CHINO BASIN WATERMASTER

NOTICE OF MEETINGS

September 11, 2003
8:30 a.m. - Dry-Year Yield Project Workshop
10:00 a.m. – Appropriative & Non-Agricultural
1:00 p.m. – Agricultural Pool
(Lunch will not be provided)

AT THE OFFICES OF
CUCAMONGA COUNTY WATER DISTRICT
10440 ASHFORD STREET
RANCHO CUCAMONGA, CA 91729
(909) 987-2591

CHINO BASIN WATERMASTER

Joint Appropriative & Non-Agricultural Pool Meeting

10:00 a.m. – September 11, 2003

AT THE OFFICES OF

CUCAMONGA COUNTY WATER DISTRICT

10440 Ashford Street

Rancho Cucamonga, CA 91729

AGENDA

CALL TO ORDER

AGENDA - ADDITIONS/REORDER

I. CONSENT CALENDAR

Note: All matters listed under the Consent Calendar are considered to be routine and non-controversial and will be acted upon by one motion in the form listed below. There will be no separate discussion on these items prior to voting unless any members, staff, or the public requests specific items be discussed and/or removed from the Consent Calendar for separate action.

A. FINANCIAL REPORTS

1. Cash Disbursement Report – August 2003 *(page 1)*

B. STATUS REPORT NO. 8

Authorize staff and legal counsel to make non-substantive edits if necessary and file OBMP Implementation Status Report No. 8 with the court. *(page 3)*

II. BUSINESS ITEMS - POSSIBLE ACTION

A. BALANCE OF RECHARGE & DISCHARGE IN ALL AREAS, AND DETERMINATION OF OPERATING STORAGE & SAFE STORAGE

At the August meetings, Mr. Wildermuth presented a Draft Technical Memorandum on the Dry-Year Yield findings related to recharge and discharge in all areas and operating storage and safe storage. Mr. Wildermuth has prepared and will present the Final Draft Technical Memorandum for the Pool's consideration. *(page 23)*

B. REQUEST FROM JURUPA COMMUNITY SERVICES DISTRICT (JCSD)/CHINO DESALTER AUTHORITY (CDA) - LONG TERM DESALTER REPLENISHMENT AND RELATED ISSUES

JCSD/CDA have requested that Watermaster consider various issues related to the desalter expansions. Staff will present background on the issues. *(page 84)*

III. REPORTS/UPDATES

A. WATERMASTER GENERAL LEGAL COUNSEL REPORT

1. Chino Land & Water
2. Chino Paragraph 15 Motion
3. September 4, 2003 Hearing
4. Central Basin Appellate Decision

B. CEO REPORT/UPDATES

1. Establishment of Workgroup to address MVWD issues
2. Statement of Intent Between the Department of Defense (DOD) and Local Entities
3. Status Update on Dry-Year Yield Project

C. OTHER AGENCY REPORTS

IV. COMMITTEE MEMBER COMMENTS

V. OTHER BUSINESS

VI. FUTURE MEETINGS AND EVENTS

September 11, 2003	8:30 a.m.	Dry-Year Yield Project Committee
	10:00 a.m.	Joint Appropriative Pool & Non-Agricultural Pool Meeting
	1:00 p.m.	Agricultural Pool Meeting

Note: September 11 meetings listed above will be held at Cucamonga County Water District, 10440 Ashford Street, Rancho Cucamonga, CA 91729

September 25, 2003	10:00 a.m.	Advisory Committee Meeting
	1:00 p.m.	Watermaster Board Meeting

Note: September 25 meetings listed above will be held at Cucamonga County Water District, 10440 Ashford Street, Rancho Cucamonga, CA 91729

October 9, 2003	8:30 a.m.	Storage & Recovery Workshop
	10:00 a.m.	Joint Appropriative Pool & Non-Agricultural Pool Meeting
	1:00 p.m.	Agricultural Pool Meeting
October 23, 2003	10:00 a.m.	Advisory Committee Meeting
	1:00 p.m.	Watermaster Board Meeting

Meeting Adjourn

CHINO BASIN WATERMASTER

Agricultural Pool Meeting
1:00 p.m. – September 11, 2003
AT THE OFFICES OF
CUCAMONGA COUNTY WATER DISTRICT
10440 Ashford Street
Rancho Cucamonga, CA 91729

AGENDA

CALL TO ORDER

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CHINO BASIN WATERMASTER

AGENDA PACKAGE

September 11, 2003
10:00 a.m. – Appropriative & Non-Agricultural Pools
1:00 p.m. – Agricultural Pool Meeting

AT THE OFFICES OF
CUCAMONGA COUNTY WATER DISTRICT
10440 ASHFORD STREET
RANCHO CUCAMONGA, CA 91729

CHINO BASIN WATERMASTER

September 11, 2003

10:00 a.m. – Appropriative & Non-Agricultural Pools
1:00 p.m. – Agricultural Pool Meeting

I. CONSENT CALENDAR

A. FINANCIAL REPORTS
Cash Disbursements

CHINO BASIN WATERMASTER

8632 Archibald Avenue, Suite 109, Rancho Cucamonga, Ca 91730
Tel: 909.484.3888 Fax: 909.484.3890 www.cbwm.org

JOHN V. ROSSI
Chief Executive Officer

STAFF REPORT

DATE: **September 11, 2003**

TO: **Advisory Committee Members**
Watermaster Board Members

SUBJECT: **Cash Disbursement Report – September 2003**

SUMMARY

Issue – Record of cash disbursements for the month of July 2003.

Recommendation – Staff recommends the Cash Disbursements for July 2003 be received and filed as presented.

Fiscal Impact – All funds disbursed were included in the FY 2003-04 Watermaster Budget.

BACKGROUND

A monthly cash disbursement report is provided to keep all members apprised of Watermaster expenditures.

DISCUSSION

Total cash disbursements during the month of August 2003 were $232,828.32. The most significant expenditures during the month were Wildermuth Environmental Inc. in the amount of $94,092.79 and Hatch & Parent in the amount of $26,509.52.

CHINO BASIN WATERMASTER
Cash Disbursement Detail Report
August 2003

Type	Date	Num	Name	Amount
Aug 03				
General Journal	8/7/2003	03/08/4	PAYROLL	-5,196 67
General Journal	8/7/2003	03/08/4	PAYROLL	-17,308 56
Bill Pmt -Check	8/7/2003	7853	A & R TIRE	-359 80
Bill Pmt -Check	8/7/2003	7854	APPLIED COMPUTER TECHNOLOGIES	-2,041 40
Bill Pmt -Check	8/7/2003	7855	BARRION, VICTOR A	-125 00
Bill Pmt -Check	8/7/2003	7856	CATLIN, TERRY	-125 00
Bill Pmt -Check	8/7/2003	7857	CHEVRON	-417 88
Bill Pmt -Check	8/7/2003	7858	CITISTREET	-2,163 54
Bill Pmt -Check	8/7/2003	7859	COSTCO	-280 12
Bill Pmt -Check	8/7/2003	7860	INLAND EMPIRE UTILITIES AGENCY	-1,224 84
Bill Pmt -Check	8/7/2003	7861	MWH LABORATORIES	-5,665 00
Bill Pmt -Check	8/7/2003	7862	PAYCHEX	-141 50
Bill Pmt -Check	8/7/2003	7863	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-277 89
Bill Pmt -Check	8/7/2003	7864	REID & HELLYER	-3,315 75
Bill Pmt -Check	8/7/2003	7865	RICOH BUSINESS SYSTEMS-Maintenance	-651 95
Bill Pmt -Check	8/7/2003	7866	RODRIGUEZ, DAN	-125 00
Bill Pmt -Check	8/7/2003	7867	STATE COMPENSATION INSURANCE FUND	-777 76
Bill Pmt -Check	8/7/2003	7868	STEWART, TRACI L	-494 81
Bill Pmt -Check	8/7/2003	7869	TLC STAFFING	-1,067 60
Bill Pmt -Check	8/7/2003	7870	UNITED PARCEL SERVICE	-419 72
Bill Pmt -Check	8/7/2003	7871	USA-FACT INC	-10 00
Bill Pmt -Check	8/7/2003	7872	VANDEN HEUVEL, GEOFFREY	-250 00
Bill Pmt -Check	8/7/2003	7873	VELASQUEZ JANITORIAL	-175 00
Bill Pmt -Check	8/7/2003	7874	VERIZON	-527 08
Bill Pmt -Check	8/7/2003	7875	WHITEHEAD, MICHAEL	-125 00
Bill Pmt -Check	8/7/2003	7876	YATES, DENNIS	-125 00
Bill Pmt -Check	8/7/2003	7877	INLAND COUNTIES INSURANCE SERVICES, INC	-340 66
Bill Pmt -Check	8/7/2003	7878	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-3,874 65
Bill Pmt -Check	8/7/2003	7879	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-4,667 73
Bill Pmt -Check	8/8/2003	7880	MARK IV COMMUNICATIONS, INC	-5,976 89
Bill Pmt -Check	8/8/2003	7881	P C. CLUB	-583 96
Check	8/14/2003	7882	TOGO'S	-210 75
Bill Pmt -Check	8/19/2003	7883	BANK OF AMERICA	-245 57
Bill Pmt -Check	8/19/2003	7884	ELLISON, SCHNEIDER & HARRIS, LLP	-13,198 68
Bill Pmt -Check	8/19/2003	7885	FIRST AMERICAN REAL ESTATE SOLUTIONS	-125 00
Bill Pmt -Check	8/19/2003	7886	HATCH AND PARENT	-26,509 52
Bill Pmt -Check	8/19/2003	7887	HOSE MAN	-146 08
Bill Pmt -Check	8/19/2003	7888	Jin M Kim, M.D	-140 00
Bill Pmt -Check	8/19/2003	7889	KING OFFICE SERVICES	-1,950 00
Bill Pmt -Check	8/19/2003	7890	MCI	-945 95
Bill Pmt -Check	8/19/2003	7891	MWH LABORATORIES	-1,150 00
Bill Pmt -Check	8/19/2003	7892	OFFICE DEPOT	-680 54
Bill Pmt -Check	8/19/2003	7893	PARK PLACE COMPUTER SOLUTIONS, INC	-2,035 00
Bill Pmt -Check	8/19/2003	7894	PETTY CASH	-474 28
Bill Pmt -Check	8/19/2003	7895	POWERS ELECTRIC PRODUCTS CO	-686 40
Bill Pmt -Check	8/19/2003	7896	RICOH BUSINESS SYSTEMS-Lease	-3,591 31
Bill Pmt -Check	8/19/2003	7897	SOFTCHOICE	-32 56
Bill Pmt -Check	8/19/2003	7898	SOUTHERN CALIFORNIA EDISON	-942 90
Bill Pmt -Check	8/19/2003	7899	TLC STAFFING	-2,135 20
Bill Pmt -Check	8/19/2003	7900	UNITEK TECHNOLOGY INC	-408 37
Bill Pmt -Check	8/19/2003	7901	WILDERMUTH ENVIRONMENTAL INC	-48,559 01
Bill Pmt -Check	8/19/2003	7902	WILDERMUTH ENVIRONMENTAL INC	-45,533 78
General Journal	8/25/2003	03/08/07	PAYROLL	-1,001 62
General Journal	8/25/2003	03/08/8	PAYROLL	-5,137 08
General Journal	8/25/2003	03/08/8	PAYROLL	-17,653 11
Check	8/26/2003	7904	TOGO'S	-104 85
Check	8/28/2003	7905	JAMES JOHNSTON	-395 00
Aug 03				**-232,828.32**

CHINO BASIN WATERMASTER

September 11, 2003

10:00 a.m. – Appropriative & Non-Agricultural Pools
1:00 p.m. – Agricultural Pool Meeting

I. CONSENT CALENDAR

B. STATUS REPORT NO. 8

CHINO BASIN WATERMASTER

8632 Archibald Avenue, Suite 109, Rancho Cucamonga, Ca 91730
Tel: 909 484 3888 Fax: 909 484 3890 www.cbwm.org

JOHN V. ROSSI
Chief Executive Officer

STAFF REPORT

DATE: **September 11, 2003**
September 25, 2003

TO: **Pool Committee Members**
Advisory Committee & Watermaster Board Members

SUBJECT: **OBMP Implementation - Status Report No. 8**

SUMMARY

Issue – Compliance with Court Order requiring OBMP implementation progress reports.

Recommendation – Staff recommends:

- Approval of Status Report No. 8,
- Authorize its filing with the Court, and
- Authorize staff and legal counsel to make non-substantive edits as necessary.

Fiscal Impact – None

BACKGROUND

In accordance with the September 28, 2000 Order, progress reports are due to the Court on the last day of March and September of each year. Watermaster had indicated to the Court its intention to accelerate the reporting schedule from semi-annual to quarterly due to the rapid pace of OBMP implementation. In a subsequent Order on October 17, 2002, the Court requested Watermaster provide periodic reports concerning various issues relating to the Interim Plan by the last day of June and December of each year. These reporting items are included within Watermaster's regular quarterly reports.

DISCUSSION

The reporting period for Status Report No. 8 is May 31, 2003 to July 31, 2003. It utilizes the same format previously filed as a baseline from which to update the Court. The attached draft report outlines the progress and status of Watermaster programs and projects

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Chino Basin Watermaster
Status Report No. 8

(Covering June 2003 through August 2003)

DRAFT

September 2003

OPTIMUM BASIN MANAGEMENT PROGRAM

In its Order of September 28, 2000, extending the term of the nine-member Watermaster Board, the Court ordered Watermaster to provide semiannual reports regarding the progress of OBMP implementation. In Status Report Number 4, filed with the Court on September 30, 2002, Watermaster notified the Court that Watermaster intended to accelerate voluntarily the reporting schedule because of the rapid pace of OBMP implementation. By a subsequent Order of October 17, 2002, the Court added additional reporting items to the quarterly report.

This Status Report Number 8 is filed pursuant to this schedule and reports on the period from June 1, 2002 to August 31, 2003.

PROGRAM ELEMENT 1 – DEVELOP AND IMPLEMENT COMPREHENSIVE MONITORING PROGRAM

Groundwater-Level Monitoring

BACK-GROUND

Watermaster has three active groundwater-level monitoring programs operating in the Chino Basin – a semiannual Basinwide program, a monthly program associated with the Chino-I and Chino-II desalter well fields, and an intensive groundwater-level monitoring program associated with land-surface monitoring (see Land-Surface Monitoring below) in Management Zone 1.

ON-GOING

Semiannual Groundwater Level Monitoring Program. Watermaster initiated the semiannual Basinwide groundwater-level monitoring program in 1999. The Spring-Summer 2003 round of testing began in April and was completed in July 2003.

Chino I and Chino II Desalter Well Field Monitoring Programs. Watermaster staff continued to collect groundwater-level data at about 250 wells once a month in and around the Chino-I and Chino-II desalter well fields during this reporting period.

THIS PERIOD

Watermaster staff began the process of analyzing hydrogeology, well construction, and groundwater-level data in the vicinity of the Chino-I Desalter well field in an effort to develop a key well groundwater-level monitoring network. This key well network will be reviewed and finalized during the next reporting period, and will likely reduce the number of monitoring wells in the Chino-I program by two-thirds. This key well network will be used for the piezometric monitoring element of the Hydraulic Control Monitoring Program (see below).

ON-GOING

Management Zone 1 Interim Monitoring Program. Watermaster consultants have initiated a groundwater-level monitoring program to collect data at about 40 wells in the southern portion of Management Zone 1 (City of Chino area). Data are being collected manually at all wells at least once a month and by automated pressure transducers at these same wells at least once every 15 minutes.

Groundwater-Quality Monitoring

THIS PERIOD

Three-Year Sampling Program of All Accessible Private Wells. During this quarter, Watermaster completed the first year of a three-year sampling program in which all accessible private wells in the southern portion of the Chino Basin are sampled (about 150 to 200 wells each year). Through the end of August 2003, 153 wells have been sampled. Watermaster is continuing the cooperative monitoring program described in the Implementation Plan. Watermaster obtains data every six months from the Department of Health Services for the municipal water agencies and from the Department of Toxics Substances Control and the Regional Board for most of the other wells in the Basin. Watermaster is in the process of obtaining updated water quality data directly from all Appropriative Pool members. This will greatly enhance the quality and integrity of Watermaster's database.

ON-GOING

Extensive Range of Substances Being Tested

- All groundwater samples are analyzed for general mineral and general physical parameters.
- Wells not previously sampled and analyzed for constituents added to the evolving groundwater-quality monitoring program (e.g., hexavalent chromium, silica, barium, etc.) in 1999-2001 are now being sampled for those constituents.
- Wells within or near the two Volatile Organic Compound (VOC) plumes are being analyzed for VOCs, in addition to the usual parameters.
- All wells are being analyzed for perchlorate because of its widespread presence in the 1999-2001 sampling program.
- Analysis for 1, 2, 3-trichloropropane has been added to the monitoring program for all wells. This chemical was detected in several wells above 50 parts per trillion (old detection limit).

New Testing Method Measures Parts Per Trillion of TCP. In the 2002-03 monitoring program, a new analytical methodology is being used to achieve a detection limit of 5 parts per trillion for 1, 2, 3-TCP, which is its California Action Level.

Prioritizing Wells to Serve Multiple Purposes

BACK-GROUND

The wells chosen for the 2002-03 monitoring program are located primarily between the Chino I Desalter well field and the Santa Ana River. Wells were prioritized for 2002-03 to aid in the development of a monitoring program to demonstrate hydraulic control in the southern portion of Chino Basin. (See the Cooperative Effort to Determine State of Hydraulic Control discussion in Program Elements 6 and 7.)

Groundwater-Production Monitoring

ON-GOING **Installation of Production Monitoring Wells Completed.** Primary production monitoring involved the installation of meters on wells operated by members of the Agricultural Pool. Initially, Watermaster counted about 516 active agricultural wells. Watermaster equipped 378 of these wells with operating meters. The other 138 wells have or will become inactive within 18-24 months due to development in the south Chino area.

All Producing Wells Are Monitored Quarterly. Watermaster staff reads the newly installed and/or rehabilitated meters on the agricultural wells quarterly. A method appropriate to the Chino Basin area continues to be used to estimate production at agricultural wells that do not have meters.

TO COME **Need For Water Use Disposal Form To Be Reviewed.** The OBMP Implementation Plan includes a provision that requires the producers to submit a water use and disposal form describing the sources of water used by each producer and how that water is disposed of after each use. Filling out the water use and disposal form and reporting the results have not been implemented, because much of the information is being collected already as elements of other monitoring activities and analyses. In the later half of fiscal 2003-2004, Watermaster anticipates discussions regarding the need for this form.

Surface-Water Monitoring

BACK-GROUND **Measure Water Quality and Water Levels In Recharge Basins.** Watermaster conducts a surface-water monitoring program to measure the water quality of water in recharge basins and the water levels in some of these basins. The purpose of this program is to estimate the volume and quality of recharge. This information will be used in subsequent years to estimate the safe yield of the Basin and for other management purposes.

THIS PERIOD During this reporting period, Watermaster staff collected nuisance water quality samples at Grove Basin on July 9 and August 14, 2003. Normal storm water flows were sampled in the Grove Basin on eight occasions during the fiscal 2002-2003 storm season for comparison purposes.

THIS PERIOD **Surface-Water Monitoring for Santa Ana River Began In June 2003.** One of the goals of the OBMP is to maximize Chino Basin yield. A key component in maximizing yield is to minimize groundwater discharge into the Santa Ana River and, in some reaches of the River, to maximize recharge from the Santa Ana River into the Chino Basin. Watermaster developed a surface-water monitoring program for the Santa Ana River that, in conjunction with Watermaster groundwater-monitoring programs, will be used to characterize those reaches of the River that are gaining water from the Basin, and to determine if significant discharge of Chino Basin groundwater to the Santa Ana River is occurring. A conceptual monitoring plan involving Inland Empire Utilities Agency, Orange County Water District, the Regional Water Quality Control Board, and Watermaster was finalized. These agencies determined that the conceptual monitoring plan was adequate and developed a detailed work plan to implement a surface-water and groundwater-monitoring program. The work plan was completed in June 2003.

THIS PERIOD

Watermaster consultants met with the staff of the U.S. Geological Survey, which conducted stream gauge measurements at 4 ad hoc stations in the Santa Ana River between MWD Crossing and Prado Dam: SAR at Van Buren, SAR at Etiwanda, SAR at Hamner, and SAR at River Road. Another ad hoc station measured discharge from Hole Lake near the Santa Ana River.

Watermaster collected water quality samples at these ad hoc stations, plus another 7 locations on tributaries, on a biweekly basis from July through mid-September 2003. In addition, Watermaster obtained discharge data for permanent USGS and OCWD stream gauge locations on the Santa Ana River and its tributaries. Discharges from POTWs were also quantified.

Land-Surface Monitoring

BACK-GROUND

Multifaceted Approach. Watermaster staff developed a multifaceted land-surface monitoring program to develop data for a long-term management plan for land subsidence in Management Zone 1. The monitoring program consists of three main elements:

1. An aquifer-system monitoring facility located in the southern portion of Management Zone 1 – an area that has experienced concentrated and differential land subsidence and ground fissuring. One major component of the aquifer system monitoring facility is a cluster of multiple-depth piezometers that measure water level and pressure changes at 11 different depths. Another major component is a dual borehole extensometer that measures deformation within the aquifer system at deep and shallow levels.

   THIS PERIOD

   Installation of the extensometer was completed in July 2003. Together, the two components will correlate the hydraulic and mechanical responses of the aquifer system to different aquifer stresses, such as pumping at wells.

2. Synthetic aperture radar interferometry (InSAR) that will measure land surface deformation across the entire Chino Basin.

3. Benchmark surveys along selected profiles of the Chino Basin. The benchmark surveys (1) establish a datum from which to measure future land surface deformation, (2) "ground-truth" the InSAR data, (3) allow determination of historical subsidence at any historical benchmarks that can be recovered, and (4) evaluate the effectiveness of the long-term management plan.

THIS PERIOD

Progress During This Reporting Period. The Ayala Park Extensometer drilling/pipe installation contract was completed in mid-May 2003. A deep extensometer borehole was drilled to a depth of 1,410 feet, and the shallow extensometer borehole was drilled to 540 feet. Construction of the extensometer instrument platform and building was completed on June 27, 2003. Extensometer wellhead construction and instrumentation was completed on July 7, 2003, at which time data collection commenced.

The arrangement of extensometer anchors, along with the piezometer data will enable distinction between compaction within the shallow aquifer system (0-300 ft-bgs), the upper, fine-grained portions of the deep aquifer system (300-440 ft-bgs), and the lower, fine-grained portions of the deep aquifer system (600-1375 ft-bgs).

Depth-Specific Data. Permanent transducers and data logging equipment are recording depth-specific groundwater-level data at the Ayala Park piezometers. Transducers also are recording groundwater-level data at wells owned by the cities of Chino and Chino Hills, and are recording groundwater-level data and "on/off" pumping cycles at active production wells. The State of California (CIM) and Watermaster have signed an access agreement that allows groundwater level and production monitoring at CIM wells. On July 15, 2003 six monitoring wells on CIM property were instrumented with transducers and are collecting groundwater-level data. Six production wells were inspected and transducers have been ordered and received. Installation of transducers at these production wells will occur on or around August 29, 2003, thereby completing the transducer installation effort at wells surrounding Ayala Park.

Observations From Water Level Data. Permanent transducers and data loggers were installed at the piezometers at Ayala Park and are continually collecting water-level data. The following observations can be made from analysis of all water-level data from the piezometers and from the surrounding wells:

- The two shallowest piezometers (PA-10 and PA-11) have a separate and distinct water level response to nearby pumping, as compared to the deeper piezometers, confirming the existence of distinct shallow and deep aquifer systems.

- Pumping at surrounding wells, screened in both the shallow and deep aquifer-systems, has lowered water levels in all piezometers – particularly in piezometers PA-7 (438-448 ft-bgs) and PB-6 (502-522 ft-bgs). These two piezometers are exhibiting a typical response to pumping within a confined aquifer system.

THIS PERIOD **Aquifer Stress Tests.** During the April-June 2003 period, Watermaster, with the assistance of the cities of Chino Hills and Chino, conducted aquifer stress tests (pumping tests) while monitoring water levels and groundwater production at nearby monitoring wells, production wells, and the Ayala Park piezometers. Data from these aquifer stress tests are currently being analyzed.

TO COME **InSAR.** Watermaster staff has initiated contact with potential sub-consultants to conduct the Insar element of the Interim Monitoring Program. An initial meeting is scheduled for September 4, 2003.

THIS PERIOD **Benchmark Monument Network.** Associated Engineers (AE) completed monument installation and the initial survey during the last reporting period (April 2003). The survey data as a hard copy deliverable were provided to the MZ-1 Technical Committee at the July 23, 2003 meeting. This initial survey is the baseline to which all future surveys will be compared. From this point forward, the deep extensometer, anchored in solid bedrock, will be the starting benchmark for all survey loops. The next planned survey is April 2004.

ON-GOING AE performed ground-level surveys for the City of Chino from 1987 to 2001 at some of the same benchmarks used in the April 2003 survey. The starting benchmark for these historical surveys was not found and was presumed destroyed, but a nearby benchmark was used instead to allow for differential vertical movement to be estimated at the benchmarks used in both survey efforts. The data indicate that modest subsidence has continued in MZ-1 during the period October 2001 to April 2003, even though elastic

rebound of the land surface because of seasonal water-level recovery was expected during the Fall to Spring measurement interval. Maximum subsidence measured at an individual monument during this period was 0.136 feet at the intersection of Pipeline Avenue and Walnut Street.

Well Construction, Abandonment, and Destruction Monitoring

BACK-GROUND

Watermaster staff monitors the condition of wells on a regular basis. Wells that may be improperly abandoned/destroyed are reported to Riverside and San Bernardino Counties as they are discovered.

Watermaster staff inspected 150 suspect wells during a 2002-03 field inspection. It was determined that 113 of these wells were properly abandoned and 37 wells would require some modification to meet the standard for a properly abandoned well. A well repair/abandonment program was prepared and approved by Watermaster. Watermaster is continuing to develop a wellhead protection program and will make recommendations on closure of abandoned wells.

TO COME

Field repair will begin in September 2003, with completion in six months. Riverside and San Bernardino Counties will be advised of the results. Ongoing land development will require continued well abandonment activity by Watermaster.

PROGRAM ELEMENT 2 – DEVELOP AND IMPLEMENT COMPREHENSIVE RECHARGE PROGRAM

A centerpiece of the OBMP is enhancement of the Basin recharge capacity, so that high quality storm water and available recycled water can be retained in the Basin.

Recharge Facilities Improvement Project (Seven Construction Packages)

THIS PERIOD

Bid Package No. 1--Construction Underway

Bid Package No. 1, which includes improvements at Banana, College Heights, Lower Day, RP-3, and Turner Basins, was awarded to LTE Excavating on March 24. Work is scheduled for completion by November 15, 2003. Earthwork for Cells 1, 3, and 4 at RP-3 is nearly complete. Construction of the trapezoidal channel to divert flow from Declez channel and distribute flow to the basin complex is approximately 50 percent complete. The contractor is laying a gravity pipeline to convey storm water flow from the trapezoidal channel to Cell 1 and to convey recycled and imported water that will be delivered to Cell 1 via the Jurupa Force Main to Cells 3 and 4. The area for Cell 2 has been used to stockpile dirt removed from the other cells. The dirt will eventually be hauled offsite by a dirt broker at no cost, and Cell 2 will be developed into a mitigation site in compliance with the Regional Water Quality Board 401 Permit. The excavation of the new College Heights SW Basin is approximately 90 percent complete. Dirt is being hauled across temporary "railroad flat car" bridges and deposited in an engineered fill at the College Heights NW Basin. The Contractor has substantially completed the earthwork at Turner No. 2, 3 & 4 Basins. Additional fill material will be excavated from Turner No. 1 Basin, hauled across Deer Creek Channel over "railroad flat car" bridges (after the bridges are relocated from

the College Heights Basin) and deposited in an engineered fill at Turner Nos. 2, 3, & 4 Basins. The Contractor began excavating and placing fill at Lower Day Basin and cutting side slopes at Lower Day Basin in late July.

THIS PERIOD

Bid Package No. 2 – Construction Underway

Bid Package No. 2 consists of construction of the bottom drop inlet structures for Brooks Street Basin, Turner Basin, and Victoria Basin; rubber dams for College Heights/Upland Basins, Turner No. 1 Basin, and Lower Day Basin, and RP-3 Basin; and various improvements at Declez Basin, Ely Basin, and 8th Street Basin. This package was originally bid in June 2003. Due to a protest, the package was rebid. The winning bid from Banshee Construction was for $6.9 million. Work began in August 2003. The contract requires that work in storm channels be completed by October 15 and that the rubber dams be operational by December 31, 2003. All work for this contract must be completed by March 2004.

THIS PERIOD

Bid Package No. 3 – Construction Expected By End of 2003

Bid Package No. 3 involves construction of approximately 11,000 linear feet of 36-inch CML&C force main between Jurupa Basin and RP-3 Basin. The force main will be used to convey storm water, imported water, and recycled water between the pump station at Jurupa Basin and the RP-3 Basin. The Engineer's estimate was $3 million-$3.5 million. IEUA received eight bids, including the winning bid of $2.9 million by W.A. Rasic Construction Company. The contract will be formally awarded on August 6, 2003. The Contractor anticipates a construction period of 6 1/2 months beginning with the delivery of pipe at the construction site in December 2003.

TO COME

Bid Package No. 4 – Construction Expected By November 2003

Bid Package No. 4 consists of construction of the Jurupa Basin Pump Station. The design is on hold at the 90 percent stage pending resolution of comments. His bid package includes the SCADA system and electrical improvements at all the basins. The 90 percent design submittal is currently under review. Comments will be received on the design submittal through the middle of August. It is expected that the 100 percent submittal will be available for review by the first week of September. Bidding of the SCADA system and electrical improvements could begin as early as September 15. The Contractor is expected to be selected and begin work by November 1, 2003.

TO COME

Bid Package No. 6 – Construction Contract Expect To Award In November 2003

This bid package covers the construction of three MWD turnouts: 11TB and 15T on the Rialto Pipeline, and new turnout on the Etiwanda Pipeline near San Sevaine Channel. An informational meeting was held with MWD staff in May 2003 to determine the design approach and requirements. MWD has provided various drawings, specifications, and other information needed to complete the three designs. The 90 percent design submittal is anticipated before September 1, 2003. The contract is expected to be awarded by the November 15, 2003.

TO COME

Bid Package No. 7 – Priority, Funding and Scope of Misc. Projects Being Evaluated

This bid package will complete miscellaneous projects not included in the previous bid packages. Among the projects being considered for this bid package are:

- Mitigation Area at RP-3
- Pre-Treatment Areas at Jurisdictional Basins
- Upland Basin Completion
- Completion of Victoria Basin Improvements
- Hickory Pump Station and Force Main
- Etiwanda Conservation Ponds
- Miscellaneous Projects

The various projects will be prioritized and those that offer the greatest benefits to groundwater recharge will be included in the bid package depending on available funding after construction of the other 6 bid packages. The scope of work is currently under development. Bid Package No. 7 is expected to be awarded by second quarter 2004.

THIS PERIOD

Groundwater Recharge Coordinating Committee

The GRCC met weekly to monitor and coordinate the Recharge Facilities Improvement Project, focusing on defining additional operations and maintenance costs. Watermaster's draft 2003-2004 budget provides about $440,000 for the operation and maintenance activities.

In addition to design review, the GRCC has initiated work on operations and maintenance for all the recharge basins, as well as obtaining regulatory agency approvals and permits.

Santa Ana River Fully Appropriated Stream (FAS) Petition and Application

BACK-GROUND

Watermaster's Santa Ana River Application to Appropriate, which was filed by Watermaster in trust for the Parties to the Judgment, is reported under Program Element 2. This is because the water referenced under Watermaster's Application is seasonal storm flow that has been and will be recharged pursuant to this Program Element.

On May 20, 2003, the SWRCB provided formal notice to all the participants in the Santa Ana River process of protests that have been filed to the various applications. A 30-day period was provided for responses to the protests.

The U.S. Forest Service, California Fish and Wildlife Service, Eastern Valley Water District, and the Cucamonga County Water District have protested Watermaster's Application. As previously reported, the Forest Service has informally agreed to withdraw its protest. FWS has general concerns about the impacts of various diversion schemes on the fish and wildlife in the Santa Ana River. Eastern Valley has questioned whether there is water available in the Santa Ana River for appropriation, while Cucamonga Water requests recognition of its pre-1914 water rights.

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

These program elements focus on the shift of production in the southern end of the Basin away from agricultural uses and toward urban uses. Without the OBMP, this land use conversion would result in a decrease in production in the southern end of the Basin, ultimately leading to rising water levels. If groundwater levels in the southern end of the Basin rise too high, then water may "spill" out of the Basin into the Santa Ana River. Such uncontrolled spillage could reduce the overall Safe Yield of the Basin. The Basin will be managed to avoid this possibility.

Directly tied to the threat of rising water levels in the southern area is the impaired ability of producers in the southern end of the Basin to pump water because of water quality concerns. The ability to compensate for the loss of agricultural production with increased appropriative production is inhibited because of water quality concerns in this part of the Basin. Appropriative production in this area therefore requires water treatment, an issue addressed through the construction of desalter facilities.

The Chino I Desalter Expansion Project.

BACK-GROUND

Chino I Expansion Underway. This expansion includes construction of 4.9 million gallons per day (mgd) of expanded treatment capacity (nitrate removal) in parallel with the existing treatment facilities, as well as associated raw water and product water delivery facilities. The Chino I Desalter was originally constructed by SAWPA to provide a total of 9,200 acre-feet per year of product water deliveries. The product water will have TDS and

nitrate concentrations less than 350 mg/L and 25 mg/L, respectively. The CDA authorized the well drilling and awarded a contract for the Chino I Desalter Expansion wells.

THIS PERIOD

Final Plans For Chino Hills Pump Station Nearly Complete. CDA successfully constructed three wells (Wells 13, 14, and 15) and conducted step draw down and constant rate pump tests in March 2003. As a result of this testing, the hydrogeologist revised the recommended flow rates to 2,200 gallons per minute (gpm) for Well 13, 2,000 gpm for Well 14, and 2,000 gpm for Well 15. With these three wells, the CDA achieved adequate capacity for expansion needs, and construction of Well No. 12 was cancelled. CDA is currently designing ancillary equipment for the three new wells. In addition, final plans and specifications for the Chino Hills pump station and the raw water pipelines are almost complete.

THIS PERIOD

Revised Bids For Ion Exchange Under Review. May Redesign. CDA received bids for the Ion Exchange Treatment System for both Chino I and Chino II Desalters in April 2003. Because of discrepancies in the low bid, all bids were rejected and the projects were rebid. The rebids were received on August 19, 2003 and are currently under review. The design of additional onsite facilities was completed in July 2003 and advertised for bidding in August 2003. However, CDA staff is currently considering redesign of onsite facilities to cut the cost of delivering treated water to its member agencies.

TO COME

The Chino II Desalter Project.

This project includes 10 mgd of reverse osmosis/ion exchange treatment capacity, as well as raw water and product water delivery facilities. The final design of the Chino II Desalter has been completed and advertised for bid with a due date of September 2, 2003.

Site Acquisition For Chino II Wells Underway. The sites for nine Chino II raw water supply wells have been identified and CDA staff is negotiating their acquisition with property owners. CDA staff is coordinating with the City of Ontario for two of the sites, which are located in a proposed development.

PROGRAM ELEMENT 4 – DEVELOP AND IMPLEMENT COMPREHENSIVE GROUNDWATER MANAGEMENT PLAN FOR MANAGEMENT ZONE 1

Program Element 4 details the steps undertaken by Watermaster to reduce or abate subsidence and fissuring in Management Zone 1.

THIS PERIOD

The MZ1 Technical Committee met on July 23, 2003. Committee representatives were informed of the status of the various efforts to implement the monitoring program (see Land-Surface Monitoring section of Program Element 1), and then toured the newly constructed Ayala Park Extensometer Facility. The next meeting is tentatively scheduled for September 24, 2003, and will focus on a more detailed examination of a possible deep well injection test, and a review of the comprehensive pumping tests to be initiated in October, 2003.

Voluntary Forbearance. The City of Chino, and the City of Chino Hills submitted certifications documenting their respective voluntary participation in forbearance of groundwater production. Through the end of July 2003, both parties have met their forbearance goals of 1,500 acre-feet per year. Their totals through July are detailed below.

Agency	Forbearance through July 2003	Forbearance Goal 03/04
City Of Chino	1,500 acre-feet	1,500 acre-feet
City Of Chino Hills	1,500 acre-feet	1,500 acre-feet

TO COME

Pending Legal Actions Regarding Subsidence. In its October 17, 2002 Order, the Court ordered Watermaster to keep the Court apprised of any legal actions that could question the Court's jurisdiction over subsidence. Watermaster is not aware at this time of any such actions.

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 SALT MANAGEMENT PROGRAM

Cooperative Programs with Regional Board and Other Entities. *The "water quality committee" as envisioned in the OBMP Implementation Plan has been formally constituted. Since the development of the OBMP, Watermaster has worked closely with the Regional Water Quality Control Board, the Department of Toxic Substances Control, and others to define water quality challenges and to refine the water quality management criteria in the Chino Basin. Watermaster continues to review water quality conditions in the Basin and to consider future water quality management activities beyond the Chino Basin desalting program. The ad hoc water quality committee (WQC) has been formed.*

THIS PERIOD

The WQC met on July 21, 2003, and decided to look at the perchlorate and other groundwater contamination issues from two perspectives:

- ***Source Determination:*** *The WQC will develop a list of tasks to help define potential source areas and/or PRPs. Steps would include: review of land use surveys, records searches, and title searches.*

- ***Assessment of Treatment Alternatives:*** *The WQC decided that both source determination and treatment alternatives should be pursued in parallel. Meeting notes from this meeting are available at Watermaster's offices and will be furnished upon request. The next WQC meeting will be August 27, 2003.*

BACK-GROUND

Water Quality Management. In response to the results of Regional Board and Watermaster's groundwater-quality monitoring programs (Program Element 1) Watermaster has refined its water-quality monitoring to focus on the following key areas:

- Watermaster is identifying and characterizing water-quality anomalies, such as the VOC anomaly north of the Chino I Desalter well field. A scope of work is being developed by Watermaster and will be presented to the Water Quality Committee.

- Watermaster staff continues to participate in the process to develop TMDLs for Reach 3 of the Santa Ana River and other water bodies in the lower Chino Basin. No progress has been made during the last quarter because of the State budget crisis and the staffing issues at the RWQCB.

- Watermaster staff is coordinating with the RWQCB with regard to surface water quality and the DTSC with regard to developing a monitoring program to track perchlorate in groundwater in the Fontana area.

Watermaster and Regional Board Propose TDS and Nitrogen Objectives to Promote Maximum Benefit of Waters Available to the Chino Basin

ON-GOING

Watermaster staff has been working with the Total Inorganic Nitrogen/Total Dissolved Solids (TIN/TDS) Task Force to revise the subbasin boundaries, and the TIN and TDS objectives for the Chino Basin to promote maximum beneficial use of waters in the Basin (as opposed to the Regional Board's current, more rigid antidegradation-based objectives). The maximum beneficial use approach will increase water supplies and lower costs over time while meeting water quality requirements. In December 2002, Watermaster proposed specific subbasin boundaries, and TIN and TDS objectives for the Chino Basin to the RWQCB at a workshop regarding the Basin Plan update. The TIN/TDS Task Force and the RWQCB have reacted favorably to the Watermaster proposal and have modified it slightly, and it is Watermaster's belief that the modified Watermaster proposal will be included in the Basin Plan update that will occur in fiscal year 2003-2004.

ON-GOING

Unprecedented Cooperative Effort to Determine State of Hydraulic Control. One outstanding issue to resolve regarding the Basin Plan changes is to develop a monitoring plan to evaluate the state of hydraulic control in the southern end of the Basin. Hydraulic control is one tool that can be used to maximize the safe yield of the Basin. Watermaster staff developed a monitoring program for OBMP purposes and described this effort in the Initial State of the Basin report (October 2002). The execution of this monitoring program is included in Program Element 1. Watermaster is collaborating with OCWD and IEUA in an investigation to select existing wells and to site new multi-piezometer wells that will be used to monitor and assess the state of hydraulic control. This collaboration is unprecedented. Hydraulic control will become a commitment of Watermaster if the proposed subbasin boundaries, and TIN and TDS objectives for the Chino Basin, are adopted. Watermaster, OCWD, and RWQCB staffs are working to develop a monitoring program to assess the state of hydraulic control and to provide information to Watermaster to manage future production and recharge. The initial phase of the monitoring program began in June 2003. This program will change or adapt over time as new information is developed and will last for several years. The coordination and review of the hydraulic control monitoring data and the development of management programs to maintain hydraulic control have been added to Program Elements 6 and 7.

Watermaster and IEUA have committed to the construction of a total of 10 new multi-piezometer wells during fiscal years 2003-04 and 2004-05. Watermaster filed an application for $250,000 from the Local Groundwater Assistance Fund, sponsored by the California Department of Water Resources (DWR). Watermaster received notice during this period that the DWR will award the full $250,000 to Watermaster. This funding will support construction of piezometric monitoring wells that, in addition to some existing wells, would be used for monitoring and assessing the state of hydraulic control. In addition to the DWR funding, IEUA and Watermaster have secured $270,000 from the U.S. Bureau of Reclamation for new monitoring wells for the hydraulic control monitoring program.

Watermaster staff prepared a detailed draft work plan for hydraulic control monitoring and assessment during this period. The OCWD and RWQCB area reviewing the draft work plan.

Salt Budget Tool Was Used To Establish TDS Objectives

BACK-GROUND

Watermaster has developed a salt budget tool to estimate the current and future salt loads to the Basin and the salt benefits of the OBMP. This tool was used to establish TDS objectives for the northern part of the Basin based on maximum beneficial use of water available to the region. These projections were based on the water supply plan in the Implementation Plan and include alternative recycled water and State Project water recharge scenarios.

TO COME

Watermaster consultants are currently preparing a letter report describing the salt budget. Originally, this letter was to be submitted to Watermaster in December 2003 but has been deferred pending discussions with the RWQCB regarding methods and the ongoing Basin Plan update. A report to Watermaster will likely be made in the next quarter.

PROGRAM ELEMENT 8 – DEVELOP AND IMPLEMENT GROUNDWATER STORAGE MANAGEMENT PROGRAM; AND

PROGRAM ELEMENT 9 – DEVELOP AND IMPLEMENT STORAGE AND RECOVERY PROGRAM

This section summarizes the work accomplished to date and the work planned over the next few months for the Chino Basin Dry Year Yield (DYY) and Storage and Recover Programs. The DYY Program is a conjunctive use program between the Metropolitan Water District of Southern California (Metropolitan) and several Basin appropriators, which would develop a maximum of 100,000 acre-feet of storage. These Programs also explore the potential for using up to 500,000 acre-feet of storage capacity.

ON-GOING

Completed Preliminary Design Report. The first draft of the DYY Preliminary Design Report was completed in July 2003 and submitted to Watermaster. It is currently under review by all of the participating agencies. The DYY Program documentation is organized into four volumes. Volumes I and II, prepared by Black & Veatch, comprise the Preliminary Design Report (PDR). Volume I describes the background information and design objectives of the Program, while Volume II describes the facilities to be designed to help the agencies meet their shift obligation. Volume III presents the groundwater modeling report developed by Wildermuth Environmental, Inc., and Volume IV contains the CEQA Findings of Consistency environmental documentation prepared by Tom Dodson and Associates.

DYY Shift Obligation. Participants in the DYY Program will be required to reduce (shift) their imported water usage by a predetermined amount during a dry year. Each participating agency will have a specific shift obligation that, when added together, will provide Metropolitan with 33,000 acre-feet of dry-year yield. The shift obligations were determined through meetings and correspondence among IEUA, Watermaster, Black & Veatch, and representatives from each participating agency.

The nine participating agencies are as follows:

• City of Chino	• Monte Vista Water District (MVWD)
• City of Chino Hills	• City of Ontario
• Cucamonga County Water District (CCWD)	• City of Pomona
• Fontana Water Company (FWC)	• City of Upland
• Jurupa Community Services District (JCSD)	

Facility Requirements and Site Selection. A preliminary screening of potential sites identified the most feasible locations for the DYY Program facilities. The information was presented to the agencies and a final selection was made. The Program facilities consist of five new ion exchange (IX) facilities, expansion of two existing IX facilities, construction of seven new non-water quality impaired wells, and two new perchlorate wellhead treatment facilities. The new wellhead IX facilities would contribute approximately 18,000

acre-feet of dry-year yield, while the new well facilities would contribute approximately 15,000 acre-feet of additional yield. The total capital cost for the facilities is estimated to be $38 million. Metropolitan will contribute approximately $27.0 million. The Groundwater Storage Program Funding Agreement between Metropolitan, IEUA, Three Valleys Municipal Water District (TVMWD), and Watermaster was signed in July 2003.

Final Design of PDR Facilities. The designs for the facilities outlined in the PDR are either under way, completed, or will commence shortly. All design documents are scheduled to be completed by September 2004.

THIS PERIOD

Groundwater Modeling. The new Chino Basin groundwater model was completed during this period. The modeling report was submitted to Watermaster in July 2003. In addition to evaluating the effects of the DYY program on the Basin, the model was used to:

- Develop draft future replenishment and wet-water recharge criteria based on requirements described in the Section 7.1b of the Watermaster Rules and Regulations regarding the balance of recharge and discharge.
- Evaluate the cumulative effects of transfers among the Parties as described in Section 9.3 of the Watermaster Rules and Regulations;
- Describe pumping patterns in Management Zone 1 that will not reduce piezometric levels below current conditions.

These management criteria were incorporated into the DYY program. The results of this work were presented to the Pool Committees, Advisory Committee, and the Watermaster Board in June and August 2003.

BACK-GROUND

Engineering Review and Determination of the Operational Storage Requirement and Safe Storage. The Operational Storage Requirement was defined in the Peace Agreement as part of the storage in the Chino Basin "necessary to maintain the safe yield" of the Basin (Peace Agreement, Exhibit B – Implementation Plan, page 37). Safe storage is the maximum storage in the Basin that can occur without significant water quality and high groundwater related problems.

THIS PERIOD

The draft results of this work were presented to the Pool Committees, Advisory Committee, and the Watermaster Board in August 2003. A technical memorandum will be provided in the next reporting period.

ON-GOING

Other Uses of the Groundwater Model in the OBMP Implementation. The groundwater model is also being used to assess the balance between recharge and discharge throughout the Basin, operational storage requirements and safe storage, and the cumulative physical impacts of transfers. Draft results from this work have been submitted to Pool Committees, Advisory Committee, and the Watermaster Board, starting in April 2003. A technical memorandum will be finalized in the next reporting period.

ADMINISTRATIVE UPDATE

THIS PERIOD

Engineering Positions Filled. In January 2003, the Watermaster Board approved a restructuring plan. Two engineering positions were recruited.

Gordon Treweek, PE, joined Chino Basin Watermaster on July 21, 2003 as a Project Engineer. With more than 20-years experience in water quality, wastewater reclamation and reuse, and hazardous waste management, he will focus his efforts on project management functions on projects such as groundwater recharge, remediation of existing contaminant plumes, and reuse of recycled water.

Danielle (Danni) D. Maurizio, PE, joined the Chino Basin Watermaster in August 2003 as a Senior Engineer. Before joining Chino Basin Watermaster, Danni worked in both the Planning and Environmental Compliance Departments at Inland Empire Utilities Agency and in the Process Development Section at Metropolitan Water District of Southern California. Danni will work on tasks such as subsidence issues within Management Zone 1, well production monitoring, and groundwater level and quality monitoring.

Relocate Offices. Regarding physical facilities, Watermaster will relocate to the former Cucamonga County Water District facilities at 9641 San Bernardino Road in Rancho Cucamonga on September 12, 2003.

CONCLUSION

THIS PERIOD

This has been an especially active reporting period for Watermaster, with major activities on a number of issues:

- A Groundwater Storage Agreement was signed for 100,000 acre-feet of storage.
- The Chino Basin Dry-Year Yield Program engineering reports were completed.
- The Recharge Facilities Improvement Project construction was begun.
- The Surface-Water Monitoring for the Santa Ana River was begun.
- The Ayala Park Extensometer became operational and began recording data on ground subsidence.

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CHINO BASIN WATERMASTER

September 11, 2003

10:00 a.m. – Appropriative & Non-Agricultural Pools
1:00 p.m. – Agricultural Pool Meeting

II. BUSINESS ITEMS

A. BALANCE OF RECHARGE & DISCHARGE IN ALL AREAS, AND DETERMINATION OF OPERATING STORAGE & SAFE STORAGE

CHINO BASIN WATERMASTER

8632 Archibald Avenue, Suite 109, Rancho Cucamonga, Ca 91730
Tel: 909 484 3888 Fax: 909 484 3890 www cbwm org

JOHN V. ROSSI
Chief Executive Officer

STAFF REPORT

DATE: **September 11, 2003**
September 25, 2003

TO: **Pool Committee Members**
Advisory Committee and Watermaster Board Members

SUBJECT: **Court Required Report on Analysis of Supplemental Water Recharge and Analysis of Operational Storage Capacity, Safe Storage and Safe Storage Capacity**

SUMMARY

Issue – File report with Court on Analysis of Supplemental Water Recharge and Analysis of Operational Storage Capacity, Safe Storage and Safe Storage Capacity.

Recommendations –Consider recommendation to Advisory Committee to file final report with court

Fiscal Impact – No fiscal impact.

BACKGROUND

Section 5.1(e) of the Peace Agreement contains the Watermaster commitments regarding the recharge of supplemental water in the Chino Basin.

Section 7 of the Rules and Regulations repeats the commitments of Section 5.1(e) of the Peace Agreement and adds (see Rules and Regulations, page 37, 7.1(b)(iv):

"(b) Watermaster shall exercise Best Efforts to:

(iv) Make its initial report on the then existing state of Hydrologic Balance by July 1, 2003, including any recommendations on Recharge actions, which may be necessary under the OBMP. Thereafter, Watermaster shall make written reports on the long term balance in the Chino Basin every two years; ..."

The attached draft technical memorandum prepared by Wildermuth Environmental, Inc. (WEI) was drafted pursuant to the requirements of the Peace Agreement and the Watermaster Rules and Regulations cited above. Staff and WEI continue to work on the analysis of cumulative effects of transfers and expect to present the draft technical memorandum in October.

Staff and WEI have presented, at meetings in the months of June and July, the criteria and background assumptions utilized in this analysis and some of the preliminary findings. Input received at these meetings has been incorporated. Staff anticipates the possibility of further comments at the meetings in July. Mark Wildermuth will present the memorandum at the meetings.

SUMMARY

Comments were received at the August meetings and have been incorporated into the Final Draft attached. Staff recommends that the Watermaster authorize staff and legal counsel to file the final report with the court.

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OPTIMUM BASIN MANAGEMENT PROGRAM

ANALYSIS OF SUPPLEMENTAL WATER RECHARGE PURSUANT TO THE PEACE AGREEMENT

ANALYSIS OF OPERATIONAL STORAGE REQUIREMENT, SAFE STORAGE, AND SAFE STORAGE CAPACITY PURSUANT TO THE PEACE AGREEMENT

EVALUATION OF THE CUMULATIVE EFFECTS OF TRANSFERS PURSUANT TO THE PEACE AGREEMENT

Draft Technical Memorandum

Prepared for

Chino Basin Watermaster

Prepared by

Wildermuth Environmental, Inc.

September 2003

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

1. Analysis of Supplemental Water Recharge Pursuant to the Peace Agreement

1.1 Background

Section 5.1 (e) of the Peace Agreement contains the Watermaster commitments regarding the recharge of supplemental water in the Chino Basin. This analysis focuses on the Watermaster's implementation of the Peace Agreement Section 5.1 (e) items (i), (iii), (v), (vii), and (viii), that are as follows (see Peace Agreement, pages 20 and 21):

"Watermaster shall exercise Best Efforts to:

(i) protect and enhance the safe yield of the Chino Basin through Replenishment and Recharge; ...

(iii) direct Recharge relative to Production in each area and sub-area of the Basin to achieve long term balance and to promote the goal of equal access to groundwater in all areas and sub-areas of the Chino Basin; ...

(v) establish and periodically update criteria for the use of water from different sources for Replenishment purposes; ...

(vii) recharge the Chino Basin with water in any area where groundwater levels have declined to such an extent that there is an imminent threat of Material Physical Injury to any party to the Judgment;

(viii) maintain long-term hydrologic balance between total Recharge and discharge in all areas and sub-areas;"

Maximization of the recharge of storm water is occurring and the related requirements of the Peace Agreement and Watermaster Rules and Regulations are being satisfied.

The *OBMP Implementation Plan* (Exhibit B of the Peace Agreement) contains identical language to the Peace Agreement Section 5.1 (e), but is mostly silent as to the schedule for implementation of the specific commitments listed above (see Exhibit B, paragraph 11 on page 20 and the implementation schedule on pages 22 and 23). Paragraph 9, on page 20 of the Implementation Plan, includes additional recharge guidelines that Watermaster must consider regarding recharge:

"9. When locating and directing physical recharge, Watermaster shall consider the following guidelines:

(i) provide long term hydrologic balance within the areas and sub-areas of the basin

(ii) protect and enhance water quality

(iii) improve water levels

(iv) the cost of recharge water

(v) any other relevant factors"

Section 7 of the Rules and Regulations repeats the commitments of Section 5.1 (e) of the Peace Agreement and adds (see Rules and Regulations, page 37, 7.1 (b) (iv)):

"(b) Watermaster shall exercise Best Efforts to: ...

(iv) Make its initial report on the then existing state of Hydrologic Balance by July 1, 2003, including any recommendations on Recharge actions which may be necessary under the OBMP. Thereafter, Watermaster shall make written reports on the long term Balance in the Chino Basin every two years; ..."

This technical memorandum was prepared pursuant to the requirements of the Peace Agreement and the Watermaster Rules and Regulations cited above.

1.2 Analysis

WEI developed a new groundwater model (hereafter, the *2003 Watermaster Model*) for the Chino Basin in support of the Chino Basin Watermaster, IEUA, and Metropolitan Water District of Southern

California (Metropolitan) Dry-Year Yield (DYY) Program. The 2003 Watermaster Model was used to evaluate the magnitude of groundwater level and storage changes throughout Chino Basin, the change in direction and speed of specific known water quality anomalies, and the storage losses from the DYY Program. This was accomplished by determining and simulating a baseline and a DYY scenario. The planning period used in this analysis consisted of a 25-year period ranging from October 2003 through September 2028. This period corresponds approximately to the 25-year period of the DYY Program. The impacts listed above were estimated by:

- Preparing maps that show the maximum differences in groundwater levels at the point of peak storage and at the end of a Dry-Year Yield extraction period. Time histories at the same wells used in the calibration were plotted to show local impacts at each of these wells.
- Preparing maps that show the plume migration tracks for the baseline and Dry-Year Yield scenarios over the planning period. Each plume was modeled as though the contaminant of concern was a conservative (non-sorbing, non-degrading) constituent using MODPATH.
- Preparing time histories of Santa Ana River discharge for the baseline and Dry-Year Yield scenarios and comparing these time histories for the planning period. The total water lost from storage will be estimated by subtracting the baseline time history from the Dry-Year Yield time history.

1.2.1 Baseline OBMP Scenario

The baseline scenario is based on a modified version of the water supply plan from the Implementation Plan. The water supply plan from the Implementation Plan contains future groundwater production plans for all producers in the Chino Basin. Black and Veatch modified the water supply plan for the water purveyors that are participating in the DYY Program and WEI used the water supply plan from the Implementation Plan for the remaining producers.

Table 1-1 shows the baseline groundwater production time history. Groundwater production in the Basin ranges from 197,000 acre-ft/yr in 2003/2004 to about 210,000 acre-ft/yr in 2019/2020 and thereafter. Watermaster's replenishment obligation was estimated using the following assumptions pursuant to the Judgment and the Implementation Plan:

- The initial increase in stormwater recharge that is anticipated from the Chino Basin Facilities Improvement Plan is about 12,000 acre-ft/yr with a goal of about 20,000 acre-ft/yr. To be conservative, the increase in stormwater recharge was assumed to be 12,000 acre-ft/yr.
- OBMP desalter capacity is increased from the current level of 8 million gallons per day (mgd) in 2002/2003 to 40 mgd as per the water supply plan from the Implementation Plan. Half of the production from the desalters will come from decreased rising water and new induced recharge from the Santa Ana River.
- The Judgment allows a 5,000 acre-ft/yr overdraft of Chino Basin through 2017.

Table 1-1 contains the replenishment obligation pursuant to the Judgment and the Implementation Plan, which ranges from about 30,000 acre-ft/yr in 2003/2004 to about 34,000 acre-ft/yr in 2019/2020 and is constant thereafter. An analysis of actual recent production in the Chino Basin suggests that the production and replenishment estimated in Table 1-1 may be higher than will actually occur in first few years of the baseline scenario. For consistency with the OBMP planning documents, the production and replenishment estimates in Table 1-1 were used.

The locations and magnitude of recharge shown in Table 1-1 were based on the requirements of the Peace Agreement to balance recharge and discharge in every area and sub-area. This requirement must be met over a period of time, which was interpreted herein as a long-term requirement. Thus, in an individual season or year there might not be a balance between recharge and discharge in an area, sub-area, or the Basin.

Balancing recharge and discharge may be critical to the management of the subsidence-prone area in MZ1. Watermaster is currently involved in an investigation to develop a management program for this subsidence-prone area. Until that management program is developed, it is assumed that Watermaster replenishment and groundwater production would be managed such that groundwater levels would remain near or above current levels in the southern part of MZ1. Current groundwater levels were assumed to be the groundwater levels at the end of the calibration period of the 2003 Watermaster Model; the groundwater levels were from fall 2001. In the rest of the Basin, replenishment would be managed to maximize desalter replenishment from a combination of reduced rising water to the Santa Ana River and increased streambed recharge from the Santa Ana River.

The 2003 Watermaster Model was used to investigate the recharge requirements for managing groundwater levels in MZ1 and to determine the theoretical potential of induced recharge from the Santa Ana River. The results of this work are summarized in Table 1-1 that shows the location and magnitude of supplemental water recharge. Approximately 75 percent of the recharge will be needed in the College Heights, Upland, Montclair, and Brooks spreading basins to manage groundwater levels in the western part of the Basin. The location of these recharge facilities are shown in Figure 1-1. The remaining 25 percent is shown to occur in the San Sevaine and RP3 spreading facilities; however, there is some flexibility in the selection of facilities that could be used in the eastern part of the Basin. Figures 1-2a, 1-2b, and 1-2c illustrate the model-estimated change in groundwater levels over the 25-year planning period for the baseline scenario. Throughout the duration of the baseline scenario, groundwater levels in the western part of the Chino Basin remain near or above the Fall 2001 groundwater levels. Groundwater levels in the other parts of Chino Basin declined over the planning period to levels that support decreased rising water to the Santa Ana River and increased streambed recharge from the Santa Ana River. Groundwater levels declined the most in the Fontana area – as much as 30 to 40 feet near the far eastern edge of the Fontana area. In the subsidence-prone area in MZ1, there was almost no change in groundwater levels. In the area north of the subsidence-prone area, there was a slight increase in groundwater levels due to the shifting of Watermaster's replenishment to this area as shown in Table 1-1. The effect of the desalters is evident in the south-central part of Chino Basin where groundwater levels declined in excess of 25 feet.

The total storage in the Chino Basin declined monotonically during the baseline scenario from a high of 5,940,000 acre-ft in Fall 2003 to 5,730,000 acre-ft in Fall 2028 – a decline of about 210,000 acre-ft. Figure 1-3 shows the estimated groundwater storage for the Chino Basin during the planning period. The modeling results suggest that the total storage in the Basin appears to be asymptotically approaching a level near 5,700,000 acre-ft. This decline in storage is necessary to induce the recharge of the Santa Ana River.

1.2.2 Analysis of Material Physical Injury

There is no material physical injury to a Party to the Judgment or to the Chino Basin from the projected groundwater level changes from the baseline scenario. The only location where significant increases in groundwater levels occur is in the vicinity of the recharge basins in Upland and Montclair (College Heights, Upland, Montclair, and Brooks Street Basins) where the depth to water is 300 feet or greater.

Under the baseline scenario, groundwater levels are projected to remain almost unchanged in the western third of the Basin. In the center of Chino Basin, groundwater levels are projected to decrease by about 15 to 20 feet, and at the far eastern edge of the Basin, north of the Jurupa Hills, groundwater levels are projected to decrease by as much as 40 feet. In addition, groundwater levels are projected to decline 25 feet or more in the vicinity of the OBMP desalter well fields with most of this drawdown caused by desalter operation. Slight increases in production costs will occur and slight decreases in production capacity might occur in these areas of groundwater level decline. For the members of the Appropriative Pool, the added cost of production will be more than offset by the savings provided by the avoided purchase of supplemental water for desalter replenishment. Production costs could increase about $3.50 per acre-ft (assuming $0.10 per kilowatt-hour, 60 percent pumping efficiency, and an average additional lift of 20 feet). The producers that will be impacted by operating the Basin at about 20 feet lower under the baseline scenario are the City of Ontario, Cucamonga County Water District, Fontana Water Company, and Jurupa Community Water District whose combined production averages about 80,000 acre-ft during the baseline scenario. The increased power cost totals about $240,000 per year. Operating the Basin at this lower level avoids the cost of purchasing about 24,600 acre-ft/yr of supplemental water at a cost of about $6,000,000 if the replenishment water consists of State Water Project water and about $2,000,000 if it were recycled water.

A similar analysis was done for the Agricultural Pool producers (see Appendix A). The results of this analysis suggest that the average increase in power cost to agricultural producers is about $1 per acre-ft over the planning period and that the estimated cumulative increase in power cost over the planning period for all agricultural production is about $340,000 or about $14,000 per year.

Under the baseline scenario, the groundwater levels in the subsidence-prone part of MZ1 are projected to remain near or above current levels. This occurs because of the recharge program described in Table 1-1 and because deep groundwater pumping in the subsidence-prone area were adjusted to maintain groundwater levels near or above current levels. This is a minimum necessary condition to minimize subsidence and ground fissuring in this area. Groundwater levels in this area should be managed using this criterion until Watermaster can implement a long-term management program for subsidence; after which groundwater levels in this area would be managed according to the long-term management program.

1.2.3 Limitations of this Analysis

Significant amounts of new information regarding the hydrogeology of the MZ1 area have been developed since the 2003 Watermaster Model was developed and calibrated. This new information seems to suggest that the deeper water bearing units that underlie the subsidence area are recharged much slower than predicted by the model. If this is true, it would imply that the model may exaggerate the benefits from the spreading of water in the northern part of MZ1 on piezometric levels in the subsidence-prone area. By extension, this implies that the management of piezometric levels in the subsidence-prone area in MZ1 will likely be done by reducing groundwater production from the deeper aquifer units, recharge by injection, or a combination of both. Given the limitations of the model and the uncertainty in the contents of the long-term MZ1 management program, the results of this analysis should be used as guidelines for planning recharge activities until the long term management plan for MZ1 is implemented. It is likely in the long term that significant quantities of future replenishment by Watermaster will need to occur in MZ1. However, the location and magnitude of future recharge should depend on the actual production by producers in MZ1, which could be different than was assumed in the OBMP and subsequently in this analysis.

1.3 Recommended Supplemental Recharge Program for the Next Five Years

We recommend the following actions by Watermaster regarding the recharge of supplemental water:

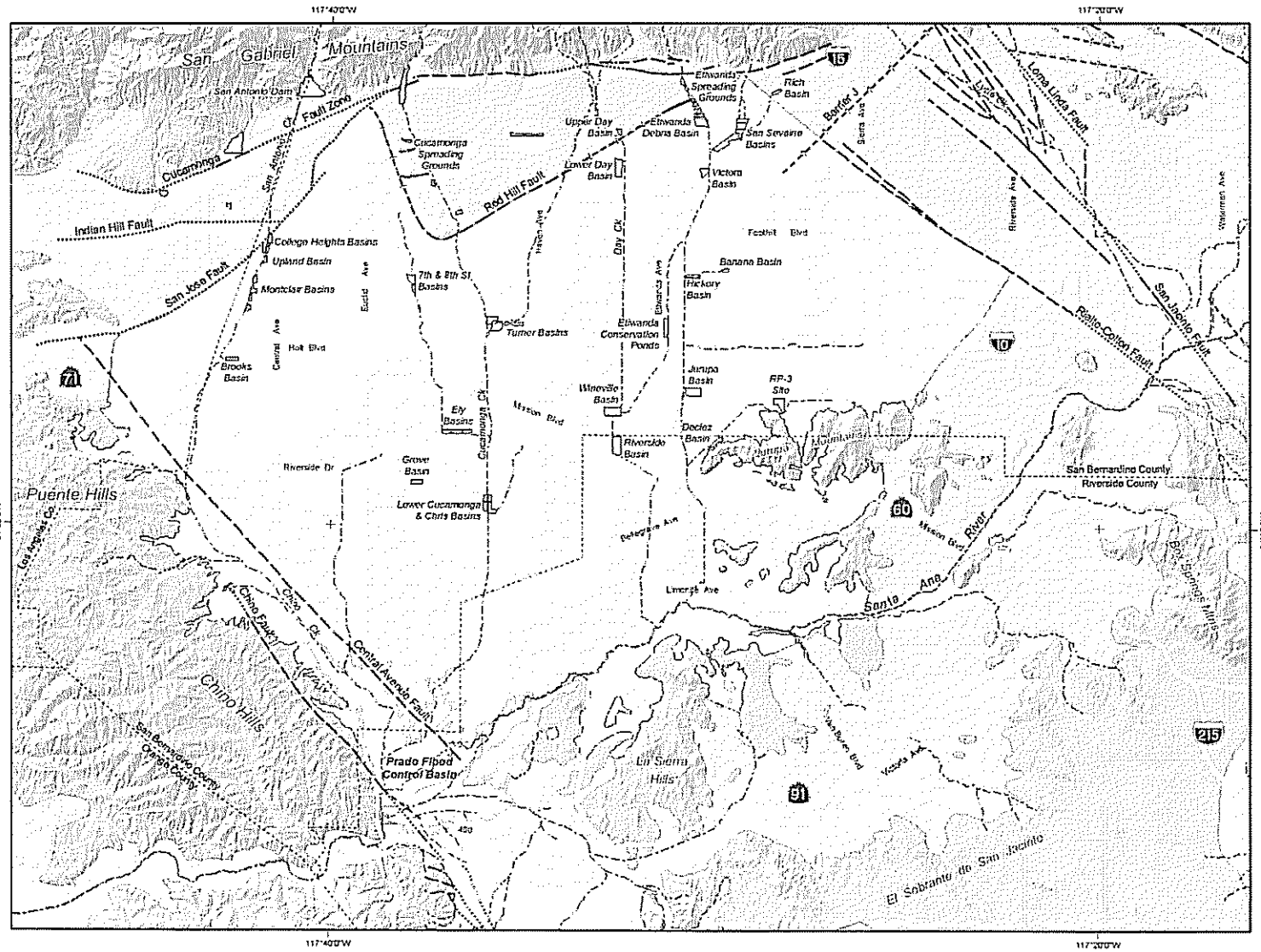
- Continue supplemental water recharge in MZ1 as is currently done (6,500 acre-ft/yr) for two more years. The need to continue this recharge should be determined in the Spring of 2005. Should Watermaster be required to replenish over-production, the replenishment should be done in MZ1, if possible, up to the amount shown in Table 1-1. Watermaster should monitor groundwater levels in MZ1 to ensure that this level of recharge is sufficient to maintain groundwater levels throughout MZ1 in the short term until the long-term MZ1 management program is implemented.
- The 2003 Watermaster model should be recalibrated prior to the completion of the long-term MZ1 management program. The revised model should be used to assess the viability of the management program and the need for supplemental water recharge in the program.
- For the next five years Watermaster should assume that half of the desalter replenishment obligation will come from reduced rising water outflow to the Santa Ana River and induced inflow from the Santa Ana River. The 2003 Watermaster Model should be recalibrated at the end of this five-year period to verify recharge assumptions regarding the Santa Ana River. This, of course, requires that Watermaster continue to monitor groundwater levels throughout the Basin.
- Per the requirements of the Peace Agreement, Watermaster should review the applicability of these recommendations in the Spring of 2005 and make revisions as appropriate.

Table 1-1
Total Chino Basin Production, Watermaster Replenishment Requirement and Replenishment Plan that Balances Recharge and Discharge for Baseline Scenario

(1) Fiscal Year	(2) Production	(3) Operating Yield	(4) New Stormwater	(5) SAR Inflow	(6)=(2)-(3)-(4)-(5) Replenishment Obligation
2004	195,577	145,000	12,000	9,989	29,588
2005	197,542	145,000	12,000	10,710	29,832
2006	195,715	145,000	12,000	10,888	27,827
2007	197,912	145,000	12,000	13,053	27,858
2008	196,058	145,000	12,000	13,231	25,837
2009	194,245	145,000	12,000	13,408	23,837
2010	205,871	145,000	12,000	20,744	29,127
2011	207,484	145,000	12,000	21,130	29,355
2012	208,089	145,000	12,000	21,515	29,574
2013	208,704	145,000	12,000	21,900	29,804
2014	209,311	145,000	12,000	22,285	30,026
2015	209,917	145,000	12,000	22,670	30,247
2016	210,015	145,000	12,000	23,057	29,958
2017	210,125	145,000	12,000	23,443	29,683
2018	210,229	140,000	12,000	23,830	34,399
2019	210,326	140,000	12,000	24,216	34,112
2020	210,423	140,000	12,000	24,602	33,821
2021	210,427	140,000	12,000	24,602	33,825
2022	210,427	140,000	12,000	24,602	33,825
2023	210,427	140,000	12,000	24,602	33,825
2024	210,423	140,000	12,000	24,602	33,821
2025	210,427	140,000	12,000	24,602	33,825
2026	210,427	140,000	12,000	24,602	33,825
2027	210,427	140,000	12,000	24,602	33,825
2028	210,423	140,000	12,000	24,602	33,821

(1) Fiscal Year	(7)	(8)	(9)	(10)	(11)	(12)=Σ(8)to(11)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)=Σ(13)to(19)	(21)=(12)+(20)
	Supplemental Water Recharge Plan														
		MZ1 Recharge Basins					MZ2 and MZ3 Recharge Basins								Total
	MZ1 Goal	Montclair 1-4 0.25	Upland 0.15	College Hts 0.15	Brooks 0.15	Subtotal	San Sevaine 0.25	Victoria	Banana + Hickory	Etiwanda Cons	Etiwanda Perc	RP3 0.05	Declez	Subtotal	
2004	20,712	20,712	0	0	0	20,712	8,876	0	0	0	0	0	0	8,876	29,588
2005	20,882	7,456	4,475	4,475	4,475	20,882	7,456	0	0	0	0	1,492	0	8,949	29,832
2006	19,479	6,957	4,174	4,174	4,174	19,479	6,957	0	0	0	0	1,391	0	8,348	27,827
2007	19,501	6,965	4,179	4,179	4,179	19,501	6,965	0	0	0	0	1,393	0	8,358	27,858
2008	18,086	6,459	3,876	3,876	3,876	18,086	6,459	0	0	0	0	1,292	0	7,751	25,837
2009	16,686	5,959	3,576	3,576	3,576	16,686	5,959	0	0	0	0	1,192	0	7,151	23,837
2010	20,389	7,282	4,369	4,369	4,369	20,389	7,282	0	0	0	0	1,456	0	8,738	29,127
2011	20,548	7,339	4,403	4,403	4,403	20,548	7,339	0	0	0	0	1,468	0	8,806	29,355
2012	20,702	7,393	4,436	4,436	4,436	20,702	7,393	0	0	0	0	1,479	0	8,872	29,574
2013	20,863	7,451	4,471	4,471	4,471	20,863	7,451	0	0	0	0	1,490	0	8,941	29,804
2014	21,018	7,507	4,504	4,504	4,504	21,018	7,507	0	0	0	0	1,501	0	9,008	30,026
2015	21,173	7,562	4,537	4,537	4,537	21,173	7,562	0	0	0	0	1,512	0	9,074	30,247
2016	20,971	7,490	4,494	4,494	4,494	20,971	7,490	0	0	0	0	1,498	0	8,987	29,958
2017	20,778	7,421	4,452	4,452	4,452	20,778	7,421	0	0	0	0	1,484	0	8,905	29,683
2018	24,079	8,600	5,160	5,160	5,160	24,079	8,600	0	0	0	0	1,720	0	10,320	34,399
2019	23,879	8,528	5,117	5,117	5,117	23,879	8,528	0	0	0	0	1,706	0	10,234	34,112
2020	23,675	8,455	5,073	5,073	5,073	23,675	8,455	0	0	0	0	1,691	0	10,146	33,821
2021	23,677	8,456	5,074	5,074	5,074	23,677	8,456	0	0	0	0	1,691	0	10,147	33,825
2022	23,677	8,456	5,074	5,074	5,074	23,677	8,456	0	0	0	0	1,691	0	10,147	33,825
2023	23,677	8,456	5,074	5,074	5,074	23,677	8,456	0	0	0	0	1,691	0	10,147	33,825
2024	23,675	8,455	5,073	5,073	5,073	23,675	8,455	0	0	0	0	1,691	0	10,146	33,821
2025	23,677	8,456	5,074	5,074	5,074	23,677	8,456	0	0	0	0	1,691	0	10,147	33,825
2026	23,677	8,456	5,074	5,074	5,074	23,677	8,456	0	0	0	0	1,691	0	10,147	33,825
2027	23,677	8,456	5,074	5,074	5,074	23,677	8,456	0	0	0	0	1,691	0	10,147	33,825
2028	23,675	8,455	5,073	5,073	5,073	23,675	8,455	0	0	0	0	1,691	0	10,146	33,821

Note -- recharge allocated to facilities that are assured of being on line in 2004



Main Features

Flood Control and Conservation Basins

Chino Basin

Geology

Water-Beanng Sediments

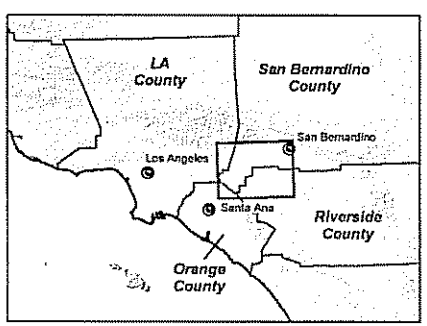
Quatemary Alluvium

Consolidated Bedrock

Cretaceous to Miocene Sedimentary Rocks

Faults

- Location Certain
- Location Approximate
- Location Concealed
- Location Uncertain



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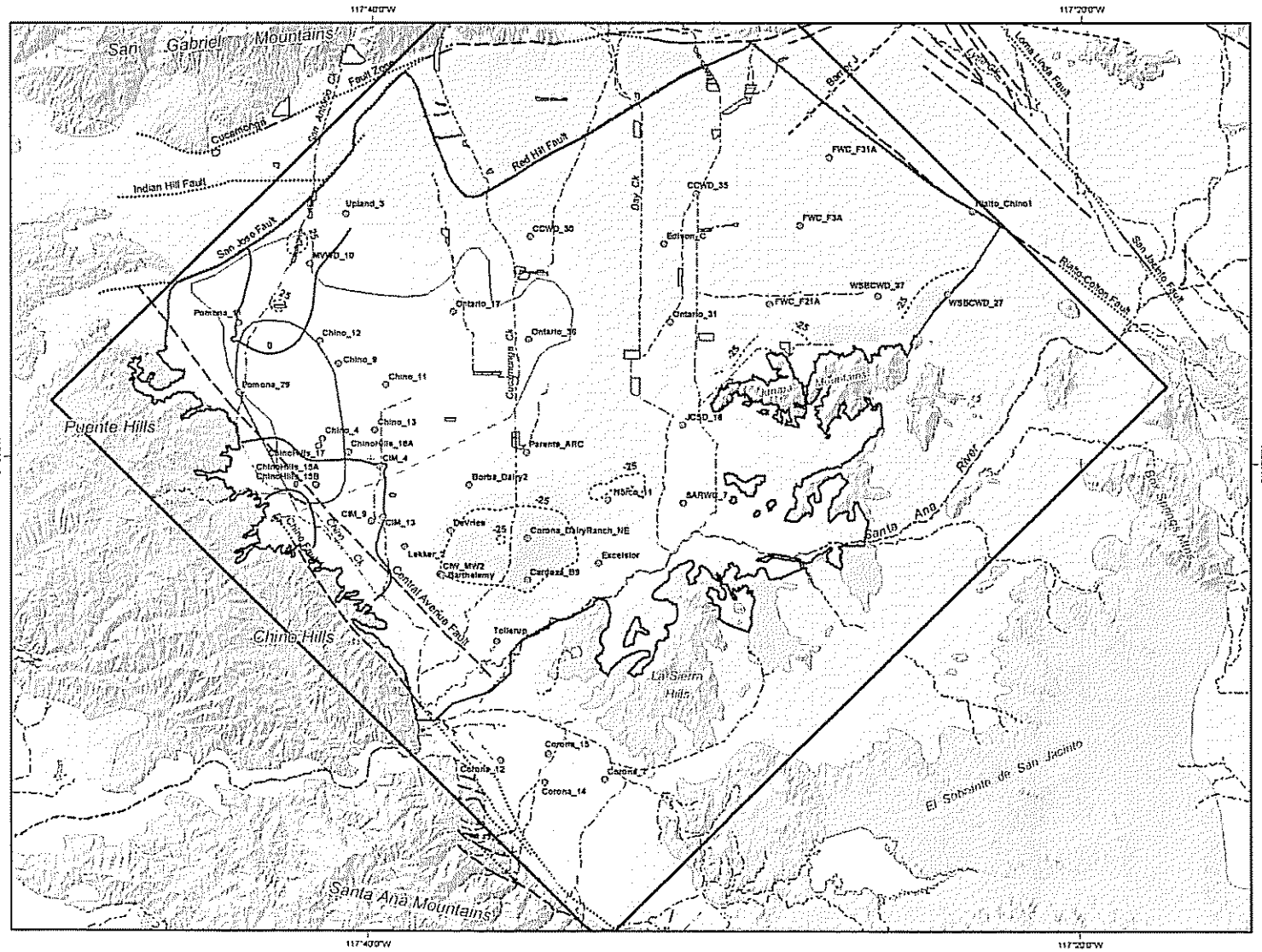
0 1 2 3 4 Miles
0 2 4 6 KM

Chino Basin Dry-Year Yield Program
Geology and Hydrogeology

Chino Groundwater Basin and Surface Water Spreading Facilities

Figure 1-1



Main Features

- Contours of Equal Change in Groundwater-Level *(ft-msl)*
- Grid of Change in Groundwater-Level *(ft-msl)*
- Primary Zone of Subsidence
- Zone of Subsidence (1992-2001) (as indicated by InSAR; southern extent uncertain)

Geology

Water-Bearing Sediments

- Quaternary Alluvium

Consolidated Bedrock

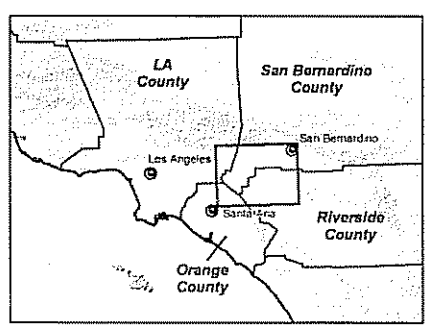
- Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

- Location Certain
- Location Approximate
- Location Concealed
- Location Uncertain

Other Features

- Well Used in Model Calibration
- Chino Basin
- Model Grid Boundary
- Flood Control and Conservation Basins



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0 1 2 3 4 Miles
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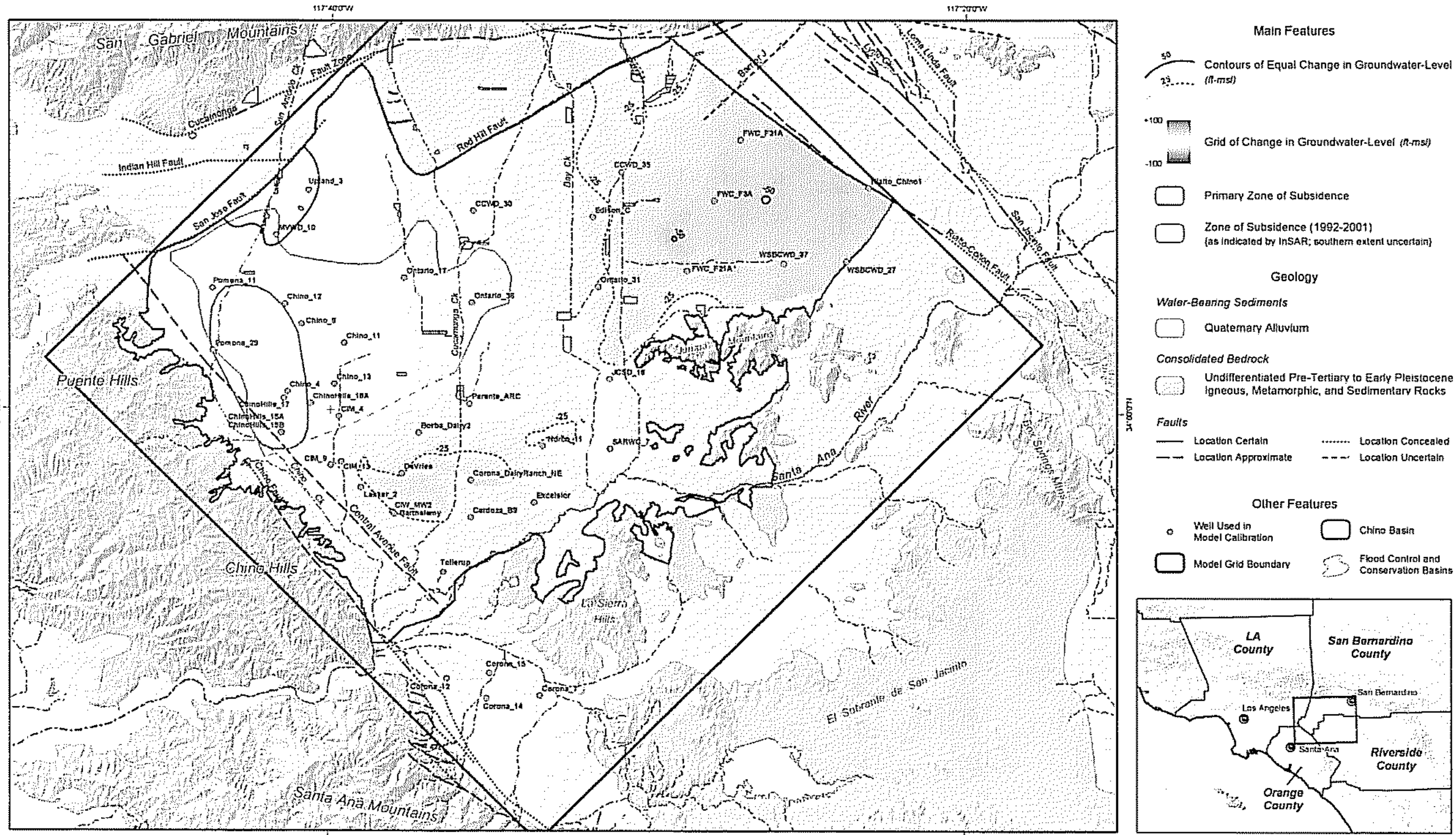
Chino Basin Dry-Year Yield Program
Geology and Hydrogeology

Change in Groundwater Level from Start to End of Baseline Scenario for Layer 1
2004-2028

Figure 1-2a



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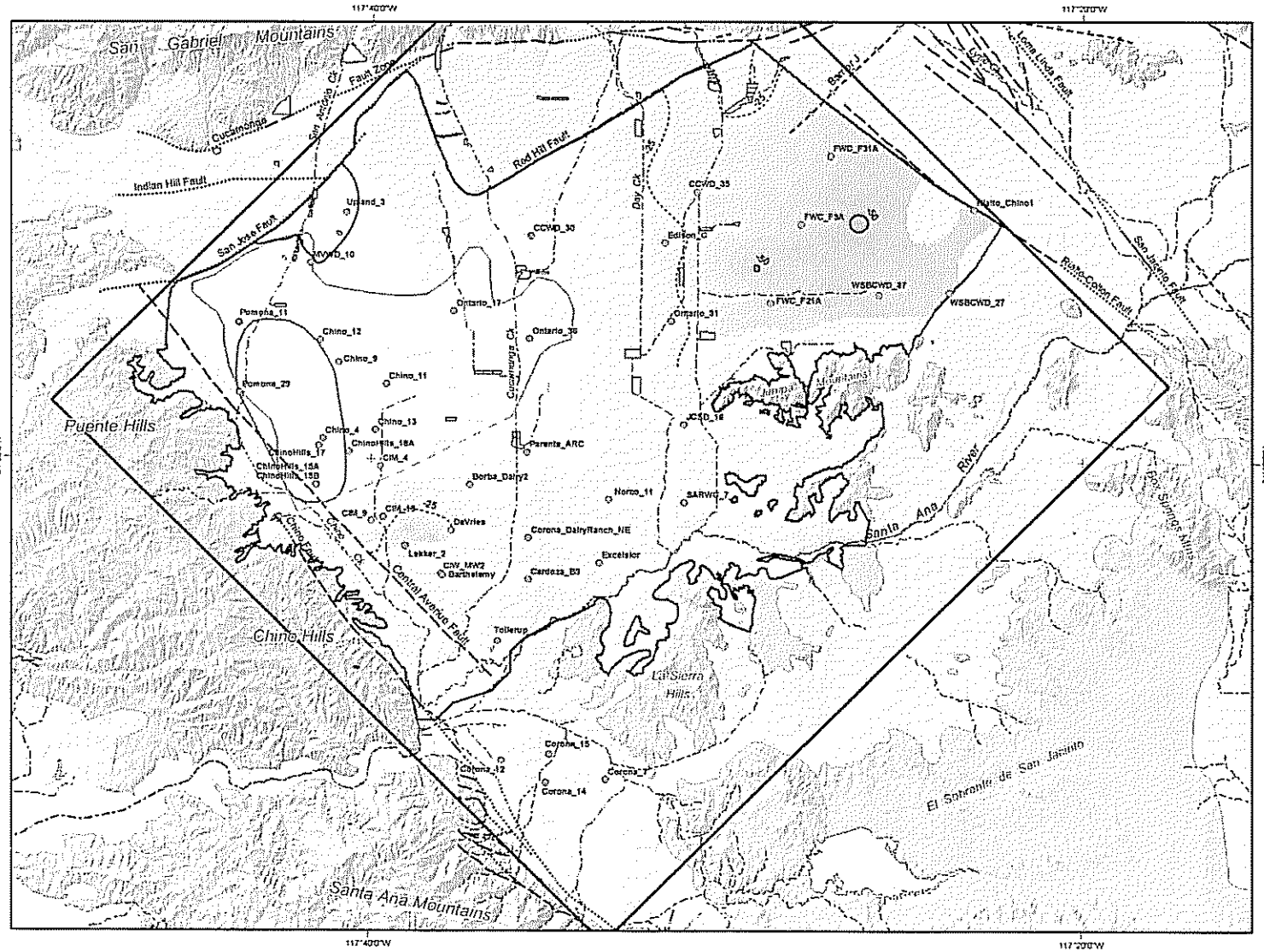
Chino Basin Dry-Year Yield Program
Geology and Hydrogeology

Change in Groundwater Level from Start to End of Baseline Scenario for Layer 2
2004-2028

Figure 1-2b



Main Features

- Contours of Equal Change in Groundwater-Level *(ft-msl)*
- Grid of Change in Groundwater-Level *(ft-msl)*
- Primary Zone of Subsidence
- Zone of Subsidence (1992-2001) (as indicated by InSAR; southern extent uncertain)

Geology

Water-Bearing Sediments

- Quaternary Alluvium

Consolidated Bedrock

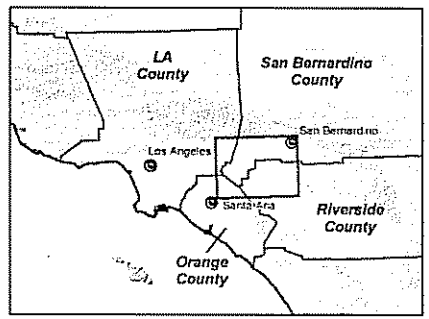
- Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Faults

- Location Certain
- Location Approximate
- Location Concealed
- Location Uncertain

Other Features

- Well Used in Model Calibration
- Model Grid Boundary
- Chino Basin
- Flood Control and Conservation Basins



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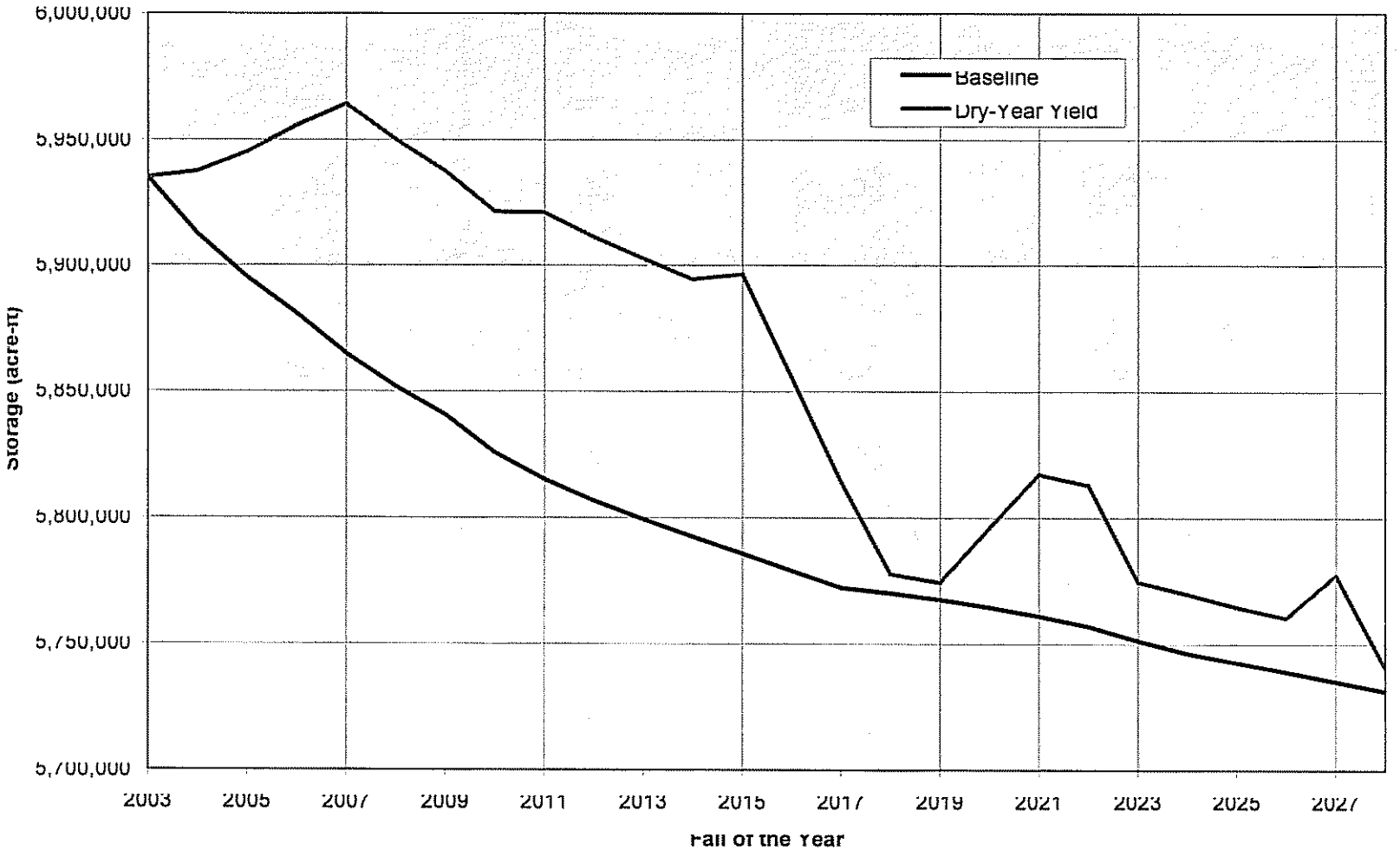
0 1 2 3 4 Miles
0 2 4 6 KM

Chino Basin Dry-Year Yield Program
Geology and Hydrogeology

Change in Groundwater Level from Start to End of Baseline Scenario for Layer 3
2004-2028

Figure 1-2c

Figure 1-3
Projected Time History of Total Storage in the Chino Basin for Baseline and Dry-Year Yield Scenarios



2. Analysis of Operational Storage Requirement, Safe Storage, and Safe Storage Capacity Pursuant to the Peace Agreement

2.1 Background

The Implementation Plan defines the *operational storage requirement* as the storage or volume in the Chino Basin that is necessary to maintain safe yield and sets the initial estimate of the operational storage requirement at 5,300,000 acre-ft, which corresponds to the estimated storage for the year 2000. The *safe storage* is defined as the maximum storage in the Basin that will not cause significant water quality and high-groundwater related problems. The *safe storage capacity* is the difference between the operational storage requirement and the safe storage. Watermaster committed to reassess the operational storage requirement and the safe storage in fiscal 2002/03. This technical memorandum contains an assessment of the operational storage requirement and safe storage.

2.2 Analysis

The Implementation Plan defines the *operational storage requirement* as the storage or volume in the Chino Basin that is necessary to maintain safe yield and sets an initial estimate of the *operational storage requirement* at 5,300,000 acre-ft, which corresponds to the estimated storage for the year 2000. The year 2000 estimate of storage developed from the baseline scenario is about 5,980,000 acre-ft. The *safe storage* was defined as the maximum storage in the Basin that will not cause significant water quality and high-groundwater related problems. The *safe storage capacity* is the difference between the operational storage requirement and the safe storage. During the development of the Peace Agreement, safe storage capacity was initially set at 500,000 acre-ft. Thus, safe storage was initially estimated at 5,800,000 acre-ft. Given the revised year 2000 estimate of storage, safe storage is about 6,480,000 acre-ft.

The safe storage capacity in the Peace Agreement was set at 500,000 acre-ft based on the observation that the change in storage during the base period for the determination of the safe yield (1965 through 1974) was at about 400,000 acre-ft and that the storage in the Basin was declining prior to the base period. It seemed reasonable that the Basin could be operated at these prior levels without causing significant water quality and other high-groundwater related problems. This assumption is maintained herein. The recharge and production plans in the OBMP that are represented in the baseline scenario will result in the Basin being operated at lower groundwater levels than that envisioned during the development of the OBMP. Thus, the concept of safe storage is not as relevant for future storage and recovery programs as was initially thought during the development of the OBMP.

WEI recently completed a hydrogeologic assessment of the proposed DYY Program (WEI, 2003). The maximum storage reached during the DYY scenario was estimated to be about 5,950,000 acre-ft (See Figure 1-3), which is about the storage reached in 2000 (operational storage capacity) and is otherwise less than the storage level of the year 2000. By adopting the supplemental recharge plan recommended above, the storage will always be less than the safe storage capacity of about 6,480,000 acre-ft. Thus, the anticipated future groundwater storage time histories, as projected for the baseline scenario DYY Program, are entirely consistent with the storage management program in the Implementation Plan.

3. Evaluation of the Cumulative Effects of Transfers Pursuant to the Peace Agreement

3.1 Background

Portions of Sections 5.1 and 5.3 of the Peace Agreement contain the basic Watermaster commitments to evaluate the transfers of water in storage or water rights that are used in place of the physical recharge of water to Chino Basin. The Peace Agreement and its Implementation Plan commit Watermaster to make an evaluation of transfers and the Watermaster Rules and Regulations further define the evaluation to include the "cumulative impacts of Transfers, if any." This analysis focuses on the Watermaster's implementation of the following portions of these documents:

> "5.1 (e) Watermaster shall exercise Best Efforts to (see Peace Agreement pages 20 - 21):
>
> (iv) evaluate the potential or threat for any Material Physical Injury to any party to the Judgment or the Chino Basin, including, but not limited to, any Material Physical Injury that may result from any Transfer of water in storage or water rights which is proposed in place of physical Recharge of water to Chino Basin in accordance with the provisions of Section 5.3;"
>
> (v) ensure a proper accounting of all sources of Recharge to the Chino Basin;
>
> 5.3 (b) (see Peace Agreement pages 32 and 33)
>
> (iii) There shall be a rebuttable presumption that the Transfer and the Production by the transferee does not result in Material Physical Injury to a party to the Judgment or the Basin;
>
> (iv) Watermaster shall base any decision to approve or disapprove any proposed Transfer upon the record after considering potential impacts associated with the individual Transfer alone and without regard to impacts attributable to any other Transfers;
>
> 5.3 (c) Watermaster shall allow Producers to lease water rights to make up for the lessee's over-Production."

Pursuant to the above and other Sections of the Peace Agreement, transfers of water have been occurring since the Peace Agreement was signed (and occurred since the Judgment was signed). Some of these transfers have resulted in an avoidance of a replenishment obligation, or the physical recharge of water, for the Producer undertaking to lease or purchase the water.

The *Implementation Plan* in Exhibit B to the Peace Agreement contains similar language to the Peace Agreement regarding 5.1 (e), but is mostly silent as to schedule for implementation of the specific commitments above (see Exhibit B, paragraph 11 on page 20 and the implementation schedule on pages 22 and 23). Paragraph 5 (iii) on page 19 of Exhibit B includes additional *guidelines* that Watermaster must consider:

> "The need to continue physical recharge under this paragraph [6,500 af/yr of supplemental water in MZ1] shall be evaluated by Watermaster after the conclusion of fiscal year 2004-2005. In evaluating further physical recharge pursuant to this paragraph, Watermaster shall take into account the provisions of this Article, the Judgment and the OBMP among all other relevant factors. Except as to Watermaster's determination of no material physical injury, the rights of each party to the Judgment to purchase or lease water to meet its over production obligation shall be unaffected by this provision;"

Page 21 of Exhibit B also commits Watermaster to:

"(d) evaluate the potential or threat for any material physical injury to any party to the Judgment or the Chino Basin, including, but not limited to, any material physical injury that may result from any transfer of water in storage or water rights which is proposed in place of physical recharge of water to Chino Basin in accordance with the provisions of Section 5.3;

(e) establish and periodically update criteria for the use of water from different sources for replenishment purposes;

(f) ensure a proper accounting of all sources of recharge to the Chino Basin;"

Section 7 of the Watermaster Rules and Regulations repeats the commitments of the Peace Agreement and Implementation Plan and adds Section 9.2 (e) and 9.3 (see Rules and Regulations, page 55):

"(e) Transfers which occur between the same parties in the same year shall be considered as a single Transfer for the purpose of determining Material Physical Injury.

9.3 Integrated Watermaster Review. In reviewing Transfers under these Rules and Regulations, Watermaster shall exercise reasonable discretion. Watermaster shall review each proposed Transfer based upon the record before it and considering the potential impacts of the proposed Transfer alone. However, Watermaster shall also consider the cumulative impacts of Transfers generally when carrying out its responsibilities to implement the OBMP and Recharge and monitoring programs authorized by these Rules and Regulations or the Judgment.

(a) Watermaster will evaluate the cumulative physical impact of Transfers on the Basin, if any, by July 1, 2003, and a minimum of once every two years thereafter.

(b) Watermaster will take the results of its evaluation into account when carrying out its obligations under section 7.1 of these Rules and Regulations."

This technical memorandum, which is being prepared pursuant to the requirements of the Peace Agreement and the Watermaster Rules and Regulations cited above, contains Watermaster's first evaluation of the "cumulative" impacts of transfers.

3.2 Analysis

The Peace Agreement defines Transfers as "the assignment, lease, or sale of a right to Produce water to another Producer within the Chino Basin or to another person or entity for use outside the Basin in conformance with the Judgment, whether the Transfer is of a temporary or permanent nature" (Peace Agreement page 11-12). Replenishment water means "Supplemental Water used to Recharge the Basin pursuant to the physical solution, either directly by percolating or injecting the water into the Basin or indirectly by delivering the water for use in lieu of Production and use of Safe Yield or Operating Safe Yield" (Peace Agreement page 10). Based on the Peace Agreement definition (and in actuality), not all transfers that occur replace the physical recharge of water to the Chino Basin. This technical memorandum focuses on an evaluation the cumulative physical impact of Transfers that replaced the physical recharge of water.

3.2.1 Historic Replenishment

WEI developed a new groundwater model (hereafter, the *2003 Watermaster Model*) for the Chino Basin in support of the Chino Basin Watermaster, IEUA, and Metropolitan Water District of Southern California (Metropolitan) Dry-Year Yield (DYY) Program. The 2003 Watermaster Model was also used to evaluate the cumulative impacts of transfers in this study. This was accomplished by determining and simulating the historic and a "reduced transfer - increased physical recharge" scenario for the model calibration period. Changes in the magnitude of groundwater level and storage throughout Chino Basin, the change in direction and speed of specific known water quality anomalies, and the losses from storage were then estimated.

3.2.2 Baseline Transfers and Replenishment

In order to determine the cumulative impacts of transfers, if any, the avoided physical recharge due to transfers had to be determined. However, since not all transfers represented avoided physical recharge and since Watermaster does not specifically determine avoided physical recharge each year, the calculation of the actual avoided physical recharge during the study period had to be estimated from historical operations of the Watermaster. First, data regarding historic transfer and replenishment activities were assembled and disaggregated into the "physically recharged" components and the "in-lieu" or "exchanged" components. This was accomplished by reviewing and tabulating transfer, recharge, and replenishment information from the Watermaster Assessment Packages and Annual Reports for the period FY 89-90 to FY 00-01 (see Appendices B & C). This was done for the major producers historically participating in transfers (CCWD, Chino, Chino Hills, FUWC, FWC, JCSD, Marygold, Ontario, Pomona, San Antonio, Santa Ana River WC, SoCal Water, and Upland). In addition, Metropolitan accounts and the ground water replenishment activities were tabulated.

To calculate the avoided replenishment or physical recharge of water that occurred during the study period, the following steps were taken:

1. Develop spreadsheets for the study period that duplicate the Watermaster Assessment Packages for each Producer listed above and check against the Assessment Packages (Appendix B).
2. Refine spreadsheets to break out water transfer activity, including known transfers from storage, Metropolitan exchanges, etc.
3. Create additional spreadsheets to summarize transfers identified in the Assessment Package based on where the transfers originated and went for the same period (Appendix C).
4. Calculate each producer's total replenishment obligation without transfers, both including and excluding any Metropolitan exchanges from production.
5. Develop spreadsheets summarizing the total replenishment obligation calculated for each producer by year for both including and excluding any Metropolitan exchanges for the study period. These tables represent what the total obligation would have been, by producer, had the Producers not completed the transfers (Table 3-1A and 3-2A).
6. Develop a spreadsheet summarizing net over-production from the Assessment Package for each producer (Table 3-1B and 3-2B).
7. Develop summary spreadsheets subtracting the net over-production from the Assessment Package from the total replenishment obligation by producer, both for including and excluding

Metropolitan exchanges. These tables represent the avoided physical recharge or replenishment by producer (Table 3-1C and 3-2C).

8. Develop spreadsheets summarizing actual groundwater replenishment, including the total unmet replenishment obligation from the Assessment Packages, and indicating how Watermaster satisfied the obligation each year (i.e. sources of water) (Table 3-3).
9. Develop spreadsheet summarizing Metropolitan cyclic account activity during the study period. Calculate the percentage of cyclic water used for replenishment that was delivered by exchange or physically recharged (Table 3-4).
10. Evaluate the results both including and excluding Metropolitan exchange.

The tables in Appendix B show the historic water transfer activity and net replenishment obligation for each producer. These tables duplicate the results of the Watermaster Assessment Package. Because exchanges with Metropolitan are included in the assessment packages as part of production, the effect of exchanges that did not avoid the physical recharge of water had to be accounted for in the calculation (See Table 3-5, Calculation of Avoided Physical Recharge).

Based on an evaluation of the information above, approximately 225,000 acre-feet of avoided physical recharge occurred between 1989 and 2001. The greatest volume of avoided physical recharge occurred in MZ2 and the least volume occurred in MZ1.

*Below to be completed after Watermaster review of Tables 3-1 through 3-5 and Appendices B & C

3.2.3 Analysis of Material Physical Injury

3.2.4 Limitations of this Analysis

3.3 Recommended Regarding Transfers for the Next Five Years

Table 3-1

A. Total Replenishment Obligation Without Transfers & Including MWD Exchange in Production

FY	CCWD	Chino	Chino Hills	FOWC	FWC	JCSD	Marygold	MVWD	Ontario	Pomona	San Antonio	Santa Ana	SoCal Wtr	Upland	Total Repl Obligation
1989-90	11,270.8	2,822.7	0.0	2,330.5	0.0	9,624.4	0.0	0.0	9,237.9	0.0	0.0	0.0	0.0	0.0	35,286.3
1990-91	0.0	2,753.0	0.0	7,349.6	1,406.9	7,710.3	0.0	0.0	6,155.2	0.0	0.0	0.0	0.0	0.0	25,374.8
1991-92	0.0	2,084.7	0.0	2,514.8	2,902.6	8,600.5	0.0	0.0	10,491.1	0.0	0.0	0.0	0.0	0.0	26,593.9
1992-93	0.0	304.8	0.0	739.7	2,678.9	8,689.1	0.0	0.0	3,456.5	0.0	0.0	0.0	0.0	0.0	15,868.8
1993-94	0.0	0.0	0.0	0.0	8,277.2	8,126.8	0.0	0.0	2,264.6	0.0	0.0	0.0	0.0	0.0	18,668.5
1994-95	0.0	0.0	0.0	0.0	6,537.6	4,534.5	0.0	0.0	998.9	0.0	0.0	0.0	0.0	0.0	12,071.0
1995-96	0.0	356.0	0.0	0.0	6,530.3	5,284.4	0.0	0.0	13,745.4	0.0	0.0	0.0	0.0	0.0	25,916.1
1996-97	0.0	1,368.9	0.0	0.0	11,631.6	7,530.3	0.0	0.0	15,114.3	0.0	0.0	0.0	0.0	0.0	35,645.2
1997-98	0.0	0.0	0.0	0.0	10,973.7	5,075.1	0.0	0.0	14,658.7	0.0	0.0	0.0	0.0	0.0	30,707.4
1998-99	0.0	1,663.6	0.0	0.0	10,373.6	6,163.8	0.0	122.8	15,915.6	0.0	0.0	0.0	0.0	0.0	34,279.2
1999-00	0.0	0.0	0.0	0.0	20,946.8	5,419.6	0.0	0.0	10,839.2	0.0	0.0	0.0	0.0	0.0	37,205.5
2000-01	0.0	0.0	0.0	0.0	17,066.0	0.0	0.0	227.0	8,943.0	300.8	0.0	0.0	0.0	0.0	26,536.8
2001-02	0.0	0.0	0.0	0.0	19,595.7	0.0	0.0	5,497.4	13,984.5	483.3	0.0	0.0	0.0	0.0	39,561.0
TOTALS	11,270.8	11,373.4	0.0	12,934.5	116,919.1	76,776.7	0.0	5,847.0	125,805.0	784.1	0.0	0.0	0.0	0.0	361,712.5

B. Net Overproduction from Assessment Package by Producer

FY	CCWD	Chino	Chino Hills	FOWC	FWC	JCSD	Marygold	MVWD	Ontario	Pomona	San Antonio	Santa Ana	SoCal Wtr	Upland	Total Repl Obligation
1989-90	0.0	2,565.6	0.0	6,146.0	0.0	8,324.4	0.0	0.0	9,237.9	0.0	0.0	0.0	0.0	0.0	26,273.9
1990-91	0.0	2,389.2	0.0	13,745.3	0.0	5,910.3	0.0	0.0	6,155.2	0.0	0.0	0.0	0.0	0.0	28,200.0
1991-92	0.0	404.7	0.0	6,899.1	564.5	5,320.5	0.0	0.0	8,811.1	0.0	0.0	0.0	0.0	0.0	21,999.9
1992-93	0.0	0.0	0.0	2,564.5	2,676.9	1,978.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7,219.9
1993-94	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1994-95	0.0	0.0	0.0	0.0	2,797.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,797.6
1995-96	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11,745.4	0.0	0.0	0.0	0.0	0.0	11,745.4
1996-97	0.0	135.9	0.0	0.0	10,931.6	3,759.5	0.0	0.0	5,037.6	0.0	0.0	0.0	0.0	0.0	19,864.7
1997-98	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
1998-99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1999-00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2001-02	0.0	0.0	0.0	0.0	4,891.7	0.0	0.0	0.0	851.4	0.0	0.0	0.0	0.0	0.0	5,743.1
TOTALS	0.0	5,495.3	0.0	29,155.9	21,962.4	25,293.3	0.0	0.0	41,838.6	0.0	0.0	0.0	0.0	0.0	123,745.5

C. Avoided Physical Recharge - Including MWD Exchange in Production

FY	CCWD	Chino	Chino Hills	FOWC	FWC	JCSD	Marygold	MVWD	Ontario	Pomona	San Antonio	Santa Ana	SoCal Wtr	Upland	Avoided Phys. Recharge
1989-90	11,270.8	257.1	0.0	-3,815.5	0.0	1,300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9,012.5
1990-91	0.0	363.8	0.0	-6,395.7	1,406.9	1,800.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2,825.0
1991-92	0.0	1,680.0	0.0	-4,184.3	2,238.3	3,280.0	0.0	0.0	1,680.0	0.0	0.0	0.0	0.0	0.0	4,694.0
1992-93	0.0	304.8	0.0	-1,824.8	0.0	6,710.6	0.0	0.0	3,456.5	0.0	0.0	0.0	0.0	0.0	8,646.8
1993-94	0.0	0.0	0.0	0.0	8,277.2	8,126.8	0.0	0.0	2,264.6	0.0	0.0	0.0	0.0	0.0	18,668.5
1994-95	0.0	0.0	0.0	0.0	3,740.0	4,534.5	0.0	0.0	998.9	0.0	0.0	0.0	0.0	0.0	9,273.3
1995-96	0.0	356.0	0.0	0.0	6,530.3	5,284.4	0.0	0.0	2,000.0	0.0	0.0	0.0	0.0	0.0	14,170.7
1996-97	0.0	1,233.0	0.0	0.0	700.0	3,770.8	0.0	0.0	10,076.7	0.0	0.0	0.0	0.0	0.0	15,780.4
1997-98	0.0	0.0	0.0	0.0	10,973.7	5,075.0	0.0	0.0	14,658.7	0.0	0.0	0.0	0.0	0.0	30,707.4
1998-99	0.0	1,663.6	0.0	0.0	10,373.6	6,163.8	0.0	122.8	15,915.6	0.0	0.0	0.0	0.0	0.0	34,279.2
1999-00	0.0	0.0	0.0	0.0	20,946.8	5,419.6	0.0	0.0	10,839.2	0.0	0.0	0.0	0.0	0.0	37,205.5
2000-01	0.0	0.0	0.0	0.0	17,066.0	0.0	0.0	227.0	8,943.0	300.8	0.0	0.0	0.0	0.0	26,536.8
2001-02	0.0	0.0	0.0	0.0	14,704.0	0.0	0.0	5,497.4	13,133.1	483.3	0.0	0.0	0.0	0.0	33,817.9
TOTALS	11,270.8	5,878.0	0.0	-16,221.4	94,956.7	51,485.3	0.0	5,847.0	83,966.4	784.1	0.0	0.0	0.0	0.0	237,967.0

Table 3-2

A. Total Replenishment Obligation Without Transfers & Excluding MWD Exchange from Production

FY	CCWD	Chino	Chino Hills	FCWC	FWC	JCSD	Marygold	MVWD	Ontario	Pomona	San Antonio	Santa Ana	SoCal Wtr	Upland	Total Repl Obligation
1989-90	0.0	2,822.7	0.0	2,330.5	0.0	9,624.4	0.0	0.0	4,362.0	0.0	0.0	0.0	0.0	0.0	19,139.6
1990-91	0.0	2,753.0	0.0	7,349.8	1,405.9	7,710.3	0.0	0.0	2,576.1	0.0	0.0	0.0	0.0	0.0	21,795.1
1991-92	0.0	2,011.0	0.0	2,514.8	2,902.8	6,000.5	0.0	0.0	9,985.2	0.0	0.0	0.0	0.0	0.0	24,515.3
1992-93	0.0	0.0	0.0	739.7	2,576.9	8,889.1	0.0	0.0	2,345.7	0.0	0.0	0.0	0.0	0.0	14,451.4
1993-94	0.0	0.0	0.0	0.0	6,277.2	8,126.8	0.0	0.0	2,264.8	0.0	0.0	0.0	0.0	0.0	16,668.8
1994-95	0.0	0.0	0.0	0.0	6,537.8	4,534.5	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	11,074.2
1995-96	0.0	356.0	0.0	0.0	6,530.3	5,264.4	0.0	0.0	12,252.7	0.0	0.0	0.0	0.0	0.0	24,403.4
1996-97	0.0	1,366.9	0.0	0.0	11,631.8	7,530.3	0.0	0.0	15,114.3	0.0	0.0	0.0	0.0	0.0	35,643.2
1997-98	0.0	0.0	0.0	0.0	10,973.7	5,075.1	0.0	0.0	14,658.7	0.0	0.0	0.0	0.0	0.0	30,707.4
1998-99	0.0	1,883.6	0.0	0.0	10,373.6	6,183.8	0.0	122.6	15,915.6	0.0	0.0	0.0	0.0	0.0	34,279.2
1999-00	0.0	0.0	0.0	0.0	20,946.8	5,419.6	0.0	0.0	10,839.2	0.0	0.0	0.0	0.0	0.0	37,205.5
2000-01	0.0	0.0	0.0	0.0	17,066.0	0.0	0.0	227.0	8,943.0	300.6	0.0	0.0	0.0	0.0	26,536.6
2001-02	0.0	0.0	0.0	0.0	19,595.7	0.0	0.0	5,497.4	13,984.5	483.3	0.0	0.0	0.0	0.0	39,561.0
TOTALS	0.0	10,999.1	0.0	12,934.5	116,919.1	76,778.7	0.0	5,847.0	111,824.8	784.1	0.0	0.0	0.0	0.0	336,083.2

B. Net Overproduction from Assessment Package by Producer

FY	CCWD	Chino	Chino Hills	FCWC	FWC	JCSD	Marygold	MVWD	Ontario	Pomona	San Antonio	Santa Ana	SoCal Wtr	Upland	Total Repl Obligation
1989-90	0.0	2,555.6	0.0	5,146.0	0.0	8,324.4	0.0	0.0	9,237.9	0.0	0.0	0.0	0.0	0.0	25,273.9
1990-91	0.0	2,389.2	0.0	13,745.3	0.0	5,910.3	0.0	0.0	6,155.2	0.0	0.0	0.0	0.0	0.0	28,200.9
1991-92	0.0	404.7	0.0	6,699.1	564.5	5,520.5	0.0	0.0	8,511.1	0.0	0.0	0.0	0.0	0.0	21,699.9
1992-93	0.0	0.0	0.0	2,564.5	2,576.9	1,978.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7,219.9
1993-94	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1994-95	0.0	0.0	0.0	0.0	2,797.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,797.8
1995-96	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11,745.4	0.0	0.0	0.0	0.0	0.0	11,745.4
1996-97	0.0	135.9	0.0	0.0	10,931.8	3,759.9	0.0	0.0	9,037.8	0.0	0.0	0.0	0.0	0.0	19,864.7
1997-98	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
1998-99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1999-00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000-01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2001-02	0.0	0.0	0.0	0.0	4,591.7	0.0	0.0	0.0	651.4	0.0	0.0	0.0	0.0	0.0	5,243.1
TOTALS	0.0	5,485.3	0.0	28,155.9	21,962.4	25,293.5	0.0	0.0	41,538.8	0.0	0.0	0.0	0.0	0.0	123,745.5

C. Avoided Physical Recharge - Excluding MWD Exchange from Production

FY	CCWD	Chino	Chino Hills	FCWC	FWC	JCSD	Marygold	MVWD	Ontario	Pomona	San Antonio	Santa Ana	SoCal Wtr	Upland	Avoided Phys. Recharge
1989-90	0.0	257.1	0.0	-3,815.5	0.0	1,300.0	0.0	0.0	-4,875.9	0.0	0.0	0.0	0.0	0.0	-7,134.3
1990-91	0.0	363.8	0.0	-6,395.7	1,405.9	1,800.0	0.0	0.0	-3,579.1	0.0	0.0	0.0	0.0	0.0	-6,405.1
1991-92	0.0	1,606.3	0.0	-4,184.3	2,338.3	480.0	0.0	0.0	-224.9	0.0	0.0	0.0	0.0	0.0	2,715.4
1992-93	0.0	0.0	0.0	-1,824.8	0.0	6,710.6	0.0	0.0	2,345.7	0.0	0.0	0.0	0.0	0.0	7,231.5
1993-94	0.0	0.0	0.0	0.0	6,277.2	8,126.8	0.0	0.0	2,264.8	0.0	0.0	0.0	0.0	0.0	16,668.8
1994-95	0.0	0.0	0.0	0.0	3,740.0	4,534.5	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	8,276.5
1995-96	0.0	356.0	0.0	0.0	6,530.3	5,264.4	0.0	0.0	487.3	0.0	0.0	0.0	0.0	0.0	12,638.0
1996-97	0.0	1,233.0	0.0	0.0	700.0	3,770.5	0.0	0.0	10,076.7	0.0	0.0	0.0	0.0	0.0	15,780.4
1997-98	0.0	0.0	0.0	0.0	10,973.7	5,075.0	0.0	0.0	14,658.7	0.0	0.0	0.0	0.0	0.0	30,707.4
1998-99	0.0	1,883.6	0.0	0.0	10,373.6	6,183.8	0.0	122.6	15,915.6	0.0	0.0	0.0	0.0	0.0	34,279.2
1999-00	0.0	0.0	0.0	0.0	20,946.8	5,419.6	0.0	0.0	10,839.2	0.0	0.0	0.0	0.0	0.0	37,205.5
2000-01	0.0	0.0	0.0	0.0	17,066.0	0.0	0.0	227.0	8,943.0	300.6	0.0	0.0	0.0	0.0	26,536.6
2001-02	0.0	0.0	0.0	0.0	14,704.0	0.0	0.0	5,497.4	13,133.1	483.3	0.0	0.0	0.0	0.0	33,817.9
TOTALS	0.0	5,499.8	0.0	-16,221.4	94,055.7	51,465.3	0.0	5,847.0	69,988.2	784.1	0.0	0.0	0.0	0.0	212,337.7

Table 3-3
GROUNDWATER REPLENISHMENT

FY	Total Unmet Replenishment Obligation From Assessment Package	Spreading						Net to be Met From Non-Wet Sources	Indirect		Balance Replenishment	Other Accounts		
		CB-13 San Sevaine	CB-5 Montclair	Day	CB-14 Etiwanda	Deer Turner	Total Spread		In Lieu Exchange	Cyclic Purchase		Trust	Co Op	Mini Conj Use
											5,679.7	14,098.8		
1989-90	30,344.5	0.0	0.0	0.0	0.0	0.0	0.0	30,344.5	0.0	19,324.2	16,700.0	16,377.1	0.0	0.0
1990-91	31,814.9	0.0	1,987.6	475.1	828.0	0.0	3,290.7	28,524.2	0.0	0.0	45,224.2	14,929.1	0.0	0.0
1991-92	23,870.4	0.0	2,583.0	501.4	705.1	0.0	3,789.5	20,080.9	5,387.1	17,726.0	42,192.0	-45,405.0	0.0	0.0
1992-93	7,501.5	3,181.6	6,443.9	0.0	2,909.3	0.0	12,534.8	-5,033.3	8,794.7	21,883.5	6,480.5	0.0	0.0	4,806.1
1993-94	432.0	2,688.0	4,885.9	0.0	1,284.9	0.0	8,858.8	-8,426.8	8,984.5	0.0	-10,930.9	0.0	0.0	-61.1
1994-95	3,060.9	0.0	0.0	0.0	0.0	0.0	0.0	3,060.9	432.1	0.0	-8,302.0	0.0	3,170.8	-1.5
1995-96	12,903.7	82.4	0.0	0.0	0.0	0.0	82.4	12,821.3	4,701.0	0.0	-181.8	0.0	2,611.9	-0.4
1996-97	20,578.2	0.0	0.0	0.0	0.0	0.0	0.0	20,578.2	4,672.7	0.0	15,723.8	0.0	-4,672.7	-0.6
1997-98	770.9	0.0	8,322.6	0.0	0.0	0.0	8,322.6	-7,551.7	0.0	0.0	8,172.1	0.0	0.0	-0.4
1998-99	657.5	1,513.3	2,960.6	0.0	1,223.4	0.0	5,697.3	-5,039.8	0.0	1,473.9	1,656.4	0.0	0.0	-1.3
1999-00	579.3		1,000.8	0.0	0.0	0.0	1,000.8	-421.5	0.0	657.5	579.4	0.0	0.0	0.0
2000-01	198.7	0.0	29.7	0.0	0.0	0.0	29.7	169.0	0.0	748.3	0.1	0.0	-1,110.0	-0.2
2001-02	5,872.9	0.0	0.1	0.0	0.0	0.0	0.1	5,872.8	0.0	0.0	5,872.8	0.0	0.0	-1.1
TOTALS	138,585.3	7,465.3	28,214.2	976.5	6,950.7	0.0	43,606.7		32,972.1	61,813.4		0.0	0.0	4,739.5

Table 3-4
CYCLIC ACTIVITIES[1]

FY	Beginning Balance	Puts						Other			Takes							
		Spreading																
		CB-131 San Bevaine	CB-591 Montclair	Day	CB-141 Edwards	Deer Turner	Total Puts Spread	Balance Spread	Delby Exchange	Total Exchange	Balance Exchange	Total Puts Spread & Other	% Total Spread	% Total Exchange	Purtor Repl	Total Spread at	Total Exchange at	Ending Balance	Bal in Ann Repl	Diff
1989-90	47,606.3	0.0	0.0	0.0	0.0	0.0	0.0											47,606.3		
1990-91	28,484.1	0.0	0.0	129.2	373.5	0.0	502.7	28,984.8	0.0	0.0	0.0	502.7	100.0%	0.0%	-19,324.2	-19,324.2	0.0	28,484.1	28,462.9	21.2
1991-92	28,984.8	0.0	1,270.3	0.0	490.8	0.0	1,761.1	13,021.9	7,205.7	7,205.7	7,205.7	8,966.8	64.4%	35.6%	-17,725.0	-17,725.0	0.0	20,227.6	20,205.4	21.2
1992-93	20,227.6	0.0	945.3	0.0	731.8	0.0	1,677.1	811.1	0.0	0.0	-589.9	1,677.1	2854.5%	-2764.5%	-21,553.5	-14,057.9	-7,795.6	21.2	0.0	21.2
1993-94	21.2	516.8	5,466.8	0.0	1,850.8	0.0	7,834.2	8,245.3	11,210.2	11,210.2	10,620.3	18,844.4	43.7%	56.3%	0.0	0.0	0.0	18,865.5	18,844.5	21.1
1994-95	18,865.5	5,942.7	715.1	0.0	2,641.2	0.0	10,300.0	18,545.3	1,051.1	1,051.1	11,671.4	11,351.1	61.4%	38.6%	0.0	0.0	0.0	30,215.7	30,193.5	22.2
1995-96	30,215.7	0.0	0.0	0.0	0.0	0.0	0.0	18,545.3	3,555.3	3,555.3	15,226.7	3,555.3	34.9%	65.1%	0.0	0.0	0.0	33,772.0	33,749.1	22.9
1996-97	33,772.0	0.0	16.5	0.0	0.0	0.0	16.5	18,561.8	0.0	0.0	15,226.7	16.5	34.9%	65.1%	0.0	0.0	0.0	33,755.5	33,755.5	22.9
1997-98	33,755.5	0.0	0.0	0.0	0.0	0.0	0.0	18,561.8	4,491.9	4,491.9	19,718.6	4,491.9	48.5%	51.5%		0.0	0.0	38,280.4	38,257.5	22.9
1998-99	38,280.4	0.0	0.0	0.0	0.0	0.0	0.0	17,547.1	0.0	0.0	15,959.4	0.0	48.5%	51.5%	-1,473.9	-714.7	-759.2	36,806.5	36,786.1	19.4
1999-00	36,806.5	0.0	0.0	0.0	0.0	0.0	0.0	17,528.3	0.0	0.0	15,520.7	0.0	48.5%	51.5%	-657.5	-318.5	-338.7	36,149.0	36,126.1	22.9
2000-01	36,149.0	0.0	0.0	0.0	0.0	0.0	0.0	17,165.4	0.0	0.0	15,235.2	0.0	48.5%	51.5%	-748.3	-362.5	-385.5	35,400.7	35,548.8	-148.1
2001-02	35,400.7	0.0	0.0	0.0	0.0	0.0	0.0	17,165.4	0.0	0.0	15,235.2	0.0	48.5%	51.5%		0.0	0.0	35,400.7	35,543.6	-142.9
TOTALS		7,459.3	8,413.0	129.2	6,888.1	0.0	21,891.6		27,314.2	27,314.2		49,405.8	35.1	-23.1	-61,513.4	-52,534.4	-9,279.0			

[1] From Watermaster Annual Reports and Assessment Packages

Table 3-5

CALCULATION OF AVOIDED PHYSICAL RECHARGE

	Including MWD Exchange		Excluding MWD Exchange	Average
Total Replenishment Obligation	361,712.5		336,083.2	
Less Net Obligation from Pkg.	123,745.5		123,745.5	
Gross Avoided Physical Recharge	237,967.0		212,337.7	
Plus Effect of Exchange/In Lieu*	-14,646.7		14,646.7	
Net Avoided Physical Recharge	223,320.3		226,984.4	225,152.4
* See Below				
Groundwater In Lieu for Replenishment	32,972.1			
Plus Cyclic In Lieu for Replenishment	9,279.0			
Total Exchange/In Lieu for Replenishment		42,251.1		
Net Groundwater Replenishment				
Required from Assessment Package	123,745.5			
Less Direct Spread for Repl	43,606.7			
Less Cyclic Spread for Repl	52,534.4			
Groundwater Replenishment by Exchange/In Lieu		-27,604.4		
Net Additional Avoided Physical Recharge due to Exchange/In Lieu		14,646.7		

4. REFERENCES

Chino Basin Watermaster, *Peace Agreement*, June 2000.

Chino Basin Watermaster, *Rules and Regulations*, June 2001.

Wildermuth Environmental, Inc., *Optimum Basin Management Program, Chino Basin Dry-Year Yield Program, Final Modeling Report*, July 2003.

APPENDIX A

APPENDIX A. IMPACT OF DRY-YEAR YIELD PROGRAM TO AGRICULTURAL PUMPING COST

A.1 Introduction

In the modeling report for Chino Basin Dry-Year Yield Program by Wildermuth Environmental, Inc. (WEI, 2003), it was assumed that half of the replenishment obligation of the desalters would come from reduced groundwater outflow to the Santa Ana River near Prado dam and from an increase in streambed recharge in the Santa Ana River. To achieve this new recharge the groundwater levels in the eastern two-thirds of the Basin will have to be operated at lower levels – on the order of about 20 feet. Members of the Agricultural pool expressed concerns at their August Pool meeting regarding the increased power cost from operating at this lower level. The analysis described herein was performed to estimate the power impact on Agricultural Pool producers from operating the Basin at lower levels as suggested in Section 1

A.2 The Impact of Reduced Recharge

The water supply plan in the baseline scenario described in the Modeling Report for the Chino Basin Dry-Year Yield Program is based on a modified version of water supply plan from the Implementation Plan in the OBMP Peace Agreement. It was assumed that OBMP desalter capacity would be increased from the current level of 8 million gallons per day (mgd) in 2002/2003 to 40 mgd by 2020. About half of the production from the desalter wells is assumed to come from decreased rising water and increased stream bed recharge in the Santa Ana River report. The supplemental water recharge plan associated with the baseline is shown in Section 1 as Table 1-1 and in this appendix as Table A-1. Figure A-1 shows the quarterly groundwater production during the planning period. Groundwater production in the basin will increase from 196,000 acre-ft/yr in 2003 to about 210,000 acre-ft/yr in 2020 and remain constant thereafter. Agricultural pumping is projected to decrease from about 40,000 acre-ft/yr to about 10,000 acre-ft/yr during the same period.

To estimate the increased cost of agricultural production from operating the Basin at lower levels a revised recharge plan was created that provided for full supplemental water recharge of all desalter production. This new recharge plan is shown in Table A-2. The 2003 Watermaster Model was used to simulate the groundwater level response of this revised recharge plan. The incremental power cost at each agricultural well was computed by comparing the model estimated groundwater-level time histories at each well and estimating a time history groundwater level differences. The increased power cost for each agricultural well was computed for each year from the formula below:

$$dC_i = f * P_i * dH_i * EC / e$$

where dC_i = incremental pumping cost ($/yr) for i^{th} well

f = unit conversion factor

P_i = pumping rate (acre-ft/yr) for i^{th} well

dH_i = groundwater level change (ft) for i^{th} well

e = overall pumping efficiency, assumed to be 0.6

EC = cost of energy, assumed to be $0.10/kw-h

The unit conversion factor is:

$$f = 43560\ ft^2/acre * 62.4\ lbs/ft^3 / 2655000\ ft\text{-}lbs/kw\text{-}h$$
$$= 1.024\ kw\text{-}h / (acre\text{-}ft\ of\ water * 1\ ft\ change)$$

Total pumping cost change is calculated by summing cost change for all agricultural wells. The change of annual agricultural pumping cost change is shown in Figure A-3.

Since total agricultural pumping decreases almost linearly from year 2004 to 2020 and water level drop steadily increases during the period, the product of two variable exhibits the characteristics of a quadratic equation, peaking at year 2016. After year 2020, as agricultural pumping remains constant until year 2028, the pumping cost steadily increases with the decreasing water level. Annual pumping cost change increases to maximum of about $22,000 per year in year 2028 with total increase of about $340,000 in 25 years.

Figure A-4 shows the estimated annual agricultural pumping cost increase per acre-foot of production. It takes about 13 years for the average power cost increase to reach $1.00 per acre-foot and it steadily increases with the increasing water level difference to a maximum of about $2.20 per acre-foot of water in year 2028.

Table A-1

Total Chino Basin Production, Watermaster Replenishment Requirement and Replenishment Plan That Balances Recharge and Discharge for Baseline Scenario

(1) Fiscal Year	(2) Production	(3) Operating Yield	(4) New Stormwater	(5) SAR Inflow	(6)=(2)-(3)-(4)-(5) Replenishment Obligation	(7) Supplemental Water Recharge Plan: MZ1 Goal	(8) MZ1 Recharge Basins: Montclair 1-4 0.3	(9) MZ1 Recharge Basins: Upland 0.15	(10) MZ1 Recharge Basins: College Hts 0.15	(11) MZ1 Recharge Basins: Brooks 0.15	(12)=Σ(8)…(11) Subtotal	(13) MZ2 and MZ3 Recharge Basins: San Sevaine 0.2	(14) Victoria	(15) Banana + Hickory	(16) Etiwanda Cons	(17) Etiwanda Perc	(18) RP3 0.05	(19) Declez	(20)=Σ(13)…(19) Subtotal	(21)=(12)+(20) Total
2004	195,577	145,000	12,000	8,989	29,588	22,191	22,191	0	0	0	22,191	5,918	0	0	0	0	1,479	0	7,397	29,588
2005	197,542	145,000	12,000	10,710	29,832	22,374	8,949	4,475	4,475	4,475	22,374	5,966	0	0	0	0	1,492	0	7,458	29,832
2006	195,715	145,000	12,000	10,888	27,827	20,871	8,348	4,174	4,174	4,174	20,871	5,565	0	0	0	0	1,391	0	6,957	27,827
2007	197,912	145,000	12,000	13,053	27,858	20,894	8,358	4,179	4,179	4,179	20,894	5,572	0	0	0	0	1,393	0	6,965	27,858
2008	196,068	145,000	12,000	13,231	25,837	19,378	7,751	3,876	3,876	3,876	19,378	5,167	0	0	0	0	1,292	0	6,459	25,837
2009	194,245	145,000	12,000	13,408	23,837	17,878	7,151	3,576	3,576	3,576	17,878	4,767	0	0	0	0	1,192	0	5,959	23,837
2010	206,871	145,000	12,000	20,744	29,127	21,845	8,738	4,369	4,369	4,369	21,845	5,825	0	0	0	0	1,456	0	7,282	29,127
2011	207,484	145,000	12,000	21,130	29,355	22,018	8,805	4,403	4,403	4,403	22,018	5,871	0	0	0	0	1,468	0	7,339	29,355
2012	208,089	145,000	12,000	21,515	29,574	22,180	8,872	4,436	4,436	4,436	22,180	5,915	0	0	0	0	1,479	0	7,393	29,574
2013	208,704	145,000	12,000	21,900	29,804	22,353	8,941	4,471	4,471	4,471	22,353	5,961	0	0	0	0	1,490	0	7,451	29,804
2014	209,311	145,000	12,000	22,285	30,026	22,520	9,008	4,504	4,504	4,504	22,520	6,005	0	0	0	0	1,501	0	7,507	30,026
2015	209,917	145,000	12,000	22,670	30,247	22,685	9,074	4,537	4,537	4,537	22,685	6,049	0	0	0	0	1,512	0	7,562	30,247
2016	210,015	145,000	12,000	23,057	29,958	22,469	8,987	4,494	4,494	4,494	22,469	5,992	0	0	0	0	1,498	0	7,490	29,958
2017	210,126	145,000	12,000	23,443	29,683	22,262	8,905	4,452	4,452	4,452	22,262	5,937	0	0	0	0	1,484	0	7,421	29,683
2018	210,229	140,000	12,000	23,830	34,399	25,799	10,320	5,160	5,160	5,160	25,799	6,880	0	0	0	0	1,720	0	8,600	34,399
2019	210,328	140,000	12,000	24,216	34,112	25,584	10,234	5,117	5,117	5,117	25,584	6,822	0	0	0	0	1,706	0	8,528	34,112
2020	210,423	140,000	12,000	24,602	33,821	25,365	10,146	5,073	5,073	5,073	25,365	6,764	0	0	0	0	1,691	0	8,455	33,821
2021	210,427	140,000	12,000	24,602	33,825	25,368	10,147	5,074	5,074	5,074	25,368	6,765	0	0	0	0	1,691	0	8,456	33,825
2022	210,427	140,000	12,000	24,602	33,825	25,368	10,147	5,074	5,074	5,074	25,368	6,765	0	0	0	0	1,691	0	8,456	33,825
2023	210,427	140,000	12,000	24,602	33,825	25,368	10,147	5,074	5,074	5,074	25,368	6,765	0	0	0	0	1,691	0	8,456	33,825
2024	210,423	140,000	12,000	24,602	33,821	25,365	10,146	5,073	5,073	5,073	25,365	6,764	0	0	0	0	1,691	0	8,455	33,821
2025	210,427	140,000	12,000	24,602	33,825	25,368	10,147	5,074	5,074	5,074	25,368	6,765	0	0	0	0	1,691	0	8,456	33,825
2026	210,427	140,000	12,000	24,602	33,825	25,368	10,147	5,074	5,074	5,074	25,368	6,765	0	0	0	0	1,691	0	8,456	33,825
2027	210,427	140,000	12,000	24,602	33,825	25,368	10,147	5,074	5,074	5,074	25,368	6,765	0	0	0	0	1,691	0	8,456	33,825
2028	210,423	140,000	12,000	24,602	33,821	25,365	10,146	5,073	5,073	5,073	25,365	6,764	0	0	0	0	1,691	0	8,455	33,821

Table A-2
Total Chino Basin Production, Watermaster Replenishment Requirement and Replenishment Plan for Baseline Scenario without SAR Inflow

(1)	(2)	(3)	(4)	(5)	(6)=(2)-(3)-(4)-(5)	(7)	(8)	(9)	(10)	(11)	(12)=Σ(8) to (11)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)=Σ(13) to (19)	(21)=(12)+(20)
						Supplemental Water Recharge Plan														
						MZ1 Recharge Basins						MZ2 and MZ3 Recharge Basins								
Fiscal Year	Production	Operating Yield	New Stormwater	SAR Inflow	Replenishment Obligation	MZ1 Goal	Montclair 1-4 0.36	Upland 0.21	College Hts 0.21	Brooks 0.21	Subtotal	San Sevaine 0.25	Victoria 0.1	Banana + Hickory 0.25	Etiwanda Cons	Etiwanda Pers 0.1	RP3 0.25	Declez 0.05	Subtotal	Total
2004	198,577	145,000	12,000	0	39,577	29,588	10,567	6,340	6,340	6,340	29,588	2,497	999	2,497	0	999	2,497	499	9,989	39,577
2005	197,542	145,000	12,000	0	40,542	29,632	10,664	6,322	6,322	6,322	29,632	2,678	1,071	2,678	0	1,071	2,678	536	10,710	40,542
2006	195,715	145,000	12,000	0	38,715	27,827	9,938	5,963	5,963	5,963	27,827	2,722	1,089	2,722	0	1,089	2,722	544	10,888	38,715
2007	197,912	145,000	12,000	0	40,912	27,858	9,949	5,970	5,970	5,970	27,858	3,263	1,305	3,263	0	1,305	3,263	653	13,053	40,912
2008	196,068	145,000	12,000	0	39,068	25,837	9,228	5,537	5,537	5,537	25,837	3,308	1,323	3,308	0	1,323	3,308	662	13,231	39,068
2009	194,245	145,000	12,000	0	37,245	23,837	8,513	5,108	5,108	5,108	23,837	3,352	1,341	3,352	0	1,341	3,352	670	13,408	37,245
2010	206,871	145,000	12,000	0	49,871	29,127	10,402	6,241	6,241	6,241	29,127	5,186	2,074	5,186	0	2,074	5,186	1,037	20,744	49,871
2011	207,484	145,000	12,000	0	50,484	29,355	10,484	6,290	6,290	6,290	29,355	5,282	2,113	5,282	0	2,113	5,282	1,056	21,130	50,484
2012	208,089	145,000	12,000	0	51,089	29,574	10,562	6,337	6,337	6,337	29,574	5,379	2,151	5,379	0	2,151	5,379	1,076	21,515	51,089
2013	208,704	145,000	12,000	0	51,704	29,804	10,644	6,387	6,387	6,387	29,804	5,475	2,190	5,475	0	2,190	5,475	1,095	21,900	51,704
2014	209,311	145,000	12,000	0	52,311	30,028	10,724	6,434	6,434	6,434	30,028	5,571	2,228	5,571	0	2,228	5,571	1,114	22,285	52,311
2015	209,917	145,000	12,000	0	52,917	30,247	10,802	6,481	6,481	6,481	30,247	5,668	2,267	5,668	0	2,267	5,668	1,134	22,670	52,917
2016	210,015	145,000	12,000	0	53,015	29,958	10,699	6,420	6,420	6,420	29,958	5,764	2,306	5,764	0	2,306	5,764	1,153	23,057	53,015
2017	210,126	145,000	12,000	0	53,126	29,683	10,601	6,361	6,361	6,361	29,683	5,861	2,344	5,861	0	2,344	5,861	1,172	23,443	53,126
2018	210,229	140,000	12,000	0	58,229	34,399	12,285	7,371	7,371	7,371	34,399	5,957	2,383	5,957	0	2,383	5,957	1,191	23,830	58,229
2019	210,328	140,000	12,000	0	58,328	34,112	12,183	7,310	7,310	7,310	34,112	6,054	2,422	6,054	0	2,422	6,054	1,211	24,216	58,328
2020	210,423	140,000	12,000	0	58,423	33,821	12,079	7,247	7,247	7,247	33,821	6,151	2,460	6,151	0	2,460	6,151	1,230	24,602	58,423
2021	210,427	140,000	12,000	0	58,427	33,825	12,080	7,248	7,248	7,248	33,825	6,151	2,460	6,151	0	2,460	6,151	1,230	24,602	58,427
2022	210,427	140,000	12,000	0	58,427	33,825	12,080	7,248	7,248	7,248	33,825	6,151	2,460	6,151	0	2,460	6,151	1,230	24,602	58,427
2023	210,427	140,000	12,000	0	58,427	33,825	12,080	7,248	7,248	7,248	33,825	6,151	2,460	6,151	0	2,460	6,151	1,230	24,602	58,427
2024	210,423	140,000	12,000	0	58,423	33,821	12,079	7,247	7,247	7,247	33,821	6,151	2,460	6,151	0	2,460	6,151	1,230	24,602	58,423
2025	210,427	140,000	12,000	0	58,427	33,825	12,080	7,248	7,248	7,248	33,825	6,151	2,460	6,151	0	2,460	6,151	1,230	24,602	58,427
2026	210,427	140,000	12,000	0	58,427	33,825	12,080	7,248	7,248	7,248	33,825	6,151	2,460	6,151	0	2,460	6,151	1,230	24,602	58,427
2027	210,427	140,000	12,000	0	58,427	33,825	12,080	7,248	7,248	7,248	33,825	6,151	2,460	6,151	0	2,460	6,151	1,230	24,602	58,427
2028	210,423	140,000	12,000	0	58,423	33,821	12,079	7,247	7,247	7,247	33,821	6,151	2,460	6,151	0	2,460	6,151	1,230	24,602	58,423

Figure A-1
Total Quarterly Pumping by Pool - Baseline Scenario

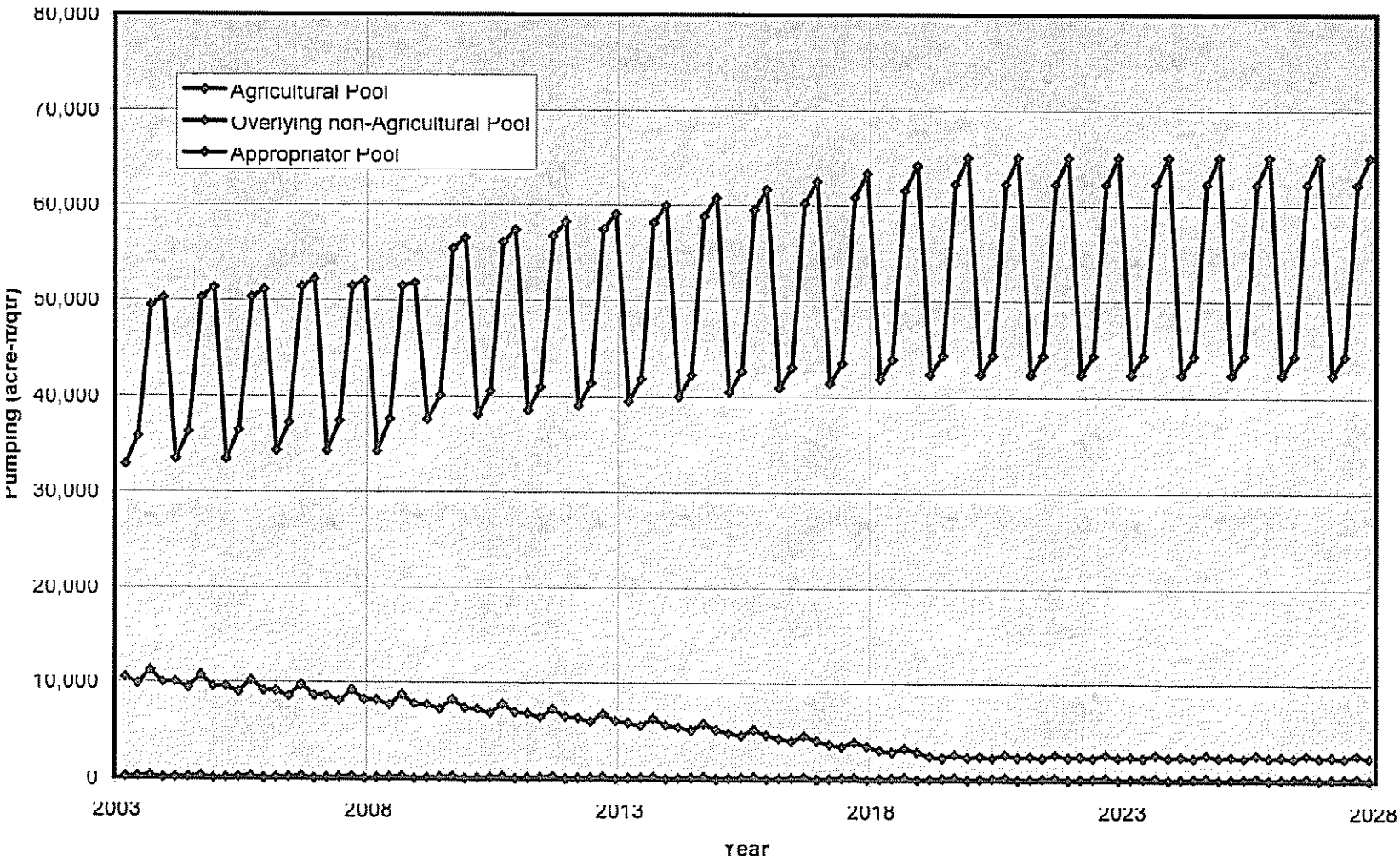


Figure A-2
Average Groundwater Level Change for Agricultural Pumping Wells

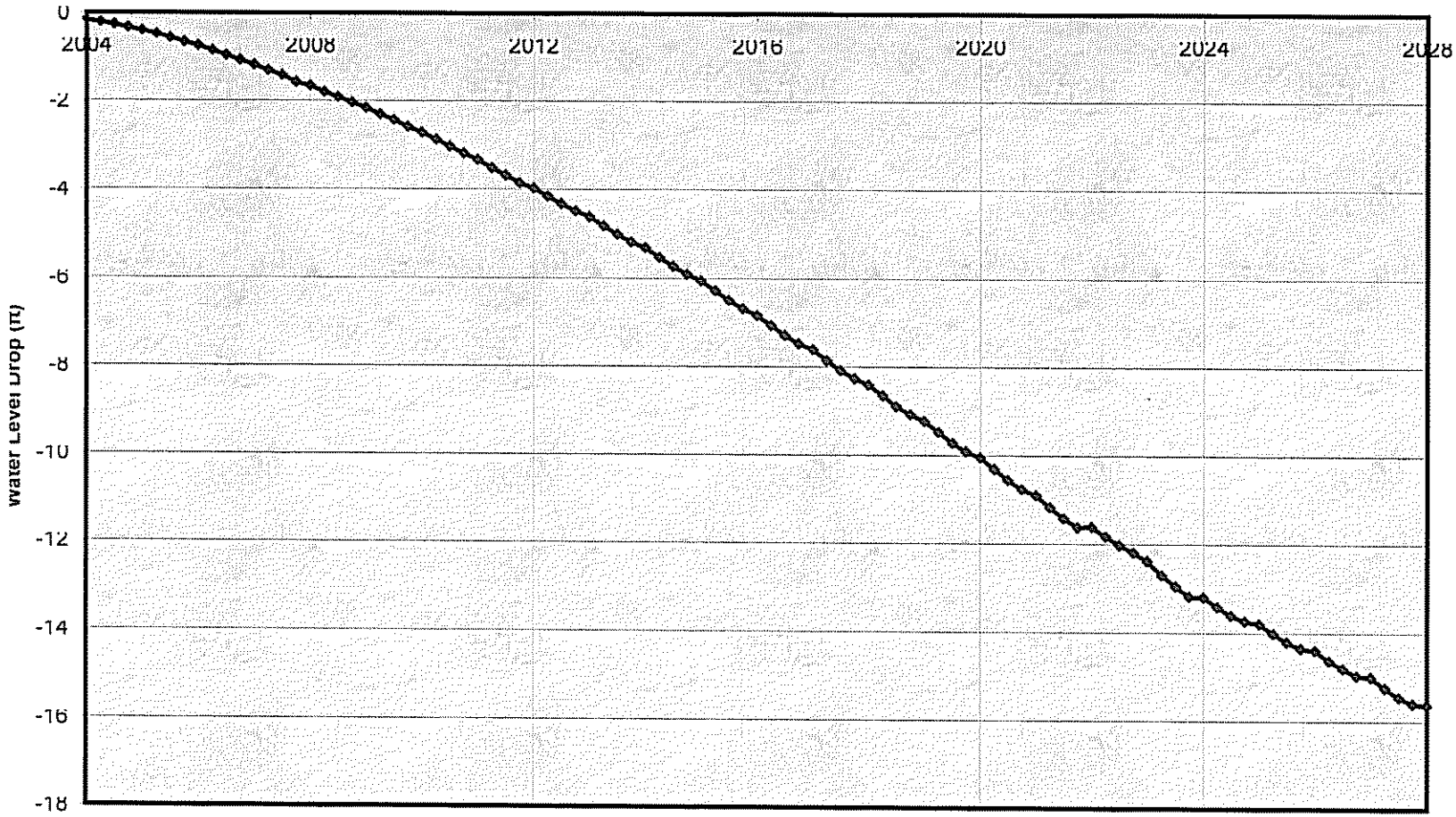


Figure A-3
Total Annual Pumping Cost Increase for Agricultural Pumping Wells

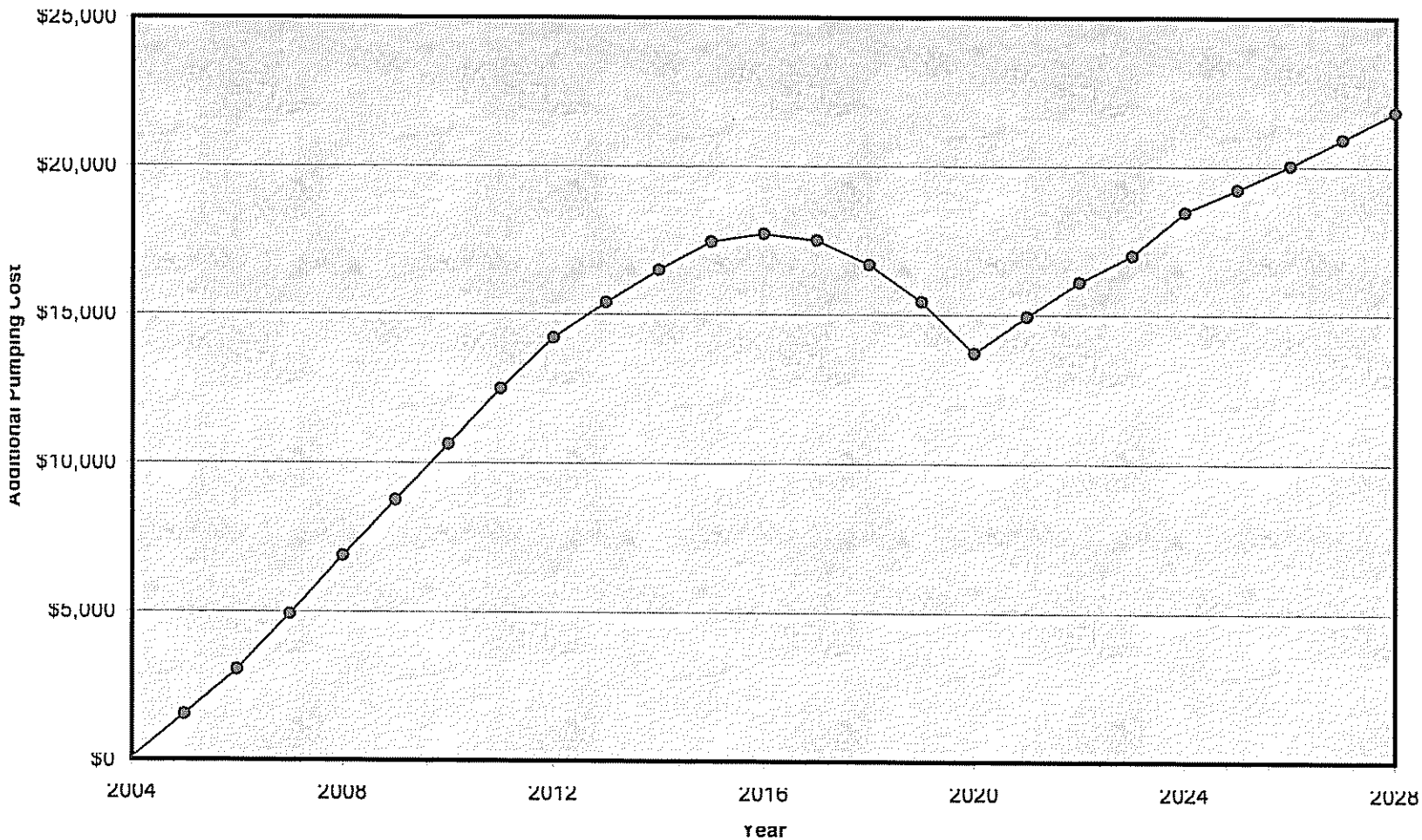
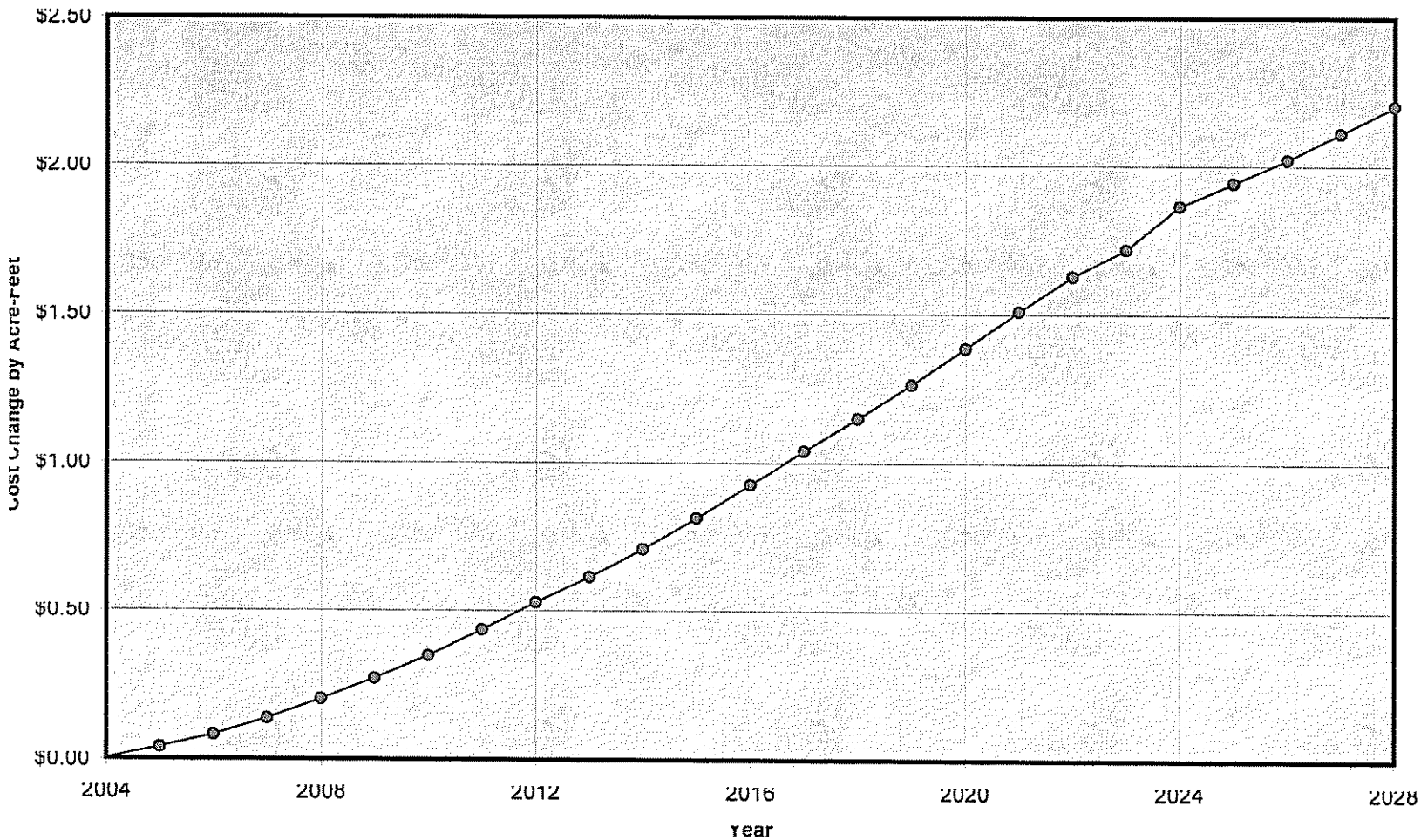


Figure A-4
Change of Agricultural Pumping Cost per Unit Production



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APPENDIX B

Appendix B

CCWD History of Operations

FY		Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	FUWC Safe Yield	Water Transfer Activity Non-Wet	Water Transfer Activity Wet Water	Ag Pool From FUWC	Ag Pool Safe Yield Reallocation	Annual Production Right
1989-90		3,819.454	3,819.454		14,090.270			2,351.978	24,481.154
1990-91	1	3,819.454	3,819.454	8,395.739	11,250.000		511.491	2,242.582	27,739.707
1991-92		3,819.454	3,819.454	8,395.739	0.000		3,430.921	2,284.655	19,331.220
1992-93		3,819.454	3,819.454	8,395.739	0.000	628.919	4,002.372	2,459.311	20,954.249
1993-94		3,819.454	3,819.454	8,395.739	0.000		4,459.157	2,520.210	20,832.011
1994-95		2,134.411	3,819.454	8,395.739	0.000	200.000	4,112.822	2,327.151	18,790.574
1995-96		3,819.454	3,819.454	8,395.739	(3,050.945)		2,557.439	2,045.471	15,177.806
1996-97		3,819.454	3,819.454	8,395.739	(2,135.094)		3,832.323	2,765.801	18,095.104
1997-98		3,819.454	3,819.454	8,395.739	0.000	122.750	3,540.435	2,829.934	19,978.783
1998-99		3,819.454	3,819.454	8,395.739	0.000		3,800.635	2,840.913	19,689.395
1999-00		3,819.454	3,819.454	8,395.739	0.000	125.000	7,371.770	4,709.550	25,902.294
2000-01		3,819.454	3,819.454	8,395.739	(12,832.030)	79.100	3,374.479	2,501.753	8,764.940
2001-02		0.000	3,819.454	8,391.739	(7,751.315)	101.500	3,400.957	2,524.058	8,259.100
TOTALS		0.000	47,053.902	75,755.632	459.307	1,455.569	44,252.704	34,055.355	249,023.054

FY	Production	MWD Exchanges	Net Over-Production 15%/85%	Net Over-Production 100%	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance
									43,915.183
1989-90	9,350.500	11,501.200	0.000	0.000	3,619.454	3,819.454	0.000	10,574.719	33,340.459
1990-91	3,717.900	11,250.000	0.000	0.000	12,871.807	3,819.454	9,052.353	11,250.040	31,042.762
1991-92	5,834.300	6,345.600	0.000	0.000	7,145.120	3,819.454	3,326.000		34,571.448
1992-93	6,529.000	9,127.800	0.000	0.000	5,297.449	3,819.454	1,877.992		36,249.440
1993-94	8,359.700	10,137.900	0.000	0.000	2,134.411	2,134.411	0.000		36,249.440
1994-95	6,615.500	0.000	0.000	0.000	12,175.074	3,819.454	8,555.620	10,542.960	34,262.100
1995-96	7,160.170	75.300	0.000	0.000	7,942.139	3,819.454	4,322.882		38,584.782
1996-97	7,949.900	0.000	0.000	0.000	10,145.204	3,819.454	6,326.750		45,113.532
1997-98	5,087.290	0.000	0.000	0.000	14,891.483	3,819.454	11,272.029	15,721.190	39,994.371
1998-99	6,052.950	0.000	0.000	0.000	13,850.445	3,819.454	10,163.991	16,630.197	33,026.185
1999-00	7,249.720	0.000	0.000	0.000	18,852.544	3,819.454	15,033.090	24,749.752	23,295.503
2000-01	6,764.940	0.000	0.000	0.000	0.000	0.000	0.000	23,295.503	0.000
2001-02	8,251.750	0.000	0.000	0.000	4.350	4.350	0.000		0.000
TOTALS	89,793.610	48,741.000	0.000	0.000	108,455.474	39,333.301	70,155.173	114,070.991	

FY	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawal From Storage	Supplemental Storage: Storage Account Balance	Replenishment Obligations: WD Transfers & Excluding MWD Exchg	Equal to Net Overprod	Difference	Replenishment Obligations: WD Transfers & Including MWD Exchg	Equal to Net Overprod	Difference
1989-90				0.000	0.000	0.000	11,270.816	0.000	11,270.816
1990-91				0.000	0.000	0.000	0.000	0.000	0.000
1991-92				0.000	0.000	0.000	0.000	0.000	0.000
1992-93				0.000	0.000	0.000	0.000	0.000	0.000
1993-94				0.000	0.000	0.000	0.000	0.000	0.000
1994-95				0.000	0.000	0.000	0.000	0.000	0.000
1995-96				0.000	0.000	0.000	0.000	0.000	0.000
1996-97				0.000	0.000	0.000	0.000	0.000	0.000
1997-98				0.000	0.000	0.000	0.000	0.000	0.000
1998-99				0.000	0.000	0.000	0.000	0.000	0.000
1999-00			0.000	0.000	0.000	0.000	0.000	0.000	0.000
2000-01	24,482.855	667.954	23,814.894	0.000	0.000	0.000	0.000	0.000	0.000
2001-02	1,165.762	1,748.585	23,252.971	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS				0.000	0.000	0.000	11,270.816	0.000	11,270.816

[1] CCWD begins receiving all FUWC OSY & Ag SY Reallocation yrly

Chino History of Operations

FY	Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity: Non-Wet	Water Transaction Activity: Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production	MWD Exchanges	Net Over-Production 15%/85%	Net Over-Production 100%
1989-90	0.000	3,870.087	257.145		2,591.100	6,509.312	9,073.900	0.000	2,565.588	0.000
1990-91	0.000	3,870.087	363.790		2,470.178	6,504.033	8,893.200	0.000	2,389.167	0.000
1991-92	0.000	4,033.657	1,650.000		2,720.177	8,434.034	8,765.000	73.700	404.666	0.000
1992-93	0.000	4,033.657	1,810.556	333.029	2,970.555	9,148.025	7,255.900	355.100	0.000	0.000
1993-94	1,509.029	4,033.657	0.000		3,013.907	8,553.702	5,718.000	0.000	0.000	0.000
1994-95	2,835.192	4,033.657	0.000	101.000	3,454.525	10,434.577	8,530.100	0.000	0.000	0.000
1995-96	1,904.477	4,033.657	1,048.000		3,079.069	10,055.470	9,373.370	0.000	0.000	0.000
1996-97	692.050	4,033.657	1,232.982		4,138.543	10,095.432	10,231.351	0.000	135.919	0.000
1997-98	692.050	4,033.657	0.000	49.436	4,055.506	8,830.649	8,821.135	0.000	0.000	0.000
1998-99	0.000	4,033.657	1,663.606		4,353.817	10,051.282	10,051.282	0.000	0.000	0.000
1999-00	0.000	4,033.657	2,000.000	1.500	7,017.314	13,052.871	10,200.825	0.000	0.000	0.000
2000-01	2,851.846	4,033.657	2,700.000	104.000	5,124.578	14,814.281	7,147.209	0.000	0.000	0.000
2001-02	4,033.657	4,033.657	0.000	51.500	5,199.149	13,318.353	5,612.901	0.000	0.000	0.000
TOTALS	0.000	51,712.581	12,778.113	640.464	50,196.435	129,641.074	109,734.603	429.800	5,495.340	0.000

FY	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawals From Storage	Supplemental Storage: Storage Account Balance
					75.327			
1989-90	0.000	0.000	0.000		75.327			
1990-91	0.000	0.000	0.000		75.327			
1991-92	0.000	0.000	1,000.000		1,075.327			
1992-93	1,509.029	1,509.029	1,000.000		2,075.327			
1993-94	2,835.192	2,835.192	700.000		2,775.327			
1994-95	1,904.477	1,904.477	0.000		2,775.327			
1995-96	692.050	692.050	0.000		2,775.327			
1996-97	0.000	0.000	0.000		2,775.327			
1997-98	9.714	9.714	0.000	682.339	2,092.988			
1998-99	0.000	0.000	0.000	183.606	1,909.383			
1999-00	2,851.846	2,851.846	0.000	602.870	1,306.513			0.000
2000-01	7,887.072	4,033.657	3,853.215	1,306.513	3,853.215	1,784.718		1,784.718
2001-02	7,705.432	4,033.657	3,671.775		7,304.790	478.205		2,262.923
TOTALS	25,171.811	17,897.021	10,004.790	2,775.327				

FY	Replenishment Obligations: WO Transfers & Excluding MWD Exchg	Equal to Net OverProd	Difference	WO Transfers & Including MWD Exchg	Equal to Net OverProd	Difference
1989-90	2,822.733	2,565.588	257.145	2,822.733	2,565.588	257.145
1990-91	2,752.957	2,389.167	363.790	2,752.957	2,389.167	363.790
1991-92	2,010.966	404.666	1,606.300	2,054.666	404.666	1,650.000
1992-93	0.000	0.000	0.000	304.560	0.000	304.560
1993-94	0.000	0.000	0.000	0.000	0.000	0.000
1994-95	0.000	0.000	0.000	0.000	0.000	0.000
1995-96	355.950	0.000	355.950	355.950	0.000	355.950
1996-97	1,368.901	135.919	1,232.982	1,368.901	135.919	1,232.982
1997-98	0.000	0.000	0.000	0.000	0.000	0.000
1998-99	1,663.606	0.000	1,663.606	1,663.606	0.000	1,663.606
1999-00	0.000	0.000	0.000	0.000	0.000	0.000
2000-01	0.000	0.000	0.000	0.000	0.000	0.000
2001-02	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS	10,995.115	5,495.340	5,499.775	11,373.375	5,495.340	5,878.035

Chino Hills History of Operations

FY		Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity Non-Wet	Water Transaction Activity Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production	MWD Exchanges	Net Over-Production 15%/85%	Net Over-Production 100%
1989-90		3,150.822	3,150.822	(734.700)		2,047.452	7,514.396	2,578.300	0.000	0.000	0.000
1990-91	*	3,150.822	3,150.822	(1,039.400)		1,052.221	7,214.465	3,700.900	0.000	0.000	0.000
1991-92	*	3,150.822	2,111.422	0.000		1,321.095	6,583.339	2,066.200	0.000	0.000	0.000
1992-93		2,111.422	2,111.422	0.000	174.315	1,452.149	5,849.308	3,209.300	188.800	0.000	0.000
1993-94		2,111.422	2,111.422	0.000		1,474.840	5,697.684	3,225.700	0.000	0.000	0.000
1994-95		2,111.422	2,111.422	0.000	54.900	1,357.552	5,635.296	3,430.200	0.000	0.000	0.000
1995-96		2,111.422	2,111.422	0.000		1,374.437	5,597.281	4,058.940	284.900	0.000	0.000
1996-97		1,253.441	2,111.422	0.000		1,890.690	5,255.553	2,201.905	0.000	0.000	0.000
1997-98		2,111.422	2,111.422	0.000	25.876	1,904.111	6,152.831	2,909.949	0.000	0.000	0.000
1998-99		2,111.422	2,111.422	0.000		2,092.874	6,285.718	4,342.653	0.000	0.000	0.000
1999-00		1,943.065	2,111.422	0.000		3,350.321	7,404.808	4,263.569	0.000	0.000	0.000
2000-01		2,111.422	2,111.422	(2,289.315)	99.000	2,030.797	4,053.326	4,053.326	0.000	0.000	0.000
2001-02		0.000	2,111.422	0.000	49.800	2,040.189	4,201.411	3,398.021	0.000	0.000	0.000
TOTALS		0.000	29,527.286	(4,053.415)	403.891	24,258.728	77,555.418	43,537.963	473.700	0.000	0.000

FY	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawal From Storage	Supplemental Storage: Storage Account Balance
					12,925.559			
1989-90	5,036.096	3,150.822	1,885.274		14,810.833			
1990-91	3,513.565	3,150.822	362.743		15,173.576			
1991-92	4,517.139	2,111.422	2,405.717	1,105.400	16,473.893			
1992-93	2,381.208	2,111.422	249.786		16,723.679			
1993-94	2,471.984	2,111.422	360.562		17,084.241			
1994-95	2,205.096	2,111.422	93.674		17,177.915			
1995-96	1,253.441	1,253.441	0.000		17,177.915			
1996-97	3,053.648	2,111.422	942.226		18,120.141			
1997-98	3,243.882	2,111.422	1,132.460		19,252.601			
1998-99	1,943.065	1,943.065	0.000	9,000.000	10,252.601			
1999-00	3,141.239	2,111.422	1,029.817	1,858.340	9,414.078	9,414.078		9,414.078
2000-01	0.000	0.000	0.000	9,414.078	0.000	250.315	2210.685	7,453.708
2001-02	803.390	803.390	0.000		0.000	250.315		7,704.023
TOTALS	33,543.753	25,081.494	8,462.259	21,387.818				

FY	Replenishment Obligations: WD Transfers & Excluding MWD Exchg	Equal to Net OverProd	Difference	WD Transfers & Including MWD Exchg	Equal to Net OverProd	Difference
1989-90	0.000	0.000	0.000	0.000	0.000	0.000
1990-91	0.000	0.000	0.000	0.000	0.000	0.000
1991-92	0.000	0.000	0.000	0.000	0.000	0.000
1992-93	0.000	0.000	0.000	0.000	0.000	0.000
1993-94	0.000	0.000	0.000	0.000	0.000	0.000
1994-95	0.000	0.000	0.000	0.000	0.000	0.000
1995-96	0.000	0.000	0.000	0.000	0.000	0.000
1996-97	0.000	0.000	0.000	0.000	0.000	0.000
1997-98	0.000	0.000	0.000	0.000	0.000	0.000
1998-99	0.000	0.000	0.000	0.000	0.000	0.000
1999-00	0.000	0.000	0.000	0.000	0.000	0.000
2000-01	0.000	0.000	0.000	0.000	0.000	0.000
2001-02	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000

* = City of Chino Hills

Appendix B

FUWC History of Operations

FY	Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity Non-Wet	Water Transaction Activity Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production	MWD Exchanges	Net Over-Production 15%/85%	Net Over-Production 100%	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawal From Storage	Supplemental Storage: Storage Account Balance	Replenishment Obligations: WO Transfers & Excluding MWD Exchg	Replenishment Obligations: Equal to Net OverProd	Replenishment Obligations: Difference	WO Transfers & Including MWD Exchg	Equal to Net OverProd	Difference
															1,869.072									
1989-90	[1] 4,909.879	6,398.736	(3,815.511)		0.000	7,491.104	13,637.100	0.000	6,145.996	0.000	0.000	0.000	0.000		1,869.072				2,330.485	6,145.996	(3,815.511)	2,330.485	6,145.996	(3,815.511)
1990-91	[1] 0.000	6,398.736	(6,398.736)		0.000	0.000	13,746.300	0.000	13,746.300	0.000	0.000	0.000	0.000	1,869.072	0.000				7,349.564	13,746.300	(6,398.736)	7,349.564	13,746.300	(6,398.736)
1991-92	0.000	6,398.736	(4,184.295)		0.000	2,212.441	8,911.500	0.000	6,699.059	0.000	0.000	0.000	0.000		0.000				2,514.764	6,699.059	(4,184.295)	2,514.764	6,699.059	(4,184.295)
1992-93	0.000	6,398.736	(1,824.839)	525.103	0.000	5,100.000	7,664.500	0.000	2,564.500	0.000	0.000	0.000	0.000		0.000				739.661	2,564.500	(1,824.839)	739.661	2,564.500	(1,824.839)
1993-94	0.000	6,398.736	(6,398.736)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000				0.000	0.000	0.000	0.000	0.000	0.000
1994-95	0.000	6,398.736	(6,398.736)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000				0.000	0.000	0.000	0.000	0.000	0.000
1995-96	0.000	6,398.736	(6,398.736)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000				0.000	0.000	0.000	0.000	0.000	0.000
1996-97	0.000	6,398.736	(6,398.736)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000				0.000	0.000	0.000	0.000	0.000	0.000
1997-98	0.000	6,398.736	(6,475.129)	76.393	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000				0.000	0.000	0.000	0.000	0.000	0.000
1998-99	0.000	6,398.736	(6,398.736)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000				0.000	0.000	0.000	0.000	0.000	0.000
1999-00	0.000	6,398.736	(6,398.736)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000			0.000	0.000	0.000	0.000	0.000	0.000	0.000
2000-01	0.000	6,398.736	(6,398.736)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000			0.000	0.000	0.000	0.000	0.000	0.000	0.000
2001-02	0.000	6,398.736	(6,398.736)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000			0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS	0.000	83,157.568	(73,870.398)	603.496	0.000	14,803.545	43,659.400	0.000	29,155.855	0.000	0.000	0.000	0.000	1,869.072					12,934.474	29,155.855	(16,221.381)	12,934.474	29,155.855	(16,221.381)

[1] to CCWD

FWC History of Operations

FY	Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity Non-Wet	Water Transaction Activity Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production	MWD Exchanges	Net Over-Production 15%/85%	Net Over-Production 100%
1989-90	0.000	0.000	341.145		0.000	341.145	0.000	0.000	0.000	0.000
1990-91	0.000	0.000	3,645.215		0.000	3,645.215	1,409.900	0.000	0.000	0.000
1991-92	0.000	0.000	2,238.315		0.000	2,238.315	2,902.800	0.000	664.485	0.000
1992-93	0.000	0.000	0.000		0.000	0.000	2,678.900	0.000	2,678.900	0.000
1993-94	0.000	0.000	8,592.000		0.000	8,592.000	6,277.200	0.000	0.000	0.000
1994-95	2,314.800	0.000	3,740.000	54.500	0.000	6,109.300	8,906.937	0.000	2,797.637	0.000
1995-96	0.000	0.000	6,662.970		0.000	6,662.970	6,530.300	0.000	0.000	0.000
1996-97	132.670	0.000	700.000		0.000	832.670	11,764.301	0.000	10,931.631	0.000
1997-98	0.000	0.000	10,973.690		0.000	10,973.690	10,973.676	0.000	0.000	0.000
1998-99	0.014	0.000	10,373.565		0.000	10,373.579	10,373.579	0.000	0.000	0.000
1999-00	0.000	0.000	20,948.752		0.000	20,948.752	20,948.752	0.000	0.000	0.000
2000-01	0.000	0.000	20,200.000		834.000	21,034.000	17,900.029	0.000	0.000	0.000
2001-02	3,133.971	1.000	14,704.000		834.583	18,673.554	23,565.281	0.000	4,891.727	0.000
TOTALS	0.000	1.000	103,117.652	54.500	1,668.583	110,423.190	124,224.655	0.000	21,992.380	0.000

FY	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawal From Storage	Supplemental Storage: Storage Account Balance
					0.000			
1989-90	341.145	0.000	341.145	341.145	0.000			
1990-91	2,238.315	0.000	2,238.315	2,238.315	0.000			
1991-92	0.000	0.000	0.000		0.000			
1992-93	0.000	0.000	0.000		0.000			
1993-94	2,314.800	0.000	2,314.800	2,314.800	0.000			
1994-95	0.000	0.000	0.000		0.000			
1995-96	132.670	0.000	132.670	132.670	0.000			
1996-97	0.000	0.000	0.000		0.000			
1997-98	0.014	0.000	0.014	0.014	0.000			
1998-99	0.000	0.000	0.000		0.000			
1999-00	0.000	0.000	0.000		0.000			0.000
2000-01	3,133.971	0.000	3,133.971	3,133.971	0.000			0.000
2001-02	0.000	0.000	0.000		0.000	0.119		0.119
TOTALS	8,160.915	0.000	8,160.915	8,160.915				

FY	Replenishment Obligations: WD Transfers & Excluding MWD Exchg	Equal to Net OverProd	Difference	WD Transfers & Including MWD Exchg	Equal to Net OverProd	Difference
1989-90	0.000	0.000	0.000	0.000	0.000	0.000
1990-91	1,409.900	0.000	1,409.900	1,409.900	0.000	1,409.900
1991-92	2,902.800	664.485	2,238.315	2,902.800	664.485	2,238.315
1992-93	2,678.900	2,678.900	0.000	2,678.900	2,678.900	0.000
1993-94	6,277.200	0.000	6,277.200	6,277.200	0.000	6,277.200
1994-95	6,537.637	2,797.637	3,740.000	6,537.637	2,797.637	3,740.000
1995-96	6,530.300	0.000	6,530.300	6,530.300	0.000	6,530.300
1996-97	11,631.631	10,931.631	700.000	11,631.631	10,931.631	700.000
1997-98	10,973.676	0.000	10,973.676	10,973.676	0.000	10,973.676
1998-99	10,373.565	0.000	10,373.565	10,373.565	0.000	10,373.565
1999-00	20,948.752	0.000	20,948.752	20,948.752	0.000	20,948.752
2000-01	17,066.029	0.000	17,066.029	17,066.029	0.000	17,066.029
2001-02	19,595.727	4,891.727	14,704.000	19,595.727	4,891.727	14,704.000
TOTALS	118,919.117	21,992.380	94,958.737	118,919.117	21,992.380	94,958.737

JCSD History of Operations

FY	Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity Non-Wet	Water Transaction Activity Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production	MWD Exchanges
1989-90	0.000	1,593.144	1,300.000		1,035.249	3,928.393	12,252.600	0.000
1990-91 [1]	0.000	1,593.144	1,800.000		987.098	4,380.242	10,290.500	0.000
1991-92	0.000	1,593.144	3,280.000		996.813	5,869.957	11,190.500	0.000
1992-93	0.000	1,593.144	6,710.588	131.527	1,095.699	9,530.958	11,509.500	0.000
1993-94	0.000	1,593.144	9,275.000		1,112.820	11,980.964	10,832.600	0.000
1994-95	1,148.364	1,593.144	7,200.000	114.400	2,434.822	12,490.730	9,825.200	0.000
1995-96	1,593.144	1,593.144	5,300.000	62.400	3,143.445	11,712.133	11,696.570	0.000
1996-97 [1]	26.820	2,051.118	3,770.800		3,771.076	9,829.814	13,389.363	0.000
1997-98	25.820	2,051.118	5,075.000	25.259	4,354.841	11,542.838	11,542.888	0.000
1998-99	0.000	2,051.118	6,183.805		5,185.991	13,430.914	13,430.914	0.000
1999-00	0.000	2,051.118	7,150.000		8,031.870	17,242.988	15,512.558	0.000
2000-01	1,730.430	2,051.118	2,650.000		8,834.029	15,075.577	11,435.426	0.000
2001-02	2,051.118	2,051.118	2,650.000		8,799.874	15,571.910	12,566.389	0.000
TOTALS	0.000	23,518.718	62,345.193	353.586	49,583.227	142,367.418	155,496.209	0.000

FY	Net Over-Production 15%/85%	Net Over-Production 100%	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance
							0.000
1989-90	8,324.407	0.000	0.000	0.000	0.000		0.000
1990-91 [1]	5,910.258	0.000	0.000	0.000	0.000		0.000
1991-92	5,320.543	0.000	0.000	0.000	0.000		0.000
1992-93	1,978.542	0.000	0.000	0.000	0.000		0.000
1993-94	0.000	0.000	1,148.364	1,148.364	2,694.363		2,694.363
1994-95	0.000	0.000	2,965.530	1,593.144	4,172.386		6,866.749
1995-96	0.000	0.000	15.583	15.583	6,000.000		12,866.749
1996-97 [1]	3,759.549	0.000	0.000	0.000	0.000	4,555.000	8,311.749
1997-98	0.050	0.000	0.000	0.000	298.181		8,609.930
1998-99	0.000	0.000	0.000	0.000	0.000	1,658.805	6,951.125
1999-00	0.000	0.000	1,730.430	1,730.430	0.000		6,951.125
2000-01	0.000	0.000	3,639.151	2,051.118	1,578.033		8,529.158
2001-02	0.000	0.000	2,985.521	2,051.118	924.403	2,500.000	6,953.561
TOTALS	25,293.349	0.000	12,184.559	8,609.737	15,887.358	8,713.805	

FY	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawals From Storage	Supplemental Storage: Storage Account Balance	Replenishment Obligations: WO Transfers & Excluding MWD Exchg	Replenishment Obligations: Equal to Net OverProd	Replenishment Obligations: Difference	WO Transfers & Including MWD Exchg	Equal to Net OverProd	Difference
1989-90				9,624.407	8,324.407	1,300.000	9,624.407	8,324.407	1,300.000
1990-91 [1]				7,710.258	5,910.258	1,800.000	7,710.258	5,910.258	1,800.000
1991-92				8,600.543	5,320.543	3,280.000	8,600.543	5,320.543	3,280.000
1992-93				8,689.130	1,978.542	6,710.588	8,689.130	1,978.542	6,710.588
1993-94				8,129.835	0.000	8,129.835	8,129.835	0.000	8,129.835
1994-95				4,534.470	0.000	4,534.470	4,534.470	0.000	4,534.470
1995-96				5,294.437	0.000	5,294.437	5,294.437	0.000	5,294.437
1996-97 [1]				7,530.349	3,759.549	3,770.800	7,530.349	3,759.549	3,770.800
1997-98				5,075.050	0.050	5,075.000	5,075.050	0.050	5,075.000
1998-99				6,183.805	0.000	6,183.805	6,183.805	0.000	6,183.805
1999-00			0.000	5,419.570	0.000	5,419.570	5,419.570	0.000	5,419.570
2000-01	244.335		244.335	0.000	0.000	0.000	0.000	0.000	0.000
2001-02	244.335		488.670	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS				76,778.655	25,293.349	51,485.306	76,778.655	25,293.349	51,485.306

[1] JCSD acquires 487.974af of OSY from Mutual Water Co of Glen Avon

Marygold History of Operations

FY	Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity Non-Wet	Water Transaction Activity Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production	MWD Exchanges	Net Over-Production 15%/85%	Net Over-Production 100%	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawal From Storage	Supplemental Storage: Storage Account Balance	Replenishment Obligations: WO Transfers & Excluding MWD Exchg	Replenishment Obligations: Equal to Net OverProd	Replenishment Obligations: Difference	WO Transfers & Including MWD Exchg	Equal to Net OverProd	Difference
															1,033.515									
1989-90	655.317	655.317	(800.000)		425.835	936.469	134.800	0.000	0.000	0.000	801.669	655.317	146.352		1,179.867				0.000	0.000	0.000	0.000	0.000	0.000
1990-91 [1]	655.317	655.317	0.000		406.029	1,716.663	291.800	0.000	0.000	0.000	1,424.863	655.317	769.546		1,949.413				0.000	0.000	0.000	0.000	0.000	0.000
1991-92	655.317	655.317	0.000		410.025	1,720.659	73.300	0.000	0.000	0.000	1,647.359	655.317	992.042		2,941.455				0.000	0.000	0.000	0.000	0.000	0.000
1992-93	655.317	655.317	0.000	54.102	450.700	1,815.436	16.800	0.000	0.000	0.000	1,798.636	655.317	1,143.319		4,084.774				0.000	0.000	0.000	0.000	0.000	0.000
1993-94	655.317	655.317	0.000		457.743	1,768.377	0.000	0.000	0.000	0.000	1,768.377	655.317	1,113.060	3,000.000	2,197.834				0.000	0.000	0.000	0.000	0.000	0.000
1994-95 [1]	655.317	655.317	0.000	8.300	421.340	1,740.274	9.800	0.000	0.000	0.000	1,730.474	655.317	1,075.157		3,272.991				0.000	0.000	0.000	0.000	0.000	0.000
1995-96	655.317	655.317	0.000		261.998	1,572.632	0.000	0.000	0.000	0.000	1,572.632	655.317	917.315	2,500.000	1,690.306				0.000	0.000	0.000	0.000	0.000	0.000
1996-97	655.317	655.317	0.000		392.605	1,703.239	0.000	0.000	0.000	0.000	1,703.239	655.317	1,047.922	700.000	2,038.228				0.000	0.000	0.000	0.000	0.000	0.000
1997-98	655.317	655.317	0.000	0.031	375.824	1,686.489	0.000	0.000	0.000	0.000	1,686.489	655.317	1,031.172	1,200.000	1,869.400				0.000	0.000	0.000	0.000	0.000	0.000
1998-99	655.317	655.317	0.000		369.812	1,680.446	0.148	0.000	0.000	0.000	1,680.298	655.317	1,024.981	1,200.000	1,694.381				0.000	0.000	0.000	0.000	0.000	0.000
1999-00	655.317	655.317	0.000		755.123	2,065.757	0.000	0.000	0.000	0.000	2,065.757	655.317	1,410.440	1,200.000	1,904.821			0.000	0.000	0.000	0.000	0.000	0.000	0.000
2000-01	655.317	655.317	(1,200.000)		345.663	456.297	0.633	0.000	0.000	0.000	455.664	455.664	0.000	1,886.490	18.331	1,896.521	(77.675)	1,974.196	0.000	0.000	0.000	0.000	0.000	0.000
2001-02	455.664	655.317	(1,200.000)		348.614	259.595	0.030	0.000	0.000	0.000	259.565	259.565	0.000		18.331	77.675		2,051.871	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS	0.000	8,519.121	(3,200.000)	70.433	5,413.311	19,122.333	527.311	0.000	0.000	0.000	18,595.022	7,923.718	10,871.308	11,686.490					0.000	0.000	0.000	0.000	0.000	0.000

[1] Wet Water credit not received

Appendix B

MVWD History of Operations

FY		Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity: Non-Wet	Water Transaction Activity: Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production
1989-90		1,333.405	4,148.344	1,277.555		2,695.557	9,454.951	7,121.000
1990-91	1	2,333.951	4,148.344	675.610		2,570.277	9,728.182	5,250.800
1991-92		4,148.344	4,823.954	0.000		3,018.298	11,990.596	7,634.200
1992-93		4,172.195	4,823.954	0.000	398.257	3,317.717	12,712.124	5,900.700
1993-94		4,823.954	4,823.954	0.000		3,389.560	13,037.468	5,787.900
1994-95		4,823.954	4,823.954	0.000	111.700	3,101.591	12,861.199	7,134.300
1995-96		4,823.954	4,823.954	0.000		1,928.634	11,576.542	8,128.110
1996-97		2,641.132	4,823.954	0.000		2,926.656	10,391.742	9,125.586
1997-98		2,641.132	4,823.954	0.000	59.118	2,744.241	10,268.445	6,828.928
1998-99		918.241	4,823.954	122.557		2,758.873	8,623.625	8,623.625
1999-00		0.000	4,823.954	700.000	1,000.000	5,595.438	12,120.192	9,313.324
2000-01		2,806.868	4,823.954	227.005	48.000	2,599.164	10,505.024	10,505.024
2001-02		0.000	4,823.954	5,500.000	25.000	2,621.402	12,970.956	12,968.368
TOTALS		0.000	61,350.162	8,502.730	1,643.475	39,247.535	149,221.055	102,321.983

FY	MVWD Exchanges	Net Over-Production 15%/85%	Net Over-Production 100%	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance
								0.000
1989-90	0.000	0.000	0.000	2,333.951	2,333.951	0.000		0.000
1990-91	0.000	0.000	0.000	4,477.392	4,148.344	329.048		329.048
1991-92	184.200	0.000	0.000	4,172.195	4,172.195	0.000		329.048
1992-93	288.500	0.000	0.000	6,522.824	4,823.954	1,698.870		2,027.918
1993-94	0.000	0.000	0.000	7,229.568	4,823.954	2,405.614		4,433.532
1994-95	0.000	0.000	0.000	5,726.899	4,823.954	902.945		5,336.477
1995-96	2,807.300	0.000	0.000	2,641.132	2,641.132	0.000		5,336.477
1996-97	0.000	0.000	0.000	1,266.056	1,266.056	0.000		5,336.477
1997-98	1,148.200	0.000	0.000	2,293.317	2,293.317	0.000		5,336.477
1998-99	0.000	0.000	0.000	0.000	0.000	0.000		5,336.477
1999-00	0.000	0.000	0.000	2,806.868	2,806.868	0.000	1,142.110	4,194.367
2000-01	0.000	0.000	0.000	0.000	0.000	227.005	4,421.375	0.000
2001-02	0.000	0.000	0.000	2.590	2.590	0.000		0.000
TOTALS	4,475.300	0.000	0.000	39,472.803	34,138.379	5,553.485	5,563.485	

FY	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdraws From Storage	Supplemental Storage: Storage Account Balance	Replenishment Obligations: WD Transfers & Excluding MVWD Exchg	Equal to Net OverProd	Difference	WD Transfers & Including MVWD Exchg	Equal to Net OverProd	Difference
1989-90				0.000	0.000	0.000	0.000	0.000	0.000
1990-91				0.000	0.000	0.000	0.000	0.000	0.000
1991-92				0.000	0.000	0.000	0.000	0.000	0.000
1992-93				0.000	0.000	0.000	0.000	0.000	0.000
1993-94				0.000	0.000	0.000	0.000	0.000	0.000
1994-95				0.000	0.000	0.000	0.000	0.000	0.000
1995-96				0.000	0.000	0.000	0.000	0.000	0.000
1996-97				0.000	0.000	0.000	0.000	0.000	0.000
1997-98				0.000	0.000	0.000	0.000	0.000	0.000
1998-99				122.557	0.000	122.557	122.557	0.000	122.557
1999-00			0.000	0.000	0.000	0.000	0.000	0.000	0.000
2000-01	4,766.172	227.005	4,539.164	227.005	0.000	227.005	227.005	0.000	227.005
2001-02	571.805		5,110.969	5,497.410	0.000	5,497.410	5,497.410	0.000	5,497.410
TOTALS				5,846.975	0.000	5,846.975	5,846.975	0.000	5,846.975

Ontario History of Operations

FY		Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity Non-Wet	Water Transaction Activity Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production	MWD Exchanges	Net Over-Production 15%/85%	Net Over-Production 100%
1989-90		0.000	11,373.816	0.000		7,600.278	18,974.094	23,336.100	4,875.900	9,237.905	0.000
1990-91	1	0.000	11,373.816	0.000		7,256.517	18,630.333	21,208.400	3,579.100	6,155.187	0.000
1991-92		0.000	11,373.816	1,680.000		7,325.679	20,379.495	27,285.900	1,904.900	8,811.105	0.000
1992-93		0.000	11,373.816	3,457.000	939.003	8,031.842	23,801.661	22,690.400	1,110.800	0.000	0.000
1993-94		0.461	11,373.816	11,681.300		8,154.076	31,209.653	21,793.000	0.000	0.000	0.000
1994-95		9,416.653	11,373.816	5,000.000	334.100	8,277.567	34,402.136	29,404.200	996.800	0.000	0.000
1995-96		4,001.136	11,373.816	2,000.000		5,301.240	22,676.192	32,909.670	1,512.700	11,745.378	0.000
1996-97		0.000	11,373.816	10,078.665		7,607.403	29,057.884	34,095.507	0.000	5,037.623	0.000
1997-98		0.000	11,373.816	14,658.705	139.388	7,253.756	33,425.665	33,425.665	0.000	0.000	0.000
1998-99		0.000	11,373.816	15,915.632		7,313.086	34,602.534	34,602.534	0.000	0.000	0.000
1999-00		0.000	11,373.816	17,413.000	308.800	14,001.470	43,097.086	36,523.255	0.000	0.000	0.000
2000-01		6,573.831	11,373.816	8,943.007	124.400	6,972.518	33,987.572	33,987.572	0.000	0.000	0.000
2001-02		0.000	11,373.816	13,133.133	219.300	7,023.749	31,749.999	32,601.410	0.000	851.412	0.000
TOTALS		0.000	147,859.608	103,958.442	2,064.991	102,119.391	375,994.503	383,860.813	13,980.200	41,839.591	0.000

FY	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawal From Storage	Supplemental Storage: Storage Account Balance	Replenishment Obligations: WO Transfers & Excluding MWD Exchg	Replenishment Obligations: Equal to Net OverProd	Replenishment Obligations: Difference	WO Transfers & Including MWD Exchg	Equal to Net OverProd	Difference
					10,000.000									
1989-90	0.000	0.000	0.000		10,000.000				4,362.005	9,237.905	(4,875.900)	9,237.905	9,237.905	0.000
1990-91	0.000	0.000	0.000		10,000.000				2,576.087	6,155.187	(3,579.100)	6,155.187	6,155.187	0.000
1991-92	0.000	0.000	0.000		10,000.000				8,586.205	8,811.105	(224.900)	10,491.105	8,811.105	1,680.000
1992-93	0.461	0.461	0.000		10,000.000				2,345.739	0.000	2,345.739	3,456.539	0.000	3,456.539
1993-94	9,416.653	9,416.653	0.000		10,000.000				2,254.647	0.000	2,254.647	2,254.647	0.000	2,254.647
1994-95	4,001.136	4,001.136	0.000		10,000.000				2.094	0.000	2.094	998.894	0.000	998.894
1995-96	0.000	0.000	0.000		10,000.000				12,232.678	11,745.378	487.300	13,745.378	11,745.378	2,000.000
1996-97	0.000	0.000	0.000		10,000.000				15,114.288	5,037.623	10,078.665	15,114.288	5,037.623	10,078.665
1997-98	0.000	0.000	0.000		10,000.000				14,658.705	0.000	14,658.705	14,658.705	0.000	14,658.705
1998-99	0.000	0.000	0.000		10,000.000				15,915.632	0.000	15,915.632	15,915.632	0.000	15,915.632
1999-00	6,573.831	6,573.831	0.000		10,000.000			0.000	10,839.169	0.000	10,839.169	10,839.169	0.000	10,839.169
2000-01	0.000	0.000	0.000	10,000.000	0.000	11,348.230	143.007	11,205.223	8,943.007	0.000	8,943.007	8,943.007	0.000	8,943.007
2001-02	0.000	0.000	0.000		0.000	1,348.230		12,553.453	13,984.545	851.412	13,133.133	13,984.545	851.412	13,133.133
TOTALS	19,992.081	19,992.081	0.000	10,000.000					111,824.752	41,839.591	69,985.161	125,804.952	41,839.591	83,965.361

Appendix B

Pomona History of Operations

FY		Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity Non-Wet	Water Transaction Activity Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right
1989-90		11,215.852	11,215.852	0.000		7,288.231	29,719.935
1990-91	1	11,215.852	11,215.852	0.000		6,949.243	29,380.947
1991-92		11,215.852	11,215.852	0.000		7,017.642	29,449.346
1992-93		11,215.852	11,215.852	0.000	925.951	7,713.801	31,071.456
1993-94		11,215.852	11,215.852	0.000		7,834.337	30,266.041
1994-95		11,215.852	11,215.852	0.000	230.100	7,211.302	29,873.106
1995-96		11,215.852	11,215.852	0.000		4,484.139	26,915.843
1996-97		10,398.923	11,215.852	0.000		6,719.484	28,334.259
1997-98		10,398.923	11,215.852	(12,062.328)	137.452	6,295.397	15,985.296
1998-99		818.926	11,215.852	(1,500.000)		8,329.385	18,862.165
1999-00		298.122	11,215.852	(5,453.190)		12,924.925	18,985.710
2000-01		19.448	11,215.852	300.794		5,916.475	17,452.567
2001-02		0.000	11,215.852	488.211		5,966.994	17,971.057
TOTALS		0.000	145,806.076	(18,246.513)	1,293.513	92,951.329	321,947.706

FY	Production	MWD Exchanges	Net Over-Production 15%-85%	Net Over-Production 100%	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage
1989-90	14,305.500	0.000	0.000	0.000	15,413.435	11,215.852	4,197.583
1990-91	8,700.900	0.000	0.000	0.000	20,680.047	11,215.852	9,464.195
1991-92	7,974.300	2,004.000	0.000	0.000	19,471.046	11,215.852	8,255.194
1992-93	8,736.400	1,593.000	0.000	0.000	20,742.066	11,215.852	9,526.214
1993-94	10,052.300	6,360.700	0.000	0.000	13,853.041	11,215.852	2,637.189
1994-95	12,850.600	3,225.100	0.000	0.000	13,787.406	11,215.852	2,571.554
1995-96	16,516.920	0.000	0.000	0.000	10,398.923	10,398.923	0.000
1996-97	16,731.573	0.000	0.000	0.000	11,602.586	11,215.852	386.734
1997-98	14,124.100	1,841.100	0.000	0.000	0.000	0.000	0.000
1998-99	18,564.043	0.000	0.000	0.000	298.122	298.122	0.000
1999-00	18,966.294	0.000	0.000	0.000	19.448	19.448	0.000
2000-01	17,452.567	0.000	0.000	0.000	0.000	0.000	0.000
2001-02	17,966.185	0.000	0.000	0.000	4.872	4.872	4,966.210
TOTALS	180,652.618	15,023.900	0.000	0.000	129,270.090	89,232.327	47,026.673

FY	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawals From Storage	Supplemental Storage: Storage Account Balance
		25,659.956			
1989-90		30,097.539			
1990-91		39,531.734			
1991-92	608.200	47,178.728			
1992-93		56,704.942			
1993-94	20,000.000	39,342.131			
1994-95	9,131.987	32,781.698			
1995-96	2,976.000	29,805.698			
1996-97		30,192.432			
1997-98	576.377	29,616.055			
1998-99	1,000.000	28,616.055			
1999-00	4,945.810	23,669.245	*		0.000
2000-01	23,669.245	0.000	24,998.745	4,300.794	20,697.951
2001-02	4,966.210	0.000	1,329.510	4,958.211	17,069.250
TOTALS	57,898.829				

FY	Replenishment Obligations: WO Transfers & Excluding MWD Exchg	Equal to Net OverProd	Difference	WO Transfers & Including MWD Exchg	Equal to Net OverProd	Difference
1989-90	0.000	0.000	0.000	0.000	0.000	0.000
1990-91	0.000	0.000	0.000	0.000	0.000	0.000
1991-92	0.000	0.000	0.000	0.000	0.000	0.000
1992-93	0.000	0.000	0.000	0.000	0.000	0.000
1993-94	0.000	0.000	0.000	0.000	0.000	0.000
1994-95	0.000	0.000	0.000	0.000	0.000	0.000
1995-96	0.000	0.000	0.000	0.000	0.000	0.000
1996-97	0.000	0.000	0.000	0.000	0.000	0.000
1997-98	0.000	0.000	0.000	0.000	0.000	0.000
1998-99	0.000	0.000	0.000	0.000	0.000	0.000
1999-00	0.000	0.000	0.000	0.000	0.000	0.000
2000-01	300.794	0.000	300.794	300.794	0.000	300.794
2001-02	483.339	0.000	483.339	483.339	0.000	483.339
TOTALS	784.133	0.000	784.133	784.133	0.000	784.133

Appendix B

San Antonio History of Operations

FY		Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity Non-Wet	Water Transaction Activity Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production	MWD Exchanges	Net Over-Production 15%/85%	Net Over-Production 100%
1989-90		1,506.888	1,506.888	0.000		979.198	3,992.974	684.000	0.000	0.000	0.000
1990-91	1	1,506.888	1,506.888	0.000		933.654	3,947.430	453.300	0.000	0.000	0.000
1991-92		1,506.888	1,506.888	0.000		942.844	3,956.620	942.400	0.000	0.000	0.000
1992-93		1,506.888	1,506.888	0.000	124.405	1,036.375	4,174.557	1,060.900	0.000	0.000	0.000
1993-94		1,506.888	1,506.888	0.000		1,052.570	4,066.346	768.100	0.000	0.000	0.000
1994-95		1,506.888	1,506.888	0.000	25.900	968.863	4,008.539	84.000	0.000	0.000	0.000
1995-96		1,506.888	1,506.888	0.000		902.459	3,916.235	0.000	0.000	0.000	0.000
1996-97		1,506.888	1,506.888	0.000		902.786	3,916.562	234.471	0.000	0.000	0.000
1997-98		1,506.888	1,506.888	(2,500.000)	18.487	845.804	1,378.047	97.675	0.000	0.000	0.000
1998-99		1,280.372	1,506.888	(2,500.000)		850.374	1,137.634	52.183	0.000	0.000	0.000
1999-00		1,085.451	1,506.888	0.000		1,736.467	4,328.806	293.780	0.000	0.000	0.000
2000-01		1,506.888	1,506.888	(3,736.401)		794.880	72.255	72.255	0.000	0.000	0.000
2001-02		0.000	1,506.888	0.000		801.667	2,308.555	931.929	0.000	0.000	0.000
TOTALS		0.000	19,589.544	(8,736.401)	169.773	12,447.941	40,904.560	5,674.993	0.000	0.000	0.000

FY	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawals From Storage	Supplemental Storage: Storage Account Balance
					8,242.259			
1989-90	3,308.974	1,506.888	1,802.086		10,044.345			
1990-91	3,494.130	1,506.888	1,987.242		12,031.587			
1991-92	3,014.220	1,506.888	1,507.332		13,538.919			
1992-93	3,113.657	1,506.888	1,606.769		15,145.688			
1993-94	3,298.246	1,506.888	1,791.358		16,937.046			
1994-95	3,924.539	1,506.888	2,417.651		19,354.697			
1995-96	3,916.235	1,506.888	2,109.347	6,000.000	15,464.044			
1996-97	3,682.091	1,506.888	2,175.203	(2,055.000)	19,694.247			
1997-98	1,280.372	1,280.372	0.000	325.000	19,369.247			
1998-99	1,085.451	1,085.451	0.000	1,825.000	17,544.247			
1999-00	4,035.026	1,506.888	2,528.138	2,650.000	17,422.385			0.000
2000-01	0.000	0.000	0.000	4,913.599	12,508.786	178.620		178.620
2001-02	1,376.626	1,376.626	0.000	4,650.000	7,858.786	178.620		357.240
TOTALS	35,229.567	17,304.441	17,925.129	18,308.599				

FY	Replenishment Obligations: WD Transfers & Excluding MWD Exchg	Equal to Net OverProd	Difference	WD Transfers & Including MWD Exchg	Equal to Net OverProd	Difference
1989-90	0.000	0.000	0.000	0.000	0.000	0.000
1990-91	0.000	0.000	0.000	0.000	0.000	0.000
1991-92	0.000	0.000	0.000	0.000	0.000	0.000
1992-93	0.000	0.000	0.000	0.000	0.000	0.000
1993-94	0.000	0.000	0.000	0.000	0.000	0.000
1994-95	0.000	0.000	0.000	0.000	0.000	0.000
1995-96	0.000	0.000	0.000	0.000	0.000	0.000
1996-97	0.000	0.000	0.000	0.000	0.000	0.000
1997-98	0.000	0.000	0.000	0.000	0.000	0.000
1998-99	0.000	0.000	0.000	0.000	0.000	0.000
1999-00	0.000	0.000	0.000	0.000	0.000	0.000
2000-01	0.000	0.000	0.000	0.000	0.000	0.000
2001-02	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000

Santa Ana River History of Operations

FY		Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity Non-Wet	Water Transaction Activity Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production	MWD Exchanges	Net Over-Production 15%/85%	Net Over-Production 100%
1989-90		804.789	1,301.374	(1,500.000)		845.653	1,451.783	475.000	0.000	0.000	0.000
1990-91	1	976.783	1,301.374	(1,600.000)		606.330	1,284.487	313.300	0.000	0.000	0.000
1991-92		971.187	1,301.374	(1,600.000)		814.256	1,486.817	468.200	0.000	0.000	0.000
1992-93		1,018.617	1,301.374	(1,600.000)	107.439	895.031	1,722.461	552.400	0.000	0.000	0.000
1993-94		1,170.061	1,301.374	(1,600.000)		909.017	1,780.452	592.000	0.000	0.000	0.000
1994-95		1,188.452	1,301.374	(1,600.000)	21.700	836.727	1,748.253	679.700	0.000	0.000	0.000
1995-96		1,068.553	1,301.374	(1,800.000)		520.294	1,090.221	961.790	0.000	0.000	0.000
1996-97		128.431	1,301.374	(600.000)		779.661	1,609.466	723.862	0.000	0.000	0.000
1997-98		885.604	1,301.374	(1,500.000)	15.949	730.650	1,433.577	491.448	0.000	0.000	0.000
1998-99		942.129	1,301.374	(1,200.000)		734.398	1,777.901	818.178	0.000	0.000	0.000
1999-00		959.723	1,301.374	(1,500.000)		1,499.504	2,260.601	692.815	0.000	0.000	0.000
2000-01		1,301.374	1,301.374	(2,000.000)		686.408	1,289.156	767.535	0.000	0.000	0.000
2001-02		521.621	1,301.374	(1,756.404)		692.269	758.860	758.295	0.000	0.000	0.000
TOTALS		0.000	18,917.862	(20,056.404)	145.088	10,749.958	19,894.045	8,294.323	0.000	0.000	0.000

FY	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawals From Storage	Supplemental Storage: Storage Account Balance
					271.977			
1989-90	976.783	976.783	0.000		271.977			
1990-91	971.187	971.187	0.000		271.977			
1991-92	1,018.617	1,018.617	0.000		271.977			
1992-93	1,170.061	1,170.061	0.000		271.977			
1993-94	1,188.452	1,188.452	0.000		271.977			
1994-95	1,068.553	1,068.553	0.000		271.977			
1995-96	128.431	128.431	0.000		271.977			
1996-97	885.604	885.604	0.000		271.977			
1997-98	942.129	942.129	0.000		271.977			
1998-99	959.723	959.723	0.000		271.977			
1999-00	1,567.786	1,301.374	266.412		538.389			0.000
2000-01	521.621	521.621	0.000		538.389	154.245		154.245
2001-02	0.565	0.565	0.000	243.596	294.793	154.245		308.490
TOTALS	11,399.722	11,133.310	266.412	243.596				

FY	Replenishment Obligations: WD Transfers & Excluding MWD Exchg	Equal to Net OverProd	Difference	WD Transfers & Including MWD Exchg	Equal to Net OverProd	Difference
1989-90	0.000	0.000	0.000	0.000	0.000	0.000
1990-91	0.000	0.000	0.000	0.000	0.000	0.000
1991-92	0.000	0.000	0.000	0.000	0.000	0.000
1992-93	0.000	0.000	0.000	0.000	0.000	0.000
1993-94	0.000	0.000	0.000	0.000	0.000	0.000
1994-95	0.000	0.000	0.000	0.000	0.000	0.000
1995-96	0.000	0.000	0.000	0.000	0.000	0.000
1996-97	0.000	0.000	0.000	0.000	0.000	0.000
1997-98	0.000	0.000	0.000	0.000	0.000	0.000
1998-99	0.000	0.000	0.000	0.000	0.000	0.000
1999-00	0.000	0.000	0.000	0.000	0.000	0.000
2000-01	0.000	0.000	0.000	0.000	0.000	0.000
2001-02	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000

Appendix 8

Social Water History of Operations

FY		Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity Non-Wet	Water Transaction Activity Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production	MWD Exchanges	Net Over-Production 105/85%	Net Over-Production 100%	Total Under-Produced	Under Production Balances ——Applications—— Carry-Over to Next Year	Deposit to Storage	Local Storage Withdrawals From Storage	Local Storage Storage Account Balance	Supplemental Storage Deposit to Storage	Supplemental Storage Withdrawals From Storage	Supplemental Storage Storage Account Balance	Replenishment Obligations WU Transfers & Excluding MWD Exchg	Replenishment Obligations Equal to Net Overprod	Replenishment Obligations Difference	WU Transfers & Including MWD Exchg	Equal to Net Overprod	Difference
1990-91		380.221	411.475	0.000		297.383	1,089.080	313.800	0.000	0.000	0.000	545.280	411.475	133.804		188.926				0.000	0.000	0.000	0.000	0.000	0.000
1991-92	1	411.475	411.475	0.000		254.947	1,077.899	365.300	0.000	0.000	0.000	492.599	411.475	81.123		250.049				0.000	0.000	0.000	0.000	0.000	0.000
1992-93		411.475	411.475	0.000		257.456	1,080.405	440.000	144.000	0.000	0.000	495.208	411.475	83.732		333.781				0.000	0.000	0.000	0.000	0.000	0.000
1993-94		411.475	411.475	0.000	33.971	252.998	1,129.919	366.500	96.430	0.000	0.000	716.959	411.475	305.513		639.294				0.000	0.000	0.000	0.000	0.000	0.000
1994-95		411.475	411.475	0.000		257.418	1,110.370	189.400	19.550	0.000	0.000	691.420	411.475	479.944		1,119.238				0.000	0.000	0.000	0.000	0.000	0.000
1995-96		411.475	411.475	0.000	7.000	294.591	1,094.513	250.900	0.000	0.000	0.000	843.813	411.475	432.137		1,551.375				0.000	0.000	0.000	0.000	0.000	0.000
1996-97		411.475	411.475	0.000		184.510	987.482	305.710	0.000	0.000	0.000	681.752	411.475	270.278	500.000	1,321.653				0.000	0.000	0.000	0.000	0.000	0.000
1997-98		411.475	411.475	0.000		240.516	1,059.470	575.551	0.000	0.000	0.000	495.809	411.475	82.133	(373.200)	1,770.984				0.000	0.000	0.000	0.000	0.000	0.000
1998-99		411.475	411.475	0.000	5.045	230.858	1,058.953	379.849	0.000	0.000	0.000	670.104	411.475	258.629	750.000	1,204.612				0.000	0.000	0.000	0.000	0.000	0.000
1999-00		411.475	411.475	0.000		232.208	1,055.158	242.521	0.000	0.000	0.000	812.337	411.475	400.861		1,605.473				0.000	0.000	0.000	0.000	0.000	0.000
1999-00		411.475	411.475	0.000		473.927	1,299.879	452.052	0.000	0.000	0.000	814.827	411.475	403.351	2,008.824	0.000			0.000	0.000	0.000	0.000	0.000	0.000	0.000
2000-01		411.475	411.475	0.000		218.943	1,039.895	372.027	0.000	0.000	0.000	687.868	411.475	256.392		256.392	2,008.824	(48.750)	2,147.075	0.000	0.000	0.000	0.000	0.000	0.000
2001-02		411.475	411.475	0.000		218.795	1,041.745	224.849	0.000	0.000	0.000	816.902	411.475	405.426		661.818	48.750		2,196.325	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS		0.000	5,349.188	0.000	45.014	3,398.819	14,111.754	4,959.855	220.580	0.000	0.000	8,951.508	5,349.188	3,602.320	2,975.824					0.000	0.000	0.000	0.000	0.000	0.000

Upland History of Operations

FY	Carry-Over From Prior Year Operations	Assigned Share of Safe Yield	Water Transaction Activity: Non-Wet	Water Transaction Activity: Wet Water	Ag Pool Safe Yield Reallocation	Annual Production Right	Production	MWD Exchanges	Net Over-Production 15%/85%	Net Over-Production 100%
1989-90	2,852.401	2,852.401	0.000		1,853.534	7,558.336	2,445.600	0.000	0.000	0.000
1990-91	1 2,852.401	2,852.401	0.000		1,767.323	7,472.125	3,145.100	0.000	0.000	0.000
1991-92	2,852.401	2,852.401	0.000		1,784.718	7,489.520	2,585.500	237.000	0.000	0.000
1992-93	2,852.401	2,852.401	0.000	235.489	1,961.764	7,902.055	2,372.600	935.800	0.000	0.000
1993-94	2,852.401	2,852.401	0.000		1,992.419	7,697.221	2,182.200	3,696.100	0.000	0.000
1994-95	1,818.921	2,852.401	0.000	55.300	1,833.970	6,560.592	3,010.100	0.000	0.000	0.000
1995-96	2,852.401	2,852.401	0.000		1,140.401	6,845.203	2,489.610	1,497.000	0.000	0.000
1996-97	2,852.401	2,852.401	0.000		1,708.891	7,413.693	1,887.134	0.000	0.000	0.000
1997-98	2,852.401	2,852.401	0.000	34.957	1,601.029	7,340.789	1,923.610	1,251.500	0.000	0.000
1998-99	2,852.401	2,852.401	0.000		1,609.681	7,314.483	2,275.622	0.000	0.000	0.000
1999-00	2,852.401	2,852.401	0.000	69.200	3,277.155	9,051.157	1,726.969	0.000	0.000	0.000
2000-01	2,852.401	2,852.401	0.000	45.800	1,504.718	7,255.320	2,580.132	0.000	0.000	0.000
2001-02	2,852.401	2,852.401	0.000	57.200	1,517.566	7,279.568	2,590.151	0.000	0.000	0.000
TOTALS	0.000	37,081.213	0.000	497.946	23,553.169	97,180.062	31,214.328	7,617.400	0.000	0.000

FY	Under Production Balances: Total Under-Produced	Applications: Carry-Over to Next Year	Applications: Deposit to Storage	Local Storage: Withdrawals From Storage	Local Storage: Storage Account Balance	Supplemental Storage: Deposit to Storage	Supplemental Storage: Withdrawals From Storage	Supplemental Storage: Storage Account Balance
					2,225.719			
1989-90	5,112.736	2,852.401	2,260.335		4,486.054			
1990-91	4,327.025	2,852.401	1,474.624		5,960.678			
1991-92	4,667.020	2,852.401	1,814.619		7,775.297			
1992-93	4,593.655	2,852.401	1,741.254		9,516.551			
1993-94	1,818.921	1,818.921	0.000		9,516.551			
1994-95	3,550.492	2,852.401	698.091		10,214.642			
1995-96	2,858.593	2,852.401	6.192	5,058.000	5,162.834			
1996-97	5,526.559	2,852.401	2,674.158	(1,876.800)	9,713.792			
1997-98	4,165.678	2,852.401	1,313.277	1,426.848	9,600.221			
1998-99	5,038.861	2,852.401	2,186.460		11,786.681			
1999-00	7,324.188	2,852.401	4,471.787	5,286.680	10,971.788			0.000
2000-01	4,675.188	2,852.401	1,822.787	10,971.788	1,822.787	11,309.918		11,309.918
2001-02	4,689.417	2,852.401	6,178.452	8,000.000	1.239	339.130	4,141.436	7,507.612
TOTALS	58,348.333	36,047.733	26,642.036	28,866.516				

FY	Replenishment Obligations: WQ Transfers & Excluding MWD Exchg	Equal to Net OverProd	Difference	WQ Transfers & Including MWD Exchg	Equal to Net OverProd	Difference
1989-90	0.000	0.000	0.000	0.000	0.000	0.000
1990-91	0.000	0.000	0.000	0.000	0.000	0.000
1991-92	0.000	0.000	0.000	0.000	0.000	0.000
1992-93	0.000	0.000	0.000	0.000	0.000	0.000
1993-94	0.000	0.000	0.000	0.000	0.000	0.000
1994-95	0.000	0.000	0.000	0.000	0.000	0.000
1995-96	0.000	0.000	0.000	0.000	0.000	0.000
1996-97	0.000	0.000	0.000	0.000	0.000	0.000
1997-98	0.000	0.000	0.000	0.000	0.000	0.000
1998-99	0.000	0.000	0.000	0.000	0.000	0.000
1999-00	0.000	0.000	0.000	0.000	0.000	0.000
2000-01	0.000	0.000	0.000	0.000	0.000	0.000
2001-02	0.000	0.000	0.000	0.000	0.000	0.000
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000

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APPENDIX C

Appendix C

Water Transfers* by Year By Zone – Zone 1					
Production Year Ending	From Entity	From Mgmt Zone	To Entity	To Mgmt Zone	Quantity
1989	MARYGOLD	3	MVWD	1	800.0
1990	CHILLS(WW8)	1	CHINO	1	257.1
1990	CHILLS(WW8)	1	MVWD	1	477.6
1990	MARYGOLD	3	MVWD	1	800.0
1991	CHILLS(WW8)	1	CHINO	1	363.8
1991	CHILLS(WW8)	1	MVWD	1	675.6
1996	MVIC	1	CHINO	1	500.0
1996	UPLAND	1	CHINO	1	548.0
1997	WEST END CON	1	UPLAND	1	11,876.8
1997	WEST END CON	1	SOCAL	1	1,123.2
1997	CCWD	2	CHINO	1	1,233.0
1997	JCSD	3	SAWCO	1	4,555.0
1999	SAWCO	1	CHINO	1	1,500.0
2000	SAWCO	1	CHINO	1	2,000.0
2000	MVIC	1	MVWD	1	200.0
2000	CHILLS	1	MVWD	1	500.0
2001	SAWCO	1	CHINO	1	2,700.0
2002	UPLAND	1	MVWD	1	3,000.0
2002	MVIC	1	MVWD	1	2,500.0

* Not exhaustive - transfers involving only storage may not be included
Does not include MWD related transfers

Appendix C

Water Transfers* by Year By Zone – Zone 2					
Production Year Ending	From Entity	From Mgmt Zone	To Entity	To Mgmt Zone	Quantity
1989	WSBCWD	2	CCWD	2	1,076.2
1989	FUWC	2	CCWD	2	22,701.5
1990	MVWD	1	CCWD	2	500.0
1990	FUWC	2	CCWD	2	3,815.5
1991	FUWC	2	CCWD	2	6,908.2
1991	FUWC	2	FWC	2	3,645.2
1991	FUWC	2	CCWD	2	4,156.7
1992	FUWC	2	CCWD	2	9,827.7
1994	POMONA	1	FWC	2	5,592.0
1994	POMONA	1	ONTARIO	2	5,592.0
1994	MARYGOLD	3	FWC	2	3,000.0
1995	POMONA	1	SCE	2	1,800.0
1995	POMONA	1	ONTARIO	2	5,000.0
1995	CCWD	2	FWC	2	3,740.0
1996	SOCAL	1	FWC	2	500.0
1996	UPLAND	1	ONTARIO	2	2,000.0
1996	POMONA	1	SCE	2	2,976.0
1996	MARYGOLD	3	FWC	2	2,500.0
1997	SOCAL	1	EDISON	2	750.0
1997	SAWCO	1	ONTARIO	2	2,500.0
1997	SUNKIST	2	ONTARIO	2	5,966.6
1997	MARYGOLD	3	FWC	2	700.0
1997	M.WCO GLEN AV	3	ONTARIO	2	108.2
1998	MVIC	1	ONTARIO	2	500.0
1998	SAWCO	1	ONTARIO	2	2,500.0
1998	POMONA	1	ONTARIO	2	4,800.0
1998	POMONA	1	ONTARIO	2	5,858.7
1998	WSBCWD	2	ONTARIO	2	1,000.0
1998	CCWD	2	FWC	2	9,773.7
1998	CCWD	2	EDISON	2	1,800.0
1998	MARYGOLD	3	FWC	2	1,200.0
1999	CHILLS	1	ONTARIO	2	9,000.0
1999	SAWCO	1	ONTARIO	2	2,500.0
1999	MVIC	1	ONTARIO	2	500.0
1999	POMONA	1	RELIANT	2	1,000.0
1999	POMONA	1	RELIANT	2	1,500.0
1999	CCWD	2	FWC	2	9,173.6
1999	CCWD	2	ONTARIO	2	3,915.6
1999	CCWD	2	RELIANT	2	750.0
1999	MARYGOLD	3	FWC	2	1,200.0

Appendix C

Water Transfers* by Year By Zone – Zone 2					
Production Year Ending	From Entity	From Mgmt Zone	To Entity	To Mgmt Zone	Quantity
2000	UPLAND	1	ONTARIO	2	5,000.0
2000	MVWD	1	ONTARIO	2	1,000.0
2000	MVWD CO-OP	1	ONTARIO	2	1,100.0
2000	POMONA	1	ONTARIO	2	7,900.0
2000	CHILLS	1	ONTARIO	2	1,368.3
2000	UPLAND	1	ONTARIO	2	289.7
2000	MVWD	1	ONTARIO	2	152.1
2000	CHINO	1	ONTARIO	2	602.9
2000	POMONA	1	RELIANT	2	2,500.0
2000	CCWD	2	FWC	2	19,746.8
2000	MARYGOLD	3	FWC	2	1,200.0
2001	POMONA	1	ONTARIO	2	2,000.0
2001	CHILLS	1	ONTARIO	2	4,500.0
2001	SAWCO	1	ONTARIO	2	1,300.0
2001	SAWCO	1	ONTARIO	2	1,000.0
2001	POMONA	1	FWC	2	2,000.0
2001	CCWD	2	FWC	2	14,000.0
2001	MARYGOLD	3	FWC	2	1,200.0
2001	SAWCO	1	FWC	2	3,000.0
2001	CSI	2	RELIANT	2	1,300.0
2001	WSBCWD	2	CCWD	2	500.0
2002	POMONA	1	ONTARIO	2	2,500.0
2002	SAWCO	1	FWC	2	1,500.0
2002	UPLAND	1	ONTARIO	2	5,000.0
2002	SAWCO	1	ONTARIO	2	2,500.0
2002	POMONA	1	FWC	2	2,000.0
2002	CCWD	2	FWC	2	10,000.0
2002	NICHOLSON TR	2	FWC	2	4.0
2002	FUWC	2	FWC	2	1.0
2002	WSBCWD	2	CCWD	2	500.0
2002	CSI	2	RELIANT	2	2,600.0
2002	JCSD	3	ONTARIO	2	2,500.0
2002	MARYGOLD	3	FWC	2	1,200.0

* Not exhaustive - transfers involving only storage may not be included
Does not include MWD related transfers

Appendix C

Water Transfers* by Year By Zone -- Zone 3					
Production Year Ending	From Entity	From Mgmt Zone	To Entity	To Mgmt Zone	Quantity
1990	SARWC	3	JCSD	3	1,300.0
1991	SARWC	3	JCSD	3	1,800.0
1992	SARWC	3	JCSD	3	1,600.0
1993	SARWCO	3	JCSD	3	1,600.0
1994	POMONA	1	JCSD	3	5,592.1
1994	POMONA	1	NORCO	3	3,223.8
1994	WSBCWD	2	JCSD	3	1,094.4
1994	SARWC	3	JCSD	3	1,600.0
1995	MVIC	1	JCSD	3	500.0
1995	POMONA	1	NORCO	3	1,200.0
1995	CCWD	2	JCSD	3	7,200.0
1995	WSBCWD	2	JCSD	3	1,000.0
1995	ONTARIO	2	JCSD - CO-OI	3	996.8
1995	SARWCO	3	JCSD	3	1,600.0
1996	SAWCO	1	JCSD	3	6,000.0
1996	UPLAND	1	JCSD	3	2,500.0
1996	WSBCWD	2	JCSD	3	1,000.0
1996	SARWCO	3	JCSD	3	1,800.0
1997	SARWCO	3	JCSD	3	600.0
1998	POMONA	1	JCSD	3	2,000.0
1998	SAWCO	1	JCSD	3	325.0
1998	CCWD	2	JCSD	3	1,575.0
1998	SARWCO	3	JCSD	3	1,500.0
1999	SAWCO	1	JCSD	3	325.0
1999	CCWD	2	JCSD	3	3,000.0
1999	SARWCO	3	JCSD	3	1,200.0
2000	SAWCO	1	JCSD	3	650.0
2000	CCWD	2	JCSD	3	5,000.0
2000	SARWCO	3	JCSD	3	1,500.0
2001	SAWCO	1	JCSD	3	650.0
2001	SARWCO	3	JCSD	3	2,000.0
2002	SAWCO	1	JCSD	3	650.0
2002	SARWCO	3	JCSD	3	2,000.0

* Not exhaustive - transfers involving only storage may not be included
Does not include MWD related transfers

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CHINO BASIN WATERMASTER

September 11, 2003

10:00 a.m. – Appropriative & Non-Agricultural Pools
1:00 p.m. – Agricultural Pool Meeting

II. BUSINESS ITEMS

B. LONG TERM DESALTER REPLENISHMENT AND RELATED ISSUES

CHINO BASIN WATERMASTER

8632 Archibald Avenue, Suite 109, Rancho Cucamonga, Ca 91730
Tel: 909.484.3888 Fax: 909.484.3890 www.cbwm.org

JOHN V. ROSSI
Chief Executive Officer

STAFF REPORT

DATE: **September 11, 2003**

TO: **Pool Committee Members**

SUBJECT: **Request from Chino Desalter Authority regarding future Desalter Expansion Replenishment Obligation and Other Issues**

SUMMARY

Issue – The Chino Desalter Authority has requested information regarding how replenishment obligations and related issues will be handled for the ultimate expansions of the Desalters

Recommendation – Staff recommends that the Pools consider forming an Ad Hoc Committee to:

1) Develop a recommended list of issues and a process by which to consider the issues.
2) Submit recommendation to Watermaster process for review and approval.

Fiscal Impact – A fiscal analysis can be performed, if necessary, once the Pools have taken action.

DISCUSSION

The Watermaster has received several letters (see attached) from the Jurupa Community Services District on behalf of the Chino Desalter Authority requesting that the following items be agendized and considered for action by the Pools:

1) Determination of interest by members of the Appropriative Pool with respect to the future purchase of water from Chino I and II Desalters.

2) Assuming it is cost-effective to expand Chino I and II, the likelihood and opportunities relative to obtaining grant funding for the expansion facilities and pipelines to distribute product water to other Appropriative Pool members. If direct connections to other Appropriators are not presently cost-effective or not desirable for other reasons, expanding the capacity of the desalters for purposes of enabling in-lieu exchanges rater than by direct deliveries. The sale of desalter water is addressed in section 7.6 of the Peace Agreement.

3) The process for determining in accordance with Section 7.5 of the Peace Agreement whether water produced from the expansion of the desalters will be subject to a replenishment water obligation.

4) Whether Watermaster parties' participation in future Desalters can be fashioned without impairing Desalter production objectives in the context of the Desalters pivotal role in the OBMP.

Staff and Mr. Dave Argo met with representatives of the CDA to better understand this request. As the CDA contemplates sizing of certain key facilities related to the expansion of Desalter I and the construction of Desalter II, engineers designing the facilities have indicated the wisdom in potentially upsizing facilities. The

incremental costs of upsizing certain facilities now is not as great as the cost to provide for the additional capacity in the future. As the costs and benefits of such upsizing are being considered, a question has arisen as to what costs should be factored for replenishment obligations for the next expansion.

In August the Appropriative Pool directed staff to work with several appropriators to develop the beginning of a list of related issues. A meeting was held on July 23rd at the Watermaster's office. The following are the significant issues that were discussed:

- How will the costs and benefits be allocated on the next expansion of the Desalters?
- Does it make sense to upsize certain trunk facilities now to save costs?
- How much, if any, of the next expansions' water replenishment obligation will be covered by Watermaster parties?
- Who should be involved in the planning of the next expansion? Who will be the owners and/or purchasers of water from the next plant?
- How will the rapidly developing southern portions of the basin affect the timing of the next expansion?
- What will the report to the Court in 2005 need to contain relative to the next expansion?
- Water quality objectives related to the Desalter expansion will be a factor.
- The basin's Storage and Recovery Project(s) will be a significant factor in the next expansion.
- Hydraulic Control must be considered as well.
- As the Desalters are base loaded, what affect will the expansion have on future shifting/in-lieu capabilities?

SUMMARY

Given the complexity of these issues, the requirement to provide a report to the Court in 2005, and the request by the CDA for input from the Watermaster on the replenishment obligation issue, staff recommends that an Ad Hoc Committee be formed to meet on a recurring basis to work through the issues. It is further recommended that the Pools consider forming an Ad Hoc Committee to:

- Develop a recommended list of issues and a process by which to consider the issues.
- Submit a recommendation to the Watermaster process for review and approval, so a scope and process can be approved for the Committee.

August 15, 2003

Mr. John Rossi
Chief Executive Officer
Chino Basin Watermaster
8632 Archibald Ave., Suite 109
Rancho Cucamonga, Ca. 91730

RE: BASIN MANAGEMENT OBJECTIVES-STORAGE/RECOVERY PROGRAM

Dear Mr. Rossi:

The presentations at the Appropriative Pool meeting held August 14th, by Watermaster Consultants, Mark Wildermuth and Dave Argo on the Draft Technical Memorandum on the Dry-Year Yield findings related to operating storage and safe storage, and the Storage & Recovery Master Plan scope of work, respectively, reinforces that the desalters in the southerly part of the basin are the catalyst to all other OBMP programs.

It is fortunate that simultaneously with the efforts by the Watermaster to proceed with the OBMP, there is tremendous growth occurring in the eastern portion of the Basin and the Chino Basin Dairy Preserve, which provides Watermaster the opportunity to work with the agencies within these areas that are planning for, and implementing, Master Water Plans.

As one of these agencies affected by rapid growth, Jurupa Community Services District (JCSD) is evaluating the feasibility and cost of several alternatives directed to increasing the physical and water supply reliability of its water system. This includes participation in the Storage/Recovery Program and direct connections, or interconnections with other adjacent agencies, to surface/imported water supplies. Access to surface/imported supplies would enable JCSD to shift or cycle groundwater production as necessary in connection with the storage and recovery of stored water in the Basin.

JCSD's participation in the storage/recovery program raises critical Basin management issues related to the operation and capacity of the Basin desalters, which for cost and production sustainability purposes are the base/primary supply for all CDA members. Although JCSD continues to add connections and thus will have increasing water supply demands over the next decade or two, shifting production from the desalters which reduces the amount of desalter production, or reduces the quantity of water that would have otherwise been taken from the desalters, may be inconsistent with Basin management objectives concerning the expected amount or rate of desalter production. This is a fundamental fact, I am sure, for all CDA members planning for, and implementing Master Water Plans to accommodate the accelerated growth.

Considering the manifold purposes of the Basin desalters, which include: 1) remediation for legacy groundwater quality impacts (i.e., Kaiser); 2) maintaining hydraulic control; 3) recycled water recharge mitigation; and, 4) meeting mitigation requirements as required by the proposed TDS/nitrogen Basin Plan Amendment, it is clear JCSD's participation in the Storage/Recovery Program, and resulting shift or changes in desalter production, must be consistent with water quality targets/mitigation associated with the operation of the desalters. The fundamental question is whether such participation can be fashioned without impairing desalter production objectives in the context of the desalters pivotal mitigation role in the OBMP.

The report you are drafting, subsequent to our recent meeting (requested by the Appropriative Pool in July), will be instrumental in the forward planning for water supplies to the areas changing from agricultural use to municipal and industrial use.

If there is any information you require for the report, please contact me. I look forward to receiving the draft report for review.

Sincerely,

Carole A. McGreevy
General Manager

Copy: Dave Argo, B&V
Mark Wildermuth, WE.Inc.
CDA Tech Committee
Tom O'Neill
John Schatz
Sam Gershon
Board of Directors

7020.admin.ltr.jrossi.re.futdesal.replen.stor&recovmp

Jurupa
Community Services District

May 6, 2003

Mr. John Rossi
Chief Executive Officer
Watermaster
8632 Archibald Avenue, Suite 109
Rancho Cucamonga, CA 91730

RE: EXPANSION OF CHINO I AND CHINO II DESALTERS

Dear Mr. Rossi:

The engineer for the CDA, RBF Consulting, has advised the Project Managers (JCSD & IEUA) that if an expansion of Chino I (2MGD) and Chino II (8MGD) is contemplated in the future, there are likely cost-savings if upsizing of pipelines is performed as part of the current project. The design and construction of the desalters is addressed in Section 7.3 of the Peace Agreement.

This is to request that you place the following items on the Pools' agenda for consideration and action:

1. Determination of interest by members of the Appropriative Pool with respect to the future purchase of water from Chino I and II Desalters.

2. Assuming it is cost-effective to expand Chino I and II, the likelihood and opportunities relative to obtaining grant funding for the expansion facilities and pipelines to distribute product water to other Appropriative Pool members. If direct connections to other Appropriators are not presently cost-effective or not desirable for other reasons, expanding the capacity of the desalters for purposes of enabling in-lieu exchanges rather than by direct deliveries. The sale of desalter water is addressed in Section 7.6 of the Peace Agreement.

3. The process for determining in accordance with Section 7.5 of the Peace Agreement whether water produced from the expansion of the desalters will be subject to a replenishment water obligation.

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RBF has informed the Project Managers that a decision needs to be made within two months regarding upsizing the pipelines currently under design.

Should you have any questions concerning this request, please contact either Tom O'Neill or myself at (909) 685-7434.

Sincerely,

Carole A. McGreevy by Jan Zevan

Carole A. McGreevy
General Manager

Copy: Tom O'Neill
Craig Parker, IEUA
John Schatz

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