH 6
- OCTOBER 5, 2016 NOTICE OF RULING ON REQUEST BY NON-AGRIUCLUTURAL POOL COMMITTEE FOR ENTRY OF ORDER REGARDING FILING AND SERVICE
- ° October 19, 2016 Notice of ORDERS: CITY OF CHINO MOTION TO PERMIT CHINO TO CONDUCT DISCOVERY; **OBJECTIONS TO DECLARATION** OF GUTIERREZ IN SUPPORT OF MOTION TO CONDUCT DISCOVERY; CHINO'S **OBJECTIONS TO DECLARATION** OF EGOSCUE IN SUPPORT OF AG POOL'S OPPOSITION TO CHINO'S MOTION TO CONDUCT DISCOVERY; CHINO'S OBJECTIONS TO DECLARATION OF HERREMA IN SUPPORT OF WATERMASTER'S **OPPOSITION TO CHINO'S** MOTION TO CONDUCT DISCOVERY; CHINO'S OBJECTIONS TO DECLARATION OF KAVOUNAS IN SUPPORT OF WATERMASTER'S **OPPOSITION TO CHINO'S** MOTION TO CONDUCT DISCOVERY
- <u>December 9, 2016</u> Hearing re Motion for Court Approval of Temporary Substitute Rate for Physical Solution Transfers Under Exhibit "G" to the Judgment
- DECEMBER 22, 2016 ORDER GRANTING MOTION FOR COURT APPROVAL OF TEMPORARY SUBSTITUTE RATE FOR PHYSICAL SOLUTION TRANSFERS UNDER EXHIBIT "G" TO THE JUDGMENT

Program Element 1: Develop and Implement a Comprehensive Monitoring Program

Groundwater Level Monitoring

Watermaster initiated a basin-wide groundwater-level monitoring program as part of the implementation of the Optimum Basin Management Program (OBMP). The monitoring program has been refined over time to satisfy the evolving needs of the Watermaster and the IEUA, such as new regulatory requirements and improved data coverage. The groundwater-level monitoring program supports many Watermaster functions, such as the periodic reassessment of Safe Yield, the monitoring and management of ground-level movement, the analysis of desalter pumping impacts at private wells, the analysis of the implementation of the Peace II Agreement on groundwater levels and riparian vegetation in Prado Basin, the triennial re-computation of ambient water quality mandated by the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan), and the assessment of hydraulic control—a maximum-benefit commitment in the Basin Plan. The data are also used to update and recalibrate Watermaster's computer-simulation groundwater-flow model, to understand groundwater flow directions, to compute storage changes, to support interpretations of water quality data, and to identify areas of the basin where recharge and discharge are not in balance.

The current groundwater-level monitoring program is comprised of about 1,200 wells. At about 950 of these wells, water levels are measured by well owners, which include municipal water agencies, the California Department of Toxic Substances Control (DTSC), the Counties, and various private consulting firms. Watermaster collects these water level data at least semi-annually. At the remaining 250 wells, water levels are measured by Watermaster staff using manual methods once per month or by using pressure transducers that record data once every 15 minutes. These wells are mainly Agricultural Pool wells or dedicated monitoring wells located south of the 60 freeway.

All groundwater-level data are checked by Watermaster staff and uploaded to a centralized database management system that can be accessed online through HydroDaVEsm. During this reporting period, Watermaster measured 400 manual water levels at about 80 wells throughout the Chino Basin, and conducted two quarterly downloads at about 170 wells containing pressure transducers. Additionally, Watermaster compiled all available groundwater-level data from well owners in the basin for the April 2016 to September 2016 period.

Groundwater Quality Monitoring

Watermaster initiated a comprehensive groundwater-quality monitoring program as part of the implementation of the OBMP. The monitoring program has been refined over time to satisfy the evolving needs of the Watermaster and the IEUA, such as new regulatory requirements and improved data coverage. The groundwater-quality data are used by Watermaster for: the biennial State of the Basin report; the triennial ambient water quality update; the demonstration of hydraulic control, monitoring nonpoint-source groundwater contamination and plumes associated with point-source discharges, and to assess the overall health of the groundwater basin. Groundwater-quality data are also used in conjunction with numerical models to assist Watermaster and other parties in evaluating proposed salinity management and groundwater remediation strategies. The groundwater-quality monitoring program currently consists of the following five components:

- An annual Key-Well Water-Quality Monitoring Program consisting of about 100 wells, which are mostly privately-owned agricultural wells in the southern portion of Chino Basin, or monitoring wells near the Kaiser Steel Mill Plume, that are otherwise not included in an established sampling program. Twenty of these wells are sampled every year, and the remaining wells are sampled once every three years. The wells sampled annually are for the continuous monitoring of areas of concern associated with the southern edge of the South Archibald Plume, the southern region of the Chino Airport Plume, and the Kaiser Steel Mill Plume.
- 2. Annual sampling at nine HCMP multi-port monitoring wells, with a total of 21 casings, which are strategically located between the Chino Desalter well fields and the Santa Ana River. The annual sampling results are used to analyze the effect of desalter pumping over time on hydraulic control, by comparing water quality measured at the wells to the water quality of the Santa Ana River.
- Quarterly sampling at four wells near the Santa Ana River to characterize the interaction between the Santa Ana River and nearby groundwater. These shallow monitoring wells consist of two former US Geological Survey (USGS) National Water Quality Assessment Program wells (Archibald 1 and Archibald 2) and two wells owned by the Santa Ana River Water Company (Well 9 and Well 11).
- 4. Quarterly sampling of eighteen PBHSP monitoring wells located in nine locations near the fringes of riparian vegetation in the Prado Basin. The data will be used to support the assessment of the impacts from the implementation of the Peace II Agreement on groundwater levels and riparian habitat in the Prado Basin.

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

5. A cooperative basin-wide data-collection effort known as the Chino Basin Data Collection program, which relies on municipal producers and other government agencies to supply groundwater-quality data on a cooperative basis. These sources include the Chino Basin Appropriators, the DTSC, the Regional Water Quality Control Board (Regional Board), the USGS, the Counties, and other cooperators.

All groundwater-quality data are checked by Watermaster staff and uploaded to a centralized database management system that can be accessed online through HydroDaVEsm. During this reporting period, Watermaster collected 46 groundwater-quality samples from private and dedicated monitoring wells and compiled all available groundwater-quality data collected from other parties for the January to June 2016 period.

Groundwater Production Monitoring

All active agricultural production wells (except for minimal producer wells) are now metered. Watermaster reads the meters on a quarterly basis and enters the production data into Watermaster's relational database, which can be accessed online through HydroDaVEsm.

Surface Water Monitoring in the Santa Ana River

Watermaster collects grab water quality samples at two sites along the Santa Ana River (Santa Ana River at River Road and Santa Ana River at Etiwanda) on a quarterly basis. Along with data collected at four wells near the Santa Ana River, these data are used to characterize the interaction between the Santa Ana River and nearby groundwater. During this reporting period, Watermaster collected four surface-water quality samples.

Prado Basin Habitat Sustainability Monitoring Program

Mitigation Measure 4.4-3 from the Peace II SEIR requires that Watermaster and the IEUA, and allows the OCWD, develop an Adaptive Management Plan for the PBHSP and form the Prado Basin Habitat Sustainability Committee (PBHSC), convened by Watermaster and the IEUA, to implement

the Adaptive Management Plan, and to perform annual reporting. The objective of this plan is to ensure that the riparian habitat in the Prado Basin is not adversely impacted by drawdown associated with the implementation of the Peace II activities. Sixteen monitoring wells at nine sites were constructed in April and May 2015 as part of the monitoring program for the PBHSP. Two existing wells will also be monitored as part of the PBHSP. The PBHSC developed the Adaptive Management Plan of the PBHSP to describe an initial monitoring program and a process to modify the monitoring program and/or implement mitigation strategies, as necessary.

In August 2016, Watermaster approved the final Adaptive Management Plan adopted by the PBHSC. A PBHSC meeting was convened in November 2016 to kick-off the PBHSP for fiscal year 2016/17 and to organize the preparation of the first Annual Report. The first Annual Report of the PBHSC will be completed by June 2017. Additionally, Watermaster collected two rounds of quarterly groundwater-quality samples and conducted two quarterly downloads of pressure transducers that measure water levels at the eighteen PBHSP monitoring wells (these data make up a part of the groundwater level and water quality monitoring programs described earlier in this section).

Chino Basin Groundwater Recharge Monitoring Program

Watermaster, the IEUA, the Chino Basin Water Conservation District, and the San Bernardino County Flood Control District 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 by increasing the recharge of storm, imported, and recycled waters. The recharge program is regulated under RWQCB Order No. R8-2007-0039 and Monitoring and Reporting Program No. R8-2007-0039.

Watermaster and the IEUA measure the quantity of storm and supplemental water that enters into recharge basins using pressure transducers or staff gauges that measure water levels during recharge operations. They also collect weekly water quality samples from recharge basins that are actively recharging recycled water and from lysimeters installed within those recharge basins. Additionally, 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 the IEUA. Combining the measured flow data with the respective water qualities enables the calculation of the blended water quality



Santa Ana River

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

of the recharge sources in each recharge basin and the assessment of whether there is adequate dilution of recycled water as required by the recycled water recharge permits held with the Department of Drinking Water (DDW). Additionally, the measurements of recharge are used to estimate the New Yield to the Chino Basin as a result of the recharge activities.

Monitoring Activities. During this reporting period, the IEUA performed its on-going monitoring program to measure and record recharge volumes and collect stormwater quality samples pursuant to its permit requirements. Also, during this reporting period, approximately 289 recharge basin and lysimeter samples were collected and 30 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, at a minimum, on a quarterly basis; however, some monitoring wells were sampled more frequently during the reporting period for a total of 118 samples.

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

- 2Q-2016 Quarterly Report, submitted to the RWQCB August 2016
- 3Q-2016 Quarterly Report, submitted to the RWQCB November 2016

Ground-Level Monitoring

In response to the occurrence of land subsidence in the City of Chino, Watermaster prepared and submitted a subsidence management plan (known as the MZ-1 Plan) to the Court for approval and, in November 2007, the Court ordered its implementation (see the update in this report under Program Element 4 for more on the MZ-1 Plan implementation). The MZ-1 Plan required several monitoring and mitigation measures to minimize or abate the future occurrence of land subsidence and ground fissuring in the western Chino Basin. These measures and activities included:

- 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 ground-level movement into other areas of MZ-1 and the Chino Basin where data indicate concern for future subsidence and ground fissuring (Areas of Subsidence Concern).
- Monitoring of horizontal strain across the historical zone of ground fissuring.
- Evaluating the potential contribution of groundwater production in northern MZ-1 on ground-level conditions in southern MZ-1.
- Conducting additional testing and monitoring to refine the MZ-1 Guidance Criteria for subsidence management.
- Developing alternative pumping plans for the MZ-1 producers that are impacted by the MZ-1 Plan.
- Constructing and testing a lower-cost cable extensometer facility at Ayala Park.
- Evaluating and comparing ground-level surveying and Interferometric Synthetic Aperture Radar (InSAR), and recommending future monitoring protocols for both techniques.
- Conducting an aquifer storage recovery (ASR) feasibility study at a City of Chino Hills production well within the MZ-1 Managed Area (Well 16).
- Providing for recovery of groundwater levels in the MZ-1 Managed Area.

Since the initial MZ-1 Plan was adopted in 2007, Watermaster has conducted the annual Ground-Level Monitoring Program (GLMP) to implement the monitoring and reporting program. The main results of the GLMP were that very little permanent land subsidence has occurred in the MZ-1 Managed Area, indicating that subsidence is being successfully managed in this area, and that land subsidence has been occurring in the Northwest MZ-1 Area. One concern is that subsidence in Northwest MZ-1 has occurred differentially across the San Jose Fault, following the same pattern of differential subsidence that occurred in the MZ-1 Managed Area during the time of ground fissuring.

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

Based on these results, Watermaster determined that the subsidence management plan needed to be updated to include a Subsidence Management Plan for the Northwest MZ-1 Area with the long-term objective to minimize or abate the occurrence of the differential land subsidence. Thus, Watermaster expanded the GLMP into the Northwest MZ-1 Area and prepared an updated 2015 Chino Basin Subsidence Management Plan (SMP), which included the Work Plan to Develop a Subsidence-Management Plan for the Northwest MZ-1 Area (Work Plan) as an appendix.

During this reporting period, Watermaster undertook the following activities called for in the SMP:

- Continued high-resolution water-level monitoring at wells within the Managed Area and within the Areas of Subsidence Concern. All monitoring equipment is inspected at least quarterly and is repaired and/or replaced as necessary. The data collected were checked and analyzed to assess the functionality of the monitoring equipment and for compliance with the MZ-1 Plan.
- Continued monitoring and maintenance at the extensometer facilities at the Ayala Park and Chino Creek sites. Performed equipment maintenance at the Ayala Park and Chino Creek Extensometer facilities which included recalibration of the transducer at the PC-2 piezometer and security updates to the software on the telemetry modem at the Chino Creek Extensometer.
- Collected InSAR data scenes across the western Chino Basin from the German Aerospace Center's TerraSAR-X satellite.
- Conducted ground-level surveys and electronic distance measurements (EDMs) at benchmarks in the Northwest MZ-1 and the San Jose Fault Zone areas. Installed a new line of benchmark monuments across the Northwest MZ-1 Area.
- Continued implementation of the Work Plan, including:
 - Installed transducers within wells in the Study Area to measure and record piezometric levels. Collected, processed and checked groundwater level data and production data from wells in the Study Area monthly.
 - ^o Worked with the Monte Vista Water District and the City of Pomona to determine the best way to modify their facilities and SCADA systems to better monitor groundwater production and levels. This involved coordinating with Pomona's operations staff and subcontracting with SCADA Integrations to assess the MVWD's SCADA system. Conducted a meeting and field visit at one MVWD well. Reviewed report prepared by SCADA Integrations.
 - [°] Worked with the cities of Chino, Pomona, and Upland, and the Golden State Water Company to collect quarterly groundwater levels and production data.

Program Element 2: Develop and Implement a Comprehensive Recharge Program

The objectives of the comprehensive recharge program include enhancing the yield of the Chino Basin through the development and implementation of a Recharge Master Plan to improve, expand, and construct recharge facilities that enable the recharge of storm, recycled, and imported waters; to ensure a balance of recharge and discharge in the Chino Basin management zones; and to ensure that sufficient storm and imported waters are recharged to comply with recycled water dilution requirements in Watermaster and the IEUA's recycled water recharge permits.

Pursuant to PE2 of the OBMP, Watermaster and the IEUA partnered with the San Bernardino County Flood Control District and the Chino Basin Water Conservation District to construct and/or improve eighteen recharge sites. This project was known as the Chino Basin Facilities Improvement Project (CBFIP). The average annual stormwater recharge of the CBFIP facilities is approximately 10,000 acre-feet per year, the supplemental "wet"¹ water recharge capacity is approximately 74,700 acre-feet per year, and the



Capturing Imported Water at the College Heights Basins

in-lieu supplemental water recharge capacity ranges from 25,000 to 40,000 acre-feet per year. In addition to the CBFIP facilities, the Monte Vista Water District has five ASR wells with a demonstrated well injection capacity of 5,600 acre-feet per year. The current total supplemental water recharge capacity ranges from 105,300 to 120,300 acre-feet per year which is greater than the projected supplemental water recharge capacity required by Watermaster.

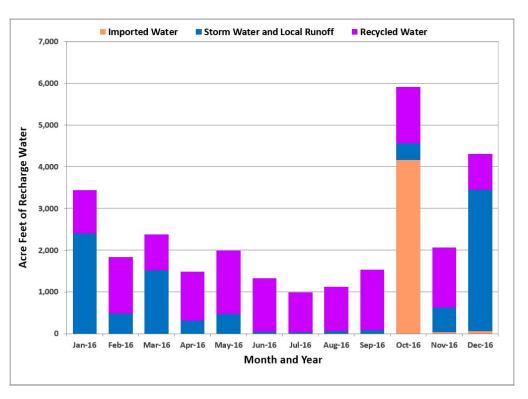
Program Element 2: Develop and Implement a Comprehensive Recharge Program (Continued)

In 2008, Watermaster began preparing the 2010 Recharge Master Plan Update (2010 RMPU) pursuant to the December 21, 2007 Court Order (the Peace II Agreement) to complete a Recharge Master Plan Update by July 1, 2010. In October 2010, the Court accepted the 2010 RMPU as satisfying the condition and ordered that certain recommendations of the 2010 RMPU be implemented. In November 2011, Watermaster reported its progress to the Court pursuant to the October 2010 Court Order; after which, in December 2011, the Court issued an order directing Watermaster to continue with its implementation of the 2010 RMPU per its October 2010 order but with a revised schedule. And, on December 15, 2011, the Watermaster Board moved to:

"approve that within the next year there will be the completion of [a] Recharge Master Plan Update, there will be the development of an Implementation Plan to address balance issues within the Chino Basin subzones, and the development of a Funding Plan, as presented."

This motion led to the development of an update to the 2010 RMPU and in 2012, Watermaster staff sent out a "call for projects" to the Watermaster parties, seeking their recommendations for recharge improvement projects that should be considered in the update. The 2013 Amendment to the 2010 Recharge Master Plan Update (2013 RMPU) outlines the recommended projects to be implemented by Watermaster and the IEUA and lays out the implementation and financing plans. The 2013 RMPU report was approved by the Watermaster Board in September 2013 and filed with the Court in October 2013. In December 2013, the Court approved the 2013 RMPU except for Section 5 that dealt with the accounting for new recharge from Municipal Separate Stormwater Sewer Systems; Section 5 was later approved by the Court in April 2014.

2013 RMPU Implementation. Watermaster and the IEUA are continuing to carry out the October 2013 Court Order, which authorizes them to implement the 2013 RMPU. During the reporting period, Watermaster and the IEUA continued developing agreements to construct the storm and supplemental water recharge projects listed in Table 8-2c of the 2013 RMPU report, prioritizing the construction of these projects relative to the availability of grant funding. During the reporting period, Preliminary Design Reports (PDRs) were developed for eight of the chosen 2013 RMPU projects: CSI Basin, Wineville/Jurupa/RP3 Basins, Declez Basin, Victoria Basin, Lower Day Basin, Turner Basin, Ely Basin, and the Montclair Basins. The expected yields of each of these projects were updated due to the new information generated through the development of the PDRs and other updated basin information provided by the IEUA.



Additionally, Watermaster and the IEUA continued to develop a series of projects outside of the 2013 RMPU effort that will increase and/or facilitate stormwater and supplemental water recharge and have jointly agreed to fund these projects, including monitoring upgrades and habitat conservation. Watermaster's share of the cost of these projects was included in the budget adopted by Watermaster for fiscal 2016/17.

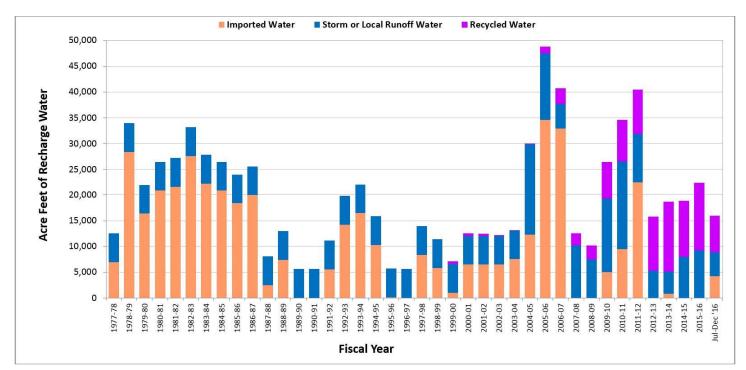
The Recharge Improvements Project Committee met monthly on the progress of implementing the 2013 RMPU Projects and other recharge-related projects.

Recharge for Dilution of Recycled Water. In fiscal year 2009/10, Watermaster and the IEUA's recharge permit was amended to allow for existing underflow dilution and extended the period for calculating dilution from a running 60-month to a running 120-month

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

period. Additionally, the IEUA has worked with the DDW to obtain approval to increase the allowable recycled water contribution (RWC) at wells to 50 percent. These permit amendments allow for increased recycled water recharge without having to increase the amount of imported and storm waters required for dilution. The IEUA projects its dilution requirements as part of its annual reporting to the DDW. Based on the latest Annual Report (May 2017), the IEUA projects that dilution requirements will be met through 2020, even if no imported water were available for dilution.

Recharge Activities. During this reporting period, ongoing recycled water recharge occurred in the Brooks, 7th Street, 8th Street, Turner, Ely, Hickory, Declez, RP-3, Victoria, and Banana Basins; stormwater was recharged at 18 recharge basins across all management zones of the Chino Basin; and imported water was recharged in the Upland, College Heights, Montclair, Brooks, Turner, Lower Day, San Sevaine, and Victoria Basins. During this reporting period, stormwater recharge was approximately 4,579 acre-feet, recycled water recharge was approximately 7,085 acre-feet, and imported water recharge was 4,260 acre-feet.



Balance of Recharge and Discharge in MZ-1. The total amount of supplemental water recharged in MZ-1 since the Peace II Agreement through December 31, 2016 was approximately 53,703 acre-feet, which is more than 11,000 acre-feet less than the 65,000 acre-feet that is required to be recharged by June 30, 2017 (annual requirement of 6,500 acre-feet); the shortfall will be recharged in MZ-1 in subsequent years as supplemental water becomes available. The amount of supplemental water recharged into MZ-1 during the reporting period was approximately 5,922 acre-feet.

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

As stated in the OBMP, "the goal of Program Elements 3 and 5 is to develop a regional, long range, cost-effective, equitable, water supply plan for producers in the Chino Basin that incorporates sound basin management." One element of the water supply plan is the development of a way to replace the decline in groundwater production to prevent significant amounts of degraded groundwater from discharging to the Santa Ana River and violating the Basin Plan. Replacing the decline in agricultural groundwater production will mitigate the reduction of the Safe Yield of the Basin and allow for more flexibility in the Basin's supplemental water supplies if the produced groundwater is treated. This is achieved through the operation of the Chino Basin Desalter facilities, which comprise a series

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 (Continued)

of wells and treatment facilities in the southern Chino Basin that are designed to replace the decline in production of the agricultural groundwater producers, and to treat and serve this groundwater to various Appropriative Pool members.

The Chino I Desalter Expansion and the Chino II Desalter facilities were completed in February 2006. As currently configured, the Chino I Desalter produces about 13,500 acre-feet per year (12.1 million gallons per day [MGD]) of groundwater at 15 wells (I-1 through I-15) that is treated through air stripping (volatile organic compound [VOC] removal), ion exchange (nitrate removal), and/or reverse osmosis (for nitrate and TDS removal). The Chino II Desalter produces about 15,800 acre-feet per year (14.1 MGD) of groundwater at eight wells (II-1 through II-4 and II-6 through II-9) that is treated through ion exchange and/or reverse osmosis. Development and planning continues between the CDA and Watermaster to expand the production and treatment capacity of the Chino Desalters by about 10,500 acre-feet per year (9.5 MGD). More than \$77 million in grant funds have been secured toward this expansion.

The most recently completed expansion project includes the construction of five wells for the new Chino Creek Well Field (CCWF), which includes wells I-16, I-17, I-18, I-20 and I-21. These wells were constructed to meet the hydraulic control commitment associated with the maximum benefit (see Program Element 7 update in this status report) and provide additional raw water to the Chino I Desalter. Production at wells I-16 and I-17 began in mid-2014, production at wells I-20 and I-21 began in early 2016. Well 1-18 is currently not planned for operation by the CDA due to high concentrations of VOCs.

Three additional wells (II-10, II-11, and II-12) are planned for construction to provide additional raw water to the Chino II Desalter and are also required to meet the maximum-benefit commitment to produce a total of 40,000 acre-feet per year from the combined desalter well fields. These wells are also being constructed as part of the remediation action plan to clean-up the South Archibald Plume (See Program Element 6 update in this status report). The construction of wells II-10 and II-11 was completed in late-2015, and equipping of the wells began in 2016. Full equipping of wells II-10 and II-11 is on-hold and planned for completion in mid-2017 after the CDA completes construction of the raw-water pipeline to plumb the three new wells into the Chino-II Desalter. During this reporting period, the CDA continued with the land acquisition process for Well II-12. As soon as that land is acquired, a monitoring well will be constructed to support the design of the production well. The CDA has retained consultants for the construction and design of Well II-12, which is anticipated to begin in 2017.

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

Because of the historical occurrence of pumping-induced land subsidence and ground fissuring in southwestern Chino Basin (southern MZ-1), the OBMP required the development and implementation of an Interim Management Plan (IMP) for MZ-1 that would:

- Minimize subsidence and fissuring in the short-term,
- Collect the 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.

From 2001-2005, Watermaster developed, coordinated, and conducted an 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. Watermaster has implemented the MZ-1 Plan since this time, including the ongoing Ground-Level Monitoring Program (GLMP) called for by the MZ-1 Plan (refer to the update in this report under Program Element 1).

The MZ-1 Plan states that if data from existing monitoring efforts in the so-called Areas of Subsidence Concern indicate the potential for adverse impacts due to subsidence, Watermaster will revise the MZ-1 Plan pursuant to the process outlined in Section 3 of the MZ-1 Plan. In early 2015, Watermaster prepared an update to the MZ-1 Plan, which included a name change to the 2015 Chino

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

Basin Subsidence Management Plan (SMP) and a Work Plan to Develop the Subsidence Management Plan for the Northwest MZ-1 Area (Work Plan) as an appendix. The SMP and the Work Plan were adopted through the Watermaster Pool process during July 2015.

The data, analysis, and reports generated through the implementation of the MZ-1 Plan, SMP, and Work Plan are reviewed and discussed by the Ground-Level Monitoring Committee (GLMC), which meets on a periodic basis throughout the year. The GLMC is open to all interested participants, including the Watermaster Parties and their consultants. During this reporting period, Watermaster undertook the following data analysis and reporting tasks:

- Reviewed water levels at the PA-7 piezometer and determined that levels remained above the Guidance Level during the reporting period, and very little, if any, permanent compaction was recorded at the Ayala Park Extensometer.
- Prepared the final version of the 2015 Annual Report of the Ground-Level Monitoring Committee, following approval of the draft report by the Watermaster Board. Submitted final report to the Court on October 28, 2016.
- Completed draft technical memorandum: Initial Hydrogeologic Conceptual Model and the Monitoring and Testing Program for the Northwest MZ-1 Area. The technical memorandum describes (1) the technical information that is required to develop a subsidence management plan for the Northwest MZ-1 Area, (2) the currently known technical information, and (3) a strategy to acquire the remaining necessary technical information through a monitoring and testing program.
- Prepared a draft technical memorandum discussing the projected basin-management strategies (i.e. baseline management alternative), documenting the one-dimensional aquifer-system compaction model and results, and summarizing the results from the historical benchmark data review.
- Conducted a siting study for the Pomona Extensometer. This work included preparation of criteria for selecting and ranking parcels within the target areas for the Pomona Extensometer. The draft siting study was submitted to the Ground-Level Monitoring Committee for review and comment.
- The GLMC met in September, October, and December of 2016.

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

Program Elements 6 and 7 are necessary to address the water quality management problems that occur in the Chino Basin. During the development of the OBMP, it was identified that Watermaster does not have sufficient information to determine whether point and non-point sources of groundwater contaminant of the Chino Basin. With the Regional Board and other agencies, Watermaster has worked to address the following major point source contaminant plumes in the Chino Basin:

South Archibald Plume

In July 2005, the Regional Board prepared draft Cleanup and Abatement Orders (CAOs) for six parties who were tenants on the Ontario Airport with regard to the South Archibald TCE Plume. The draft CAOs required the parties to "submit a work plan and time schedule to further define the lateral and vertical extent of the TCE and related VOCs that are discharging, have



Watermaster Staff Taking WQ Sampling Notes

been discharged, or threaten to be discharged from the site" and to "submit a detailed remedial action plan, including an implementation schedule, to cleanup or abate the effects of the TCE and related VOCs." Four of the six parties (Aerojet-General Corporation, The Boeing Company, General Electric, and Lockheed Martin) voluntarily formed a group known as ABGL to work jointly on a remedial investigation. Northrop Grumman declined to participate in the group. 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 Parties.

In 2008, Regional Board staff conducted research pertaining to the likely source of the TCE contamination and identified discharges of wastewater that may have contained TCE to the RP-1 treatment plant and associated disposal areas to be a potential source. The

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

Regional Board identified several industries, including some previously identified tenants of the Ontario Airport property, that likely used TCE solvents before and during the early-1970s, and discharged wastes to the Cities of Ontario and Upland's sewage systems and subsequently to the RP-1 treatment plant and disposal areas. In 2012, an additional Draft CAO was issued by the Regional Board jointly to the City of Ontario, City of Upland, and IEUA as the previous and current operators of the RP-1 treatment plant and disposal area (collectively, the RP-1 parties). In part, the draft CAOs require that RP-1 parties "supply uninterrupted replacement water service...to all residences south of Riverside Drive that are served by private domestic wells at which TCE has been detected at concentrations at or exceeding $5 \ \mu g/L \ [...]$ " and to report this information to the Regional Board. In addition, the RP-1 parties are to "prepare and submit [a] [...] feasibility study" and "prepare, submit and implement the Remedial Action Plan" to mitigate the "effects of the TCE groundwater plume."

Under the Regional Board's oversight, sampling at private residential wells and taps has been conducted approximately every two years (2007-2008, 2009, 2011, 2013-2014) by multiple parties in the region where groundwater is potentially contaminated with TCE. As of 2014, all private residences in the area of the plume have been sampled at least once. Alternative water systems (tanks) have been installed at residences in the area where well water contains TCE at or above 80% of the MCL for TCE. Residents who declined tank systems are being provided bottled water. Watermaster also routinely samples for water quality at private wells in the area, and uses data obtained from this monitoring to delineate the spatial extent of the plume. In July 2015, the RP-1 parties completed the Draft Feasibility Study Report for the South Archibald Plume (Feasibility Study). The Feasibility Study establishes clean-up objectives for both domestic water supply and plume remediation, and evaluates alternatives to accomplish these objectives. A Draft Remedial Action Plan (RAP) was concurrently prepared and published in August 2015. Two community meetings were convened in September 2015 to educate the public about the plume, the Feasibility Study and the RAP, and to solicit comments on these reports. In November 2015, a revised Draft Feasibility Study, RAP, and Responses to Comments were completed to address input from the public, the ABGL, and others.

The preferred plume remediation alternative identified in the Draft Feasibility Study and RAP involves the use of existing and proposed CDA production wells and facilities. The RP-1 parties reached a Joint Facility Development Agreement with the CDA for implementation of a project designed to remediate the South Archibald Plume. The proposed project includes the operation of three new CDA desalter wells (II-10, II-11, and II-12), and a dedicated pipeline to convey produced groundwater from the three new wells and existing CDA well I-11 to the Desalter II treatment facility.

The preferred domestic water supply alternative identified in the Feasibility Study and RAP for those private residences affected by the TCE groundwater contamination that are currently receiving bottled water, is a hybrid between the installation of tank systems for some residences where water is delivered from the City of Ontario potable supply via truck deliveries, and the installation of a temporary pipeline to connect some residences to the City of Ontario potable water system. The City of Ontario has assumed the responsibility for implementing the domestic water supply alternative.

In September 2016, the Regional Board issued the Final CAO R8-2016-0016 collectively to the RP-1 parties and the ABGL parties. The Final CAO was adopted by all parties in November 2016, thus approving the plume remediation and domestic water supply alternatives identified in the RAP. The parties also reached a settlement agreement that aligns with the Final CAO and authorizes funding to initiate implementation of the plume remediation alternative. Project initiation of the plume remediation alternative is expected to begin in the second quarter of 2017.

Chino Airport Plume

In 1990, the Regional Board issued CAO No. 90-134 to the County of San Bernardino, Department of Airports (County) to address groundwater contamination originating from the Chino Airport. During 1991 to 1992, ten underground storage tanks and 310 containers of hazardous waste were removed, and 81 soil borings were drilled and sampled on the airport property. During 2003 to 2005, nine onsite monitoring wells were installed and used to collect groundwater quality samples. In 2007, the County conducted its first offsite monitoring effort, and in 2008, the Regional Board issued CAO No. R8-2008-0064, which requires the County to define the lateral and vertical extent of the plume and prepare a remedial action plan. From 2009 to 2012, Tetra Tech, the consultant to the County, conducted several off-site plume characterization studies to delineate the areal and vertical extent of the plume, and constructed 33 offsite monitoring wells. From 2013 to early-2015 Tetra Tech conducted an extensive investigation of several areas identified for additional characterization of soil and groundwater contamination; and at the conclusion of the work, they constructed an additional 33 groundwater monitoring wells on and adjacent to the Airport property. The County conducts quarterly and/or annual monitoring events at all 75 of their monitoring wells constructed to date. Conclusions from this monitoring program can be

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

found in reports posted on the Regional Board's GeoTracker website. In September 2016, Tetra Tech submitted the Semiannual Groundwater Monitoring Report, Winter and Spring 2016, Chino Airport Groundwater Assessment, San Bernardino County, California.

The County completed a Draft Feasibility Study for the Chino Airport in August 2016. The Feasibility Study identifies remedial action objectives for contaminated groundwater originating from the Chino Airport and evaluates remediation alternatives for mitigation. The recommended remediation alternative in the Feasibility Study is a groundwater pump-and-treat system to provide hydraulic containment and treatment of both the West Plume and East Plume originating from the Chino Airport. The system consists of seven extraction wells that will produce approximately 650 gallons per minute of groundwater for treatment onsite using carbon adsorption. An air stripper may be added to the system if found necessary. The preferred option for discharge of treated groundwater is to construct a pipeline to the onsite CDA Chino-I Desalter influent pipeline. If this discharge option is not available at the time of system construction the backup options are to discharge to the local surface waters or treatment plants or to six injection wells at the northeast corner of the Chino Airport. Additionally, the County has proposed an interim remediation plan to construct a granular activated carbon wellhead treatment system at CDA well I-18 located at the center of the plume, which is currently not being used by the CDA for groundwater production for the Chino Desalters. The CDA is currently reviewing the proposed design and operations plan for this well-head treatment system. The Draft Feasibility Study will be finalized after comments from the Regional Board are received and adequately addressed. Watermaster periodically collects groundwater-quality samples from dedicated monitoring wells and private wells in and around the Chino Airport plume area. And, Watermaster has also used its calibrated groundwater model to estimate cleanup times and contaminant concentrations in the vicinity of the CCWF. 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 with other point sources in the Chino Basin, including: Alumax Aluminum Recycling, Alger Manufacturing Facility, the Former Crown Coach Facility, General Electric Test Cell and Flatiron, Former Kaiser Steel Mill, Milliken Landfill, Upland Landfill, and the Stringfellow National Priorities List sites

Program Element 7: Develop and Implement a Salt Management Program

Maximum Benefit Salinity Management Plan

In January 2004, the Regional Board amended the Basin Plan 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-N for the Chino-North and Cucamonga groundwater management zones (GMZs). The maximum benefit objectives allow for the reuse and recharge of recycled water and the recharge of imported water without mitigation; these activities are an integral part of the OBMP. The application of the maximum-benefit objectives is contingent on Watermaster and the IEUA's implementation of specific projects and requirements termed the maximum-benefit commitments. There are a total of nine commitments and Watermaster and the IEUA report the status of compliance with each commitment to the Regional Board annually.



Chino Desalter I Facility

Monitoring Programs. Two of the maximum-benefit commitments are to implement surface and groundwater monitoring programs. On April 15, 2005, the Regional Board adopted resolution R8-2005-0064, approving Watermaster and the IEUA's surface and groundwater monitoring programs. These monitoring programs were conducted pursuant to the 2005 work plan until 2012, when the Basin Plan was amended to remove all references to the specific monitoring programs to be modified over time on a go-forward basis, subject to the approval of the Executive Officer of the Regional Board. The Basin Plan amendment was approved by the Regional Board on February 12, 2012 and by the State Office of Administrative Law on December 6, 2012. This amendment was adopted based on demonstrations made by Watermaster and the IEUA, showing that the surface water monitoring program, as explicitly described in the Basin Plan, was not

Program Element 7: Develop and Implement a Salt Management Program (Continued)

meaningfully adding to the body of evidence required to demonstrate hydraulic control. In the place of specific monitoring requirements, the Basin Plan required that Watermaster and the IEUA submit a new surface water monitoring program work plan by February 25, 2012 and a new groundwater monitoring program work plan by December 31, 2013. In February 2012, Watermaster and the IEUA submitted, and the Regional Board approved, a new surface water monitoring program that reduced the 2005 monitoring program from bi-weekly surface water quality measurements at 17 sites and direct discharge measurements at six sites to quarterly surface water quality sampling at two sites.

In December 2013, Watermaster and the IEUA submitted an updated Maximum Benefit Monitoring Program Work Plan and Proposed Schedule for Achieving Hydraulic Control to the Regional Board. The updated Work Plan states that Watermaster and the IEUA will recalibrate the Chino Basin groundwater model every five years and use the model to estimate groundwater discharge from the Chino-North GMZ to the Santa Ana River (i.e. annual underflow past the CCWF) and determine whether hydraulic control has been achieved. The new Maximum Benefit Monitoring Program Work Plan was adopted by the Regional Board in April 2014. Maximum benefit monitoring is incorporated as part of the groundwater level, groundwater quality, and surface water monitoring programs described in Program Element 1. During this reporting period, Watermaster continued implementing the monitoring programs (see Program Element 1 of this report for details).

Hydraulic Control and Chino Desalters. One of the main maximum-benefit commitments is to achieve and maintain "hydraulic control" of the Chino Basin so the downstream beneficial uses of the Santa Ana River are protected. The mechanism for achieving hydraulic control is the construction of the Chino Basin Desalters in the southern Chino Basin, thereby replacing the diminishing agricultural production that previously prevented the outflow of high TDS and nitrate groundwater. Hydraulic control is defined by the Basin Plan as the elimination of groundwater discharge from the Chino-North GMZ to the Santa Ana River or its reduction to a de minimus level. In October 2011, the Regional Board indicated that groundwater discharge from the Chino-North GMZ to the Prado Basin surface water management zone (Prado Basin) in an amount less than 1,000 acre-feet per year is considered de minimus. Watermaster and the IEUA have demonstrated, in Annual Reports to the Regional Board, that complete hydraulic control has been achieved at and east of Chino-I Desalter Well 5. The construction and operation of the CCWF (see Program Element 5), which began in 2010, is intended to achieve hydraulic control in the area west of Chino-I Desalter Well 5. In February 2016, the CCWF commenced full-scale operation with production at wells I-16, I-17, I-20, and I-21. The CCWF wells produced a total of about 1,665 acre-feet in 2016, which is more than the model-estimated production needed to achieve hydraulic control to the de minimus standard west of Chino-I Desalter Well 5. With this accomplishment, Watermaster has achieved full hydraulic control of the Chino Basin.

Although full hydraulic control has been achieved, future agricultural groundwater production in the southern part of the basin is expected to continue to decline, necessitating future expansion of the desalters to sustain hydraulic control. In a letter dated January 23, 2014, the Regional Board required that by May 31, 2014, Watermaster and the IEUA submit a plan detailing how hydraulic control will be sustained in the future as agricultural production in the southern region of Chino-North continues to decrease, specifically how the Chino Basin Desalters will achieve the required total groundwater production level of 40,000 acre-feet per year. On May 30, 2014 Watermaster and the IEUA submitted a draft plan and schedule to install three new desalter wells—with the location of one well being provisional. On June 30, 2015 Watermaster and the IEUA submitted a final plan and schedule for the construction and operation of the three new desalter wells including the final well locations. These wells are under construction. During this reporting period, Watermaster coordinated with the Chino Desalter Authority to track the progress of construction of the desalter expansion facilities. A full status report on the desalter expansion facilities is described in this status report under Program Element 3.



Recycled Water Line at the San Sevaine Basins

Recycled Water Recharge and Quality. The maximum benefit commitments require Watermaster and the IEUA to construct and operate expanded facilities for the recharge of storm and recycled waters and to report on the quality of the individual and combined sources of water used for recharge. This data is compiled and analyzed each year for reporting to the Regional Board. During this reporting period, Watermaster and the IEUA continued their monitoring programs to collect the data required for analysis and reporting to the Regional Board.

Ambient Water Quality. Commitment number 9 requires that Watermaster and the IEUA recompute the ambient TDS and nitrate concentrations for the Chino Basin and Cucamonga GMZs every three years. The recomputation of ambient water quality is performed for the entire Santa Ana River Watershed, and the technical work is contracted, managed, and directed by the Santa Ana Watershed Project Authority's Basin Monitoring Program Task

Program Element 7: Develop and Implement a Salt Management Program (Continued)

Force. Watermaster and the IEUA have participated in each triennial, watershed-wide ambient water quality determination as members of the Task Force. The most recent recomputation, covering the 20-year period from 1993 to 2012, was completed in August 2014. During this reporting period, the Task Force initiated the effort to compute the ambient water quality for the 20-year period from 1996 to 2015, and Watermaster and the IEUA provided the Task Force with a portion of the groundwater data necessary for the recomputation of the management zones in the Chino and Cucamonga Basins. The remainder of the data is anticipated to be delivered in early 2017.

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

Groundwater storage is important to the Chino Basin. The OBMP outlines Watermaster's commitments to investigate the technical and management implications of Local Storage Agreements, improve related policies and procedures, and then revisit all pending Local Storage Agreement applications.

The existing Watermaster/IEUA/MWDSC/Three Valleys Municipal Water District Dry-Year Yield (DYY) program continues to be implemented. By April 30, 2011, all DYY program construction projects and a full "put" and "take" cycle had been completed, leaving the DYY storage account with a zero balance. During the reporting period, no water was stored or withdrawn from storage in the DYY Program.

Safe Yield Redetermination

The Basin's Safe Yield was initially set by the Judgment at 140,000 acre-feet per year. The Safe Yield was based in on the hydrology of the period 1965 through 1974. Pursuant to the Judgment, the Chino Basin Safe Yield is to be re-determined periodically, but it provides that the Safe Yield would not be reexamined for at least ten years from 1978. Pursuant to the OBMP Implementation Plan and Watermaster's Rules and Regulations, in year 2010/11 and every ten years thereafter, Watermaster is to compute the Safe Yield. The 2011 Safe Yield recalculation was to be based in part on the information obtained in the prior ten-year period.

In 2011, Watermaster authorized its staff to compile the necessary data and update its model of the basin and, based on the data and the model, to recalculate the Safe Yield. The model calibration was completed in 2012, and the evaluation of Safe Yield began in 2013. During fiscal year 2014/15, the Watermaster parties, pursuant to Watermaster Board direction, met intensively in a facilitated process which resulted in a majority consensus regarding the implementation of the recalculated Safe Yield and drafted the 2015 Safe Yield Reset Agreement. At its September 24, 2015 meeting, the Board adopted Resolution 2015-06, endorsing the 2015 Safe Yield Reset Agreement, and directed Watermaster legal counsel to file the Agreement with the Court. Resolution 2015-06 was adopted by majority vote, with two of the nine Board members opposing the action. The agreement was filed with the Court on October 23, 2015 with a motion recommending that the Court reset the Safe Yield of the Chino Basin at 135,000 acre-feet per year. The hearing on this motion was originally scheduled for December 18, 2015. The Court continued the hearing to September 23, 2016. The Court conducted a hearing on September 23, 2016, heard oral arguments from various parties and Watermaster legal counsel, requested further briefing from the interested parties, and scheduled a hearing in the next reporting period.