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CHINO BASIN WATERMASTER

BEFORE THE

STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA

In the Matter of Water Right Applications 31165 and 31370 of San Bernardino Valley Municipal Water District and Western Municipal Water District of Riverside County; Application 31174 of Orange County Water District; Application 31369 of Chino Basin Watermaster; Application 31371 of San Bernardino Valley Water Conservation District; and Application 31372 and Wastewater Change Petition WW-0045 of the City of Riverside

WRITTEN TESTIMONY OF MARK WILDERMUTH

I. INTRODUCTION

I am Mark Wildermuth, President and CEO of Wildermuth Environmental, Inc. I have 31 years experience in water resources engineering and planning including: surface and groundwater hydrology and hydraulics; water resources planning; surface water and groundwater computer simulation modeling; water rights; surface water and groundwater quality; flood plain management; municipal recycled water discharge impacts in receiving waters; and water supply and flood control facility design. I have extensive expertise in the development of water resources management plans for groundwater basins and watersheds in southern California.

I received a B.S. in Engineering from the University of California at Los Angeles in 1975, and a M.S. in Water Resources Engineering from the University of California at Los Angeles in

1976. I am a registered professional civil engineer in the State of California. My full résumé is attached hereto as CBWM Exhibit 2-2.

I and my consulting firm, Wildermuth Environmental, Inc., act as hydrologists for the Chino Basin Watermaster. I have been actively involved in the Chino Basin for 20 years and am the person most familiar with Watermaster's current activities and proposed appropriation under its Application No. 31369.

My testimony addresses three issues in regard to Chino Basin Watermaster's Application 31369: water availability, water quality and the impacts on groundwater contaminant plumes. These issues are described as Key Issues 1, 2, and 6, respectively, in the February 16, 2007 Notice of Public Hearing on Application 31369. My testimony proceeds as a series of questions and answers regarding these issues.

II. WATER AVAILABILITY

A. What were the modeling tools that you used to estimate the water available for diversion and recharge, the volume of water that can be recharged, and the impacts of Watermaster's application 31369 on the discharge of the Santa Ana River and its tributaries?

Back in the early 1990s, I was asked by the Chino Basin Water Conservation District (CBWCD) to estimate the stormwater recharge in the spreading basins within their jurisdiction. These facilities include the Upland, Montclair, Brooks, Chris, and Lower Cucamonga Creek Basins. These facilities are shown in Figure 1. At the time, there were no stream discharge measurement stations to estimate inflow, and the basins were not instrumented. If there was stream discharge and operational information, it would not be representative of the then current or the future conditions because the land uses and drainage systems in the watersheds that are tributary to these basins have been changing over time.

To respond to the questions posed by the CBWCD, we developed a strategy to develop long-term stationary time histories of stormwater discharge that could be diverted into each basin, route these storm discharges through each basin using the storage and hydraulic characteristics of each basin, and estimate the volume of water recharged at each basin (Mark J. Wildermuth, Water Resources Engineer, 1995). The effect of upstream diversions for recharge on downstream discharge and recharge at downstream basins was also evaluated. For the CBWCD investigation, we estimated daily stormwater discharge and recharge throughout the study area for the period 1934 through 1974; a period of 41 years. Daily isohyetal maps were developed to drive the runoff model. Current and future land use maps and drainage plans were developed and used to estimate stormwater discharge for current future planning conditions. I personally developed and applied the runoff model.

The storage and hydraulic properties of existing basins and for postulated new or improved basins were developed. A drainage network was developed to route the daily discharge through the study area watershed. The drainage network consisted of links (channel segments and detention/recharge facilities) and nodes (discharge entry points for runoff from the land surface and channel junctions). These discharges were then routed through the drainage systems. The recharge basins were included in the drainage system. Water retained in the recharge basins recharged the groundwater basins or was lost to evaporation. I developed the discharge routing model that was used to route the stormwater discharge and estimate stormwater recharge. The runoff and routing models and supporting software tools were referred to as the Chino Recharge Model.

The daily discharge and recharge estimates were aggregated to provide monthly and annual estimates. Basic statistics were estimated and used to characterize the water available for diversion, actual recharge, potential for recharge, and water lost to evaporation. Sensitivity studies were done to evaluate the effects of daily percolation rates at each basin, changes in facility design and operation, and the effects of upstream recharge basins on downstream basins.

As a consequence of this effort, the CBWCD initiated a more thoughtful and aggressive program for managing recharge in their basins. They installed water level sensors in their basins that are used to estimate inflow, recharge, and percolation rates.

The Chino Basin Watermaster subsequently joined with the CBWCD and expanded the modeling investigation and instrumentation effort to the entire Chino Basin Watershed. The CBWCD and the Watermaster developed a two-phase investigation to maximize stormwater and supplemental water recharge in Chino Basin. The results of the subsequent effort were documented

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in the Phase I Recharge Master Plan.[1] Wildermuth's models were used to estimate the total discharge potentially available for diversion, the recharge capacity for existing and proposed recharge facilities, and the other information that was included in the Chino Basin Watermaster's application 31369.

The Chino Recharge Model was expanded to the entire Santa Ana Watershed in the early 2000s and was modified to include the simulation of water quality; principally, total dissolved solids and nitrogen. The modeling domain is shown in Figure 2. The resulting set of models and support software was renamed the Waste Load Allocation Model (WLAM). This model is the current model Watermaster uses to evaluate surface water discharge, recharge, and downstream impacts in the Santa Ana River and its tributaries. The same basic processes used to develop the models for the Chino Basin were used for the entire watershed with three important extensions: the inclusion of the reservoir operating rules for the Seven Oaks and Prado dams, the extension of the study period from 41 years to 50 years (1950 through 1999), and the inclusion of a water quality model. The WLAM has been adopted by the Santa Ana Regional Water Quality Control Board and the major watershed stakeholders as the primary tool for the evaluation of waste load allocations on the Santa Ana River and is used by Regional Board staff to evaluate the discharge and water quality impacts from proposed changes in the discharge requirements for all recycled water discharges to the Santa Ana River. The results were incorporated into the 2004 Basin Plan Amendment[2] that was approved by the Santa Ana Regional Water Quality Control Board and the State Water Resources Control Board.

B. <u>What was your basic approach to estimate the water available for diversion and recharge and downstream impacts?</u>

We applied the WLAM as it was developed for the 2004 Basin Plan Amendment to estimate the daily discharge, water available for diversion and recharge, recharge, and downstream changes in discharge that would result from upstream diversion and recharge. We used 50 years of precipitation data and contemporaneous, gauged stream discharge data for the period 1950 through

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[1] CBWM Exhibit 1-11: Chino Basin Recharge Master Plan, Phase 1 Final Report, January 1998.
[2] CBWM Exhibit 2-5: Basin Plan Amendment (RWQCB Order 2004-0001)

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1999.[3] We used the projected 2010 estimates of recycled water discharge to the Santa Ana River as described in the 2004 Basin Plan Amendment. The land use used in this work corresponded to 1993. Using these assumptions, we ran the model under two diversion conditions: a no project condition that corresponds to no diversions or recharge on behalf of Watermaster or Muni/Western and a maximum diversion condition where Watermaster and Muni/Western divert the maximum requested under their applications. The results of these model simulations were summarized into tables and charts to characterize the water available for diversion and recharge, the volume recharged, and the impacts on downstream recharge.

C. What are the major planning assumptions considered in the model runs and their implications?

Chino Basin Watermaster Diversions per Application No. 31369. For the no project or baseline case, we assumed that only the stormwater detention and conservation facilities that existed prior to the construction of the Chino Basin Facilities Improvement Program and that are described in the Watermaster's Application No. 31369. For the "with" project condition we assumed that all the recharge improvements that are included in Watermaster Application No. 31369 were constructed and operated at their maximum rates of diversion and recharge.

Muni/Western Application Nos. 31165 and 31370 and the Conservation District Application No. 31371. Diversions Water Rights Applications. For the no project condition we assumed that the Seven Oaks dam was operated pursuant to the Water Control Manual, Seven Oaks Dam developed by the Army Corps of Engineers (USACOE, 2000) and that the Prior Rights Parties always diverted all the discharge in the River up to a maximum diversion rate of 88 cfs. For the "with" project condition we assumed that the Prior Rights Parties always diverted all the discharge in the River up to a maximum diversion rate of 88 cfs and that Muni/Western and the Conservation District would divert any additional water available after the first 88 cfs up to a capacity of 1,500 cfs. We used the same storage elevation relationships, target storages, and reservoir evaporation rates as assumed in Appendix A, Santa Ana River Water Rights Applications for Supplemental Water Supply Draft environmental Impact Report (Muni/Western, 2004).

[3] CBWM Exhibit 2-9: 50 Year Chino Rain Gage and Daily Precipitation

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Riverside Application No. 31372. We assumed that the city of Riverside did not reduce their discharge pursuant to their application. This was done for two reasons. First, the SWRCB, upon review of the City's application, asked the City to withdraw their application and request a change in point of use for their recycled water. Second, the City's Wastewater Change Petition proposal is of too recent an origin to have allowed us to incorporate it into the WLAM.

2010 Projections of Recycled Water Discharge. The locations of recycled water discharge to the Santa Ana River are shown in Figure 3. For the no and "with" project conditions, we assumed that recycled discharges to the Santa Ana River were identical to what is contained in Figure 4, which are the discharge projections adopted in the 2004 Basin Amendment for the Santa Ana River (RWQCB Resolution R8-2004-0001).

1993 Landuse Conditions. The land use assumed in the WLAM projections was based on available Southern California Association of Governments (SCAG) information for 1993. These land uses are shown graphically in Figure 5. Some of the undeveloped land shown in Figure 5 has been developed or will be developed by 2010. The implication to the model projections is that the runoff estimates from the valley floor areas will be slightly underestimated, which means there will be more stormwater discharge in the drainage systems available for diversion and recharge and in the Santa Ana River. That is why the WLAM runoff projections are conservatively low.

D. How much water is available for diversion and recharge in the Chino Basin?

Using the WLAM daily discharge projections for the precipitation period 1950 through 1999 for the no project and "with" project alternatives, we can make the following estimates regarding stormwater available for diversion, stormwater recharged, and stormwater bypassed by the recharge facilities:

- The average annual stormwater available for diversion is 46,300 acre-ft yr
- The average annual stormwater recharge that is estimated to have occurred for the no project alternative is about 5,700 acre-ft/yr
- The average annual stormwater recharge that is projected to occur for the "with" project alternative is about 18,400 acre-ft/yr, an increase of about 12,700 acre-ft/yr
- The average annual stormwater discharge that bypasses the recharge facilities and

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discharges into the Santa Ana River for the "with" project alternative is about 27,900 acre-ft/yr

It should be emphasized that the above values are averages used for planning and analysis purposes. The actual availability and discharge amount will vary greatly in any given year. It is important, in order to achieve Watermaster's planning goals, that it retain the discretion to divert and recharge as much stormwater as possible up to the full amount of the rights sought.

E. <u>When and under what circumstances is this water available?</u>

This water is only available when stormwater and snowmelt discharges are available and can be diverted into Watermaster's recharge facilities

F. <u>What metrics did you use to describe the changes in discharge in the Santa Ana River and its Chino Basin tributaries?</u>

We constructed flow duration curves that describe the cumulative probability that a discharge is less then or equal to specified value. We also developed tables that summarize the total discharge in the Santa Ana River at MWD Crossing and below Prado Dam as well as the average monthly discharge at these locations. The discharge projections used to develop this information came from a 50-year daily discharge projection that represents a stationary time history of daily discharge for 2010 conditions in the watershed. These projections were developed for the no project and "with" project alternative.

G. <u>What are the specific discharge impacts to the discharge in the Santa Ana River and its Chino Basin tributaries?</u>

Figures 7 through 12 contain flow duration curves for selected locations on the tributaries of the Santa Ana River in the Chino Basin and the Santa Ana River at the MWD Crossing and below Prado Dam. Figure 7 contains the flow duration curves for the no and "with" project alternatives for San Sevaine Creek just upstream of the Santa Ana River. The blue and red lines on this figure show the flow duration curve for the no project and "with" project alternatives, respectively. The San Sevaine Creek channel is projected to be dry for both alternatives about 75 percent of the time. At the 90 percent point, the discharge for the no project alternative would be about 25 cfs, and the corresponding discharge for the "with" project alternative would be about 5 cfs; a difference of about 20 cfs. This difference is attributable to the stormwater diverted to recharge basins for

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temporary storage and recharge. Another way to describe this is to say that ten percent of the time (~36 days per year), the reduction in discharge will be greater than or equal to 20 cfs; 90 percent of the time (~329 days), the reduction in discharge will be less than 20 cfs; and 75 percent of the time (~274 days), the reduction in discharge will be negligible or zero.

Figure 8 contains the flow duration curves for the no and "with" project alternatives for Day Creek just upstream of the Santa Ana River. The Day Creek channel is projected to be dry for both alternatives about 50 percent of the time. At the 80 percent point, the discharge for the no project alternative would be about 8 cfs, and the corresponding discharge for the "with" project alternative would be about 2 cfs; a difference of about 6 cfs. At the 90 percent point, the discharge for the no project alternative would be about 18 cfs, and the corresponding discharge for the "with" project alternative would be about 5 cfs; a difference of about 13 cfs. This difference is attributable to stormwater diverted to the Lower Day Creek Basin for temporary storage and recharge. Another way to describe this is to say that ten percent of the time (~36 days per year), the reduction in discharge will be greater than or equal to 13 cfs; 90 percent of the time (~329 days), the reduction in discharge will be less than 13 cfs; and 50 percent of the time (~183 days), the reduction in discharge will be negligible or zero.

Figure 9 contains the flow duration curves for the no and "with" project alternatives for Cucamonga Creek just upstream of the Chino Creek. The short unlined reach of Cucamonga Creek, which is just upstream of Chino Creek, is also called Mill Creek. The Cucamonga Creek channel has identical discharges for both alternatives about 90 percent of the time. At the 95 percent point, the discharge for the no project alternative would be about 170 cfs, and the corresponding discharge for the "with" project alternative would be about 160 cfs; a difference of about 10 cfs. This difference is attributable to stormwater diverted to several recharge basins for temporary storage and recharge. Another way to describe this is to say that 10 percent of the time (~36 days per year), the reduction in discharge will be greater than or equal to zero cfs; 90 percent of the time (~329 days), the reduction in discharge will be zero cfs; and 5 percent of the time (~19 days), the reduction in discharge will be 10 cfs.

Figure 10 contains the flow duration curves for the no and "with" project alternatives for

Chino Creek just upstream of its confluence with Cucamonga Creek. The Chino Creek channel has identical discharges for both alternatives about 90 percent of the time. At the 95 percent point, the discharge for the no project alternative would be about 180 cfs, and the corresponding discharge for the "with" project alternative would be about 160 cfs; a difference of about 20 cfs. This difference is attributable to stormwater diverted to the Montclair and Brooks Street Recharge Basins for temporary storage and recharge. Another way to describe this is to say that 10 percent of the time (~36 days per year), the reduction in discharge will be greater than or equal to zero cfs; 90 percent of the time (~329 days), the reduction in discharge will be zero cfs; and 5 percent of the time (~19 days), the reduction in discharge will be greater than 20 cfs.

Figure 11 contains the flow duration curves for the no and "with" project alternatives for the Santa Ana River at MWD Crossing. The Santa Ana River channel has identical discharges for both alternatives about 75 percent of the time. At the 80 percent point, the discharge for the no project alternative would be about 135 cfs, and the corresponding discharge for the "with" project alternative would be about 125 cfs; a difference of about 10 cfs. At the 90 percent point, the discharge for the no project alternative would be about 275 cfs, and the corresponding discharge for the "with" project alternative would be about 235 cfs; a difference of about 40 cfs. This difference is attributable to stormwater diverted pursuant to the proposed Muni/Western and Conservation District applications for temporary storage and recharge. Another way to describe this is to say that ten percent of the time (~36 days per year), the reduction in discharge will be greater than or equal to 40 cfs; 90 percent of the time (~329 days), the reduction in discharge will be less than 40 cfs; and 75 percent of the time (~274 days), the reduction in discharge will be negligible or zero.

Figure 12 contains the flow duration curves for the no and "with" project alternatives for the Santa Ana River below Prado Dam. This chart looks strikingly different than the prior charts due the operation of Prado Dam. For the no and "with" project alternatives, we assumed that Prado Dam was operated pursuant to the Water Control Manual, Prado Dam and Reservoir developed by the Army Corps of Engineers (USACOE, 1994). The Santa Ana River has identical discharges for both alternatives about 50 percent of the time; the decrease in discharge caused by all assumed upstream conservation activities being about 6 cfs compared to a no project discharge of about 330

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cfs. Between about 56 and 62 percent of the time, this difference grows to about 90 cfs compared to a no project discharge of about 450 cfs; this difference is due mainly to Prado Dam operating procedures. Between about 62 and about 85 percent of the time, the discharge for the no project and "with" project alternatives is identical at 450 cfs, which is attributable to Prado dam operating procedures. At the 90 percent point, the discharge for the no project alternative would be about 710 cfs, and the corresponding discharge for the "with" project alternative would be about 610 cfs; a difference of about 100 cfs.

H. What are the changes in total Santa Ana River discharge at MWD Crossing and at below Prado dam?

Finally, Figure 13 shows the WLAM estimated total annual Santa Ana River discharge at MWD Crossing and below Prado Dam. The average annual decrease in the Santa Ana River discharge is projected to be about 5,000 and 19,700 acre-ft/yr at the MWD Crossing and below Prado Dam, respectively. (Michael, this will slightly change tonight, more to follow)

I. What does this suggest about impacts of the Watermaster's recharge project on Santa Ana River?

The impacts of Watermaster's recharge projects on Santa Ana River discharge are small relative to the discharge in the Santa Ana River and are limited to times when stormwater discharges occur. There are no dry-weather flow diversions, so Watermaster's recharge projects will not affect discharge during low discharge, dry-weather periods. At the 90 percent point, the cumulative impact on the discharge in the Santa Ana River at below Prado will be about 40 cfs compared to a comparable no-project, reservoir-attenuated discharge of about 710 cfs or about a 6 percent reduction in flow during flood discharge periods.

J. What does this suggest about cumulative impacts on the Santa Ana River of our project in combination with the other projects?

As to discharge, the impacts are negligible.

III. WATER QUALITY

A. What is the role of stormwater recharge as a mitigation measure under Basin Plan Amendment?

Watermaster and the IEUA jointly proposed TDS and nitrogen water quality objectives combined with the water resources management projects contained in the OBMP that have been

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found to improve water quality in the Basin and protect water quality for the Santa Ana River itself and for the benefit of the Orange County Water District. One of these projects, specifically listed in the Basin Plan Amendment, is the stormwater recharge project described in Application 31369. The significance of its specific listing within the Basin Plan Amendment is that it is one of the conditions upon Watermaster's utilization of the "Maximum Benefit" objectives, which make the use and recharge of recycled water in the Chino Basin possible.[4] These requirements were incorporated explicitly into the Inland Empire Utility Agency's recycled water permit, RWQCB Order No. R8-2005-0033.[5]

B. <u>How does the diversion and recharge of stormwater help the water quality in the Chino Basin?</u>

Watermaster and the IEUA conduct water quality monitoring in all the recharge basins in the CBFIP, lysimeters located in these basins, and in monitoring wells. This monitoring has demonstrated that the recharge of stormwater to Chino Basin is beneficial.[6] Pathogens, metals, and organic constituents in stormwater that is diverted into the recharge basins are reduced to insignificant levels through soil aquifer treatment. The TDS and nitrogen in stormwater is very low; around 100 mg/L or less for TDS (compared to the objective of 420 mg/L) and 1mg/L-N or less for nitrogen (compared to the objective of 5 mg/L-N). Thus, the recharge of stormwater helps mitigate the other non-controllable discharges of salts into the basin. The recharge of stormwater can be used to dilute recycled water recharge to the basin, which reduces the demand for State Water Project water deliveries to the Chino Basin area.

C. <u>How does the diversion of stormwater help the water quality of the Santa Ana River?</u>

The diversion of stormwater to recharge basins in the Chino Basin reduces the discharge of stormwater to the Santa Ana River. This in turn reduces the discharge of debris, pathogens, metals, and organic compounds to the River. On the other hand, there may be some slight increases in TDS and nitrogen in the River, caused by the diversion of low TDS and nitrogen stormwater to the

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[4] See Attachments to CBWM Exhibit 2-5: RWQCB Resolution No. R8-2004-0001, Table 5-8a and generally pages 54-58.

[5] CBWM Exhibit 2-7: CBWM Permit for Recharge of Imported and Recycled Water (RWQCB Order 2005-0033). See also CBWM Exhibit 2-4: Recycled Water Permit (RWQCB Order No. R8-2003-0003).

[6] See CBWM Exhibit 2-7: OBMP Chino Basin State of the Basin Report, July 2005, at page 6-1.

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recharge basins in the Chino Basin.

IV. RECHARGE IMPACTS ON THE CONTAMINANT PLUMES IN THE CHINO BASIN

A. What are the significant contaminant plumes in the Chino Basin and how are these plumes being managed?

The discussion presented below describes contaminant plumes associated with known point source discharges to groundwater. Figure 14 shows the location of various point sources and areas of water quality degradation associated with these sources.

Chino Airport. The Chino Airport is located approximately four miles east of the City of Chino and six miles south of Ontario International Airport and occupies an area of about 895 acres. From the early 1940s until 1948, the airport was owned by the federal government and used for flight training and aircraft storage. The County of San Bernardino acquired the airport in 1948 and has operated and/or leased portions of the facility ever since. Since 1948, past and present businesses and activities at the airport include the modification of military aircraft, crop dusting, aircraft-engine repair, aircraft painting, stripping and washing, the dispensing of fire-retardant chemicals to fight forest fires, and general aircraft maintenance. The use of organic solvents for various manufacturing and industrial purposes has been widespread throughout the airport's history (RWQCB, 1990). From 1986 to 1988, a number of groundwater quality investigations were performed in the vicinity of Chino Airport. Analytical results from groundwater sampling revealed the presence of VOCs above MCLs in six wells downgradient of Chino Airport. The most common VOC detected above its MCL was TCE. TCE concentrations in the contaminated wells ranged from 6.0 to 75.0 µg/L. Figure 14 shows the approximate aerial extent of TCE in groundwater in the vicinity of Chino Airport at concentrations exceeding its MCL as of 2006. The plume is elongate in shape, up to 3,600 feet wide and extends approximately 14,200 feet from the airport's northern boundary in a south to southwestern direction. During the period from 1997 to 2006, the maximum TCE concentration in groundwater detected at an individual well within the Chino Airport plume was 570 µg/L. In 2002, the County of San Bernardino submitted a work plan to the Regional Board for installing up to five monitoring wells at and around Chino Airport during the summer 2003. The concentrations of TCE observed in the five monitoring wells are entirely consistent with a

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conceptual model of the plume, which has migrated away from Chino Airport. These new data corroborate other data generated by the Watermaster and others. This plume is currently being characterized and a draft remediation plan will be prepared by the end of 2007.

California Institute for Men. The California Institute for Men (CIM), located in Chino, is bounded on the north by Edison Avenue, on the east by Euclid Avenue, on the south by Kimball Avenue, and on the west by Central Avenue. CIM is a state correctional facility and has been in existence since 1939. It occupies approximately 2,600 acres—about 2,000 acres are used for dairy and agricultural and about 600 acres are used for housing inmates and related support activities (Geomatrix Consultants, 1996). In 1990, PCE was detected at a concentration of 26 µg/L in a sample of water collected from a CIM drinking water supply well. Analytical results from groundwater sampling indicated that the most common VOCs detected in groundwater underlying CIM were PCE and TCE. Other VOCs that have been detected include carbon tetrachloride, chloroform, 1,2-DCE, bromodichloromethane, 1,1,1-trichloroethane (1,1,1-TCA), and toluene. The maximum PCE concentration in groundwater detected at an individual monitoring well (GWS-12) was 290 µg/L. The maximum TCE concentration in groundwater detected at an individual monitoring well (MW-6) was 160 µg/L (Geomatrix Consultants, 1996). Figure 14 shows the approximate aerial extent of VOCs in groundwater at concentrations exceeding MCLs as of 2006. The plume is up to 2,900 feet wide and extends about 5,800 feet from north to south. During the period from 1999 to 2006, the maximum PCE and TCE concentrations in groundwater detected at an individual well within the CIM plume were 1,990 µg/L and 141 µg/L, respectively. This plume has been characterized and is currently being remediated.

General Electric Flatiron Facility. The General Electric Flatiron Facility (Flatiron Facility) occupied the site at 234 East Main Street, Ontario, California from the early 1900s to 1982. Its operations primarily consisted of the manufacturing of clothes irons. Currently, the site is occupied by an industrial park. The RWQCB issued an investigative order to General Electric (GE) in 1987 after an inactive well in the City of Ontario was found to contain TCE and chromium above drinking water standards. Analytical results from groundwater sampling indicated that VOCs and total dissolved chromium were the major groundwater contaminants. The most common VOC

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detected at levels significantly above its MCL is TCE, which reached a measured maximum concentration of 3,700 µg/L. Other VOCs periodically detected, but commonly below MCLs, included PCE, toluene, and total xylenes (Geomatrix Consultants, 1997). Figure 14 shows the approximate aerial extent of TCE in groundwater at concentrations exceeding MCLs as of 2006. The plume is up to 3,400 feet wide and extends about 9,000 feet south-southwest (hydraulically downgradient) from the southern border of the site. During the period from 1999 to 2006, the maximum TCE and total dissolved chromium concentrations in groundwater detected at an individual well within the Flatiron Facility plume were 7,990 µg/L and 1,700 µg/L, respectively. This plume has been characterized and is currently being remediated.

General Electric Company's Engine Maintenance Center Test Cell Facility. The General Electric Company's Engine Maintenance Center Test Cell Facility (Test Cell Facility) is located at 1923 East Avon, Ontario, California. Primary operations at the Test Cell Facility include the testing and maintenance of aircraft engines. A soil and groundwater investigation, followed by a subsequent quarterly groundwater-monitoring program, began in 1991 (Dames & Moore, 1996). The results of these investigations showed that VOCs exist in the soil and groundwater beneath the Test Cell Facility and that the released VOCs have migrated off site. Analytical results from subsequent investigations have indicated that the most common and abundant VOC detected in groundwater beneath the Test Cell Facility is TCE. Other VOCs detected include PCE, cis-1,2-DCE, 1,2-dicholoropropane, 1,1-DCE, 1,1-DCA, benzene, toluene, and xylenes, among others. The historical maximum TCE concentration measured at an on-site monitoring well (directly beneath the Test Cell Facility) was 1,240 µg/L. The historical maximum TCE concentration measured at an off-site monitoring well (downgradient) was 190 µg/L (BDM International, 1997). Figure 14 shows the aerial extent of VOC contamination exceeding federal MCLs as of 2006. The plume is elongate in shape, up to 2,400 feet wide, and extends approximately 10,300 feet from the Test Cell Facility in a southwesterly direction. During the period from 1997 to 2006, the maximum TCE and PCE concentrations in groundwater detected at an individual well within the Test Cell Facility plume were 1,100 µg/L and 29 µg/L, respectively. This plume has been characterized and a remediation plan will be completed by the end of 2007.

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Kaiser Steel Fontana Steel Site. Between 1943 and 1983, the Kaiser Steel Corporation (Kaiser) operated an integrated steel manufacturing facility in Fontana. During the first 30 years of the facility's operation (1945-1974), a portion of the Kaiser brine wastewater was discharged to surface impoundments and allowed to percolate into the soil. In the early 1970s, the surface impoundments were lined to eliminate percolation to groundwater (Wildermuth, 1991). In July of 1983, Kaiser initiated a groundwater investigation that revealed the presence of a plume of degraded groundwater under the facility. In August of 1987, the RWQCB issued Cleanup and Abatement Order Number 87-121, which required additional groundwater investigations and remediation activities. The results of these investigations show that the major constituents of release to groundwater were inorganic dissolved solids and low molecular weight organic compounds. The wells that were sampled during the groundwater investigations showed total dissolved solids (TDS) concentrations ranging from 500-1,200 mg/L and total organic carbon (TOC) concentrations ranging from 1 to 70 mg/L. As of November 1991, the plume had migrated almost entirely off the Kaiser site. Figure 14 shows the approximate aerial extent of the TDS/TOC groundwater plume as of 2002. Based on a limited number of wells, including City of Ontario Well No. 30, the plume is up to 3,400 feet wide and extends about 17,500 feet from northeast to southwest. This plume has been characterized and is currently being remediated.

Milliken Sanitary Landfill. The Milliken Sanitary Landfill (MSL) is a Class III Municipal Solid Waste Management Unit located near the intersections of Milliken Avenue and Mission Boulevard in the City of Ontario. The facility is owned by the County of San Bernardino and managed by the County's Waste System Division. The facility was opened in 1958 and continues to accept waste within an approximate 140-acre portion of the 196-acre permitted area (GeoLogic Associates, 1998). Groundwater monitoring at the MSL began in 1987 with five monitoring wells as part of a Solid Waste Assessment Test investigation (IT, 1989). The results of this investigation indicated that the MSL has released organic and inorganic compounds to the underlying groundwater. At the completion of an Evaluation Monitoring Program (EMP) investigation (GeoLogic Associates, 1998), a total of 29 monitoring wells were drilled to evaluate the nature and extent of groundwater impacts identified in the vicinity of the MSL. Analytical results from

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groundwater sampling indicated that VOCs are the major constituents of release. The most common VOCs detected were TCE, PCE, and dichlorodifluoromethane. Other VOCs detected above MCLs include vinyl chloride, benzene, 1,1-dichloroethane, and 1,2-dichloropropane. The historical maximum total VOC concentration in an individual monitoring well is 159.6 µg/L (GeoLogic Associates, 1998). Figure 14 shows the approximate aerial extent of VOCs in groundwater at concentrations exceeding MCLs as of 2006. The plume is up to 1,800 feet wide and extends about 2,100 feet south of the MSL's southern border. During the period from 1999 to 2006, the maximum TCE and PCE concentrations in groundwater detected at an individual well within the MSL plume were 64 µg/L and 81 µg/L, respectively. This plume has been characterized and no active remediation plan has been developed.

Upland Sanitary Landfill. The closed and inactive Upland Sanitary Landfill (USL) is located on the site of a former gravel quarry at the southeastern corner of 15th Street and Campus Avenue in the City of Upland. The facility operated from 1950 to 1979 as an unlined Class II and Class III municipal solid waste disposal site. In 1982, the entire disposal site was covered with a 10-inch thick, low permeability layer of sandy silt (GeoLogic Associates, 1997). Groundwater monitoring at the USL began in 1988 and now includes three on-site monitoring wells: an upgradient well, a cross-gradient well, and a downgradient well (City of Upland, 1998). The results of historic groundwater monitoring indicate that USL has released organic and inorganic compounds to underlying groundwater (GeoLogic Associates, 1997). Groundwater samples from the downgradient monitoring well consistently contain higher concentrations of organic and inorganic compounds than samples from the upgradient and cross-gradient monitoring wells. Analytical results from historic groundwater sampling indicate that VOCs are the major constituents of organic release. All three monitoring wells have shown detectable levels of VOCs. The most common VOCs detected above MCLs are dichlorodifluoromethane, PCE, TCE, and vinyl chloride. Other VOCs that have been periodically detected above MCLs include methylene chloride, cis-1,2-DCE, 1,1-DCA, and benzene. The 1990 to 1995 average total VOC concentration in the downgradient monitoring well is 125 µg/L (GeoLogic Associates, 1997). Figure 14 shows the approximate aerial extent of VOCs in groundwater at concentrations exceeding MCLs as of 2006.

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However, the plume is defined only by three on-site monitoring wells. The extent of the plume may be greater than currently depicted in Figure 14. During the period from 1999 to 2006, the maximum TCE and PCE concentrations detected in downgradient monitoring wells within the USL plume were 4.2 µg/L and 16 µg/L, respectively. This plume has been characterized and is currently being remediated.

VOC Anomaly – South of the Ontario Airport. A VOC plume containing primarily TCE exists south of the Ontario Airport. The plume extends approximately from State Route 60 on the north and Haven Avenue on the east to Cloverdale Road on the south and South Grove Avenue on the west. Figure 14 shows the approximate aerial extent of the plume as of 2006. The plume is up to 17,700 feet wide and 20,450 feet long. During the period from 1999 to 2006, the maximum TCE concentration in groundwater detected at an individual well within this plume was 83 µg/L. This plume is currently being characterized by a group of potential responsible parties and should be fully characterized by the end of 2009. The remediation of this plume will likely be accomplished through the existing Chino Basin Desalter I facilities, which are owned by the Chino Desalter Authority.

Stringfellow NPL Site. The Stringfellow site is located in Pyrite Canyon, north of Highway 60, near the community of Glen Avon in Riverside County (Figure 14). From 1956 until 1972, the 17-acre Stringfellow site was operated as a hazardous waste disposal facility. More than 34 million gallons of industrial waste—primarily from metal finishing, electroplating, and pesticide production—were deposited at the site (USEPA, 2001). A groundwater plume of site-related contaminants exists underneath portions of the Glen Avon area. Groundwater at the site contains various VOCs, perchlorate, N-nitrosodimethylamine (NDMA), and heavy metals such as cadmium, nickel, chromium, and manganese. Soil in the original disposal area is contaminated with pesticides, PCBs, sulfates, and heavy metals. The original disposal area is now covered with a barrier and fenced. Contamination at the Stringfellow site has been addressed by cleanup remedies described in four US Environmental Protection Agency (USEPA) Records of Decision. These cleanup actions have focused on controlling the source of contamination, the installation of an onsite pretreatment plant, the cleanup of the lower part of Pyrite Canyon, and the cleanup of the community

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groundwater area. Figure 14 shows the approximate aerial extent of the Stringfellow plume as of 2006. The plume is elongate in shape, up to 6,000 feet wide, and extends approximately 22,500 feet from the original disposal area in a southwesterly direction. During the period from 1999 to 2006, the maximum TCE concentration detected in the Stringfellow plume was greater then 175 µg/L. This plume has been characterized and is currently being remediated. Additional characterization is ongoing, and additional remediation work may be required in the future.

B. How will the proposed recharge projects in Watermaster's Application No. 31369 impact the fate of these contaminant plumes?

These contaminant plumes are moving from their source areas in response to regional groundwater flow, which is driven by groundwater recharge and discharge. We used Watermaster's high resolution groundwater model to estimate the impacts of a groundwater storage program[7] on these plumes. In this investigation, 25,000 acre-ft/yr of supplemental water was recharged into the Basin up to total of 100,000 acre-ft and was subsequently withdrawn. This cycle was repeated twice over a 25-year period running from 2004 to 2028. To be conservative in our projections, we assumed that all contaminants were conservative; that is retardation or decay was assumed. We assumed that there were no active remediation plans in place. Finally, we assumed that the total stormwater recharge anticipated with Watermaster's Application No. 31369 of about 18,000 acre-ft/yr as well as Watermaster's replenishment-related recharge was occurring through out the planning period. Thus, the resulting model projections provided a conservative estimate of the impacts of recharge programs in the Chino Basin. Figure 16 shows the simulated location of the groundwater contaminant plumes in Chino Basin at the end of the planning period (2028) for the both the no groundwater storage program and "with" storage program scenarios. All plume locations are virtually identical for both scenarios, indicating that the change in direction and speed of movement of these plumes caused by the increased recharge anticipated by the storage program is insignificant.

C. What does the total recharge program in the Chino Basin look like?

Figure 16 shows the projected groundwater pumping, the new stormwater recharge estimate

[7] CBWM Exhibit 2-3: OBMP Chino Basin Dry Year Yield Program Modeling Report, Vol. III. Wildermuth. July 2003.

that was developed with the CBFIP, and the allocation of supplemental water recharge to specific facilities in the Chino Basin. There is about 18,000 acre-ft/yr of stormwater recharge in the Chino Basin of which about 6,000 acre-ft/yr comes from pre-project facilities and about 12,000 acre-ft/yr of new stormwater recharge from the CBFIP. The supplemental water used for Watermaster's replenishment activities includes State Water Project water and recycled water. The placing of water into storage for groundwater storage programs is not included in Figure 16; that is, actual recharge will be even greater than shown in Figure 16. Stormwater recharge is about 16 percent of the total recharge if storage programs are excluded and will be less that 16 percent with storage programs.

D. <u>Do all of the recharge elements taken together cause the plumes to move?</u>

They have some minor effect on the direction and rate of movement of the plumes. However, the effects are small and are provided for in the remediation plans for each plume.

E. <u>Does the recharge of stormwater cause any special movement of the plumes? ie., would the movement of the plumes change if we did not recharge stormwater?</u>

In general, no; the fraction of stormwater recharge is small compared to the total recharge activities of the Watermaster. The direction and magnitude of the GE Test Cell plume, located just north of the Ely Basins, appears to be the only plume that is strongly influenced by stormwater recharge at the Ely basins. This recharge has been occurring since the 1950s. The remediation plan being developed by GE has incorporated this recharge activity. In fact, if this recharge were to cease, the magnitude and cost of the remediation would greatly increase.

Dated: April 12, 2007

MARK WILDERMUTH

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LIST OF FIGURES

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LIST OF DOCUMENTS REVIEWED[8]

Black and Veatch, 1994. Lake Elsinore Water Quality Management Plan, April, 1994.

Black and Veatch, 2001. Phase 2 Recharge Master Plan. August 2001.

Mark J. Wildermuth, Water Resources Engineers. 1995. Annual Recharge Estimates at Chino Basin Water Conservation District Spreading Basins. October 1995.

Mark J. Wildermuth, Water Resources Engineers. 1997. Phase 1A Task 2.2 and 2.3 Final Report: Describe Watershed Hydrology and Identify Current TDS and TIN Inflows in the Watershed. September, 1997.

Natural Resources Conservation Service, 1985. National Engineering Handbook, Section 4 Hydrology. March 1985.

Santa Ana River Watermaster Reports, Numbers 26 through 30.

Soil Conservation Service, 1917. Soil Survey of the Pasadena Area, California. 1917.

Soil Conservation Service, 1980. Soil Survey of San Bernardino County, Southwestern Part, California. 1980.

Soil Conservation Service, 1971. Soil Survey of Western Riverside County. 1971.

Soil Conservation Service, 1975. Urban Hydrology for Small Watersheds, Technical Release No. 55. 1975.

United State Army Corps of Engineers, San Antonio and Chino Creeks Channel, San Bernardino County, California, 1994.

United State Army Corps of Engineers, 1994. Water Control Manual, Prado Dam and Reservoir, Santa Ana River, California, 1994.

United State Army Corps of Engineers, 2000. Water Control Manual, Seven Oaks Dam and Reservoir, Santa Ana River, California, 2000.

Viessman, Warren, and Lewis, Gary L., 1995. Introduction to Hydrology. Fourth Edition. 760 Pages. 1995.

Wildermuth, Mark J., 1995.

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[8] These documents were reviewed as background information in the preparation of this testimony. A copy can be supplied upon request.

Wildermuth Environmental, Inc. 2000a. TIN/TDS Phase 2A: Tasks 1 through 5. TIN/TDS Study of the Santa Ana Watershed. Technical Memorandum. July 2000.

Wildermuth Environmental, Inc. 2000b. TIN/TDS Phase 2A: MS Access Database for TIN/TDS Study of the Santa Ana Watershed. Technical Memorandum. July 2000. Appendix A

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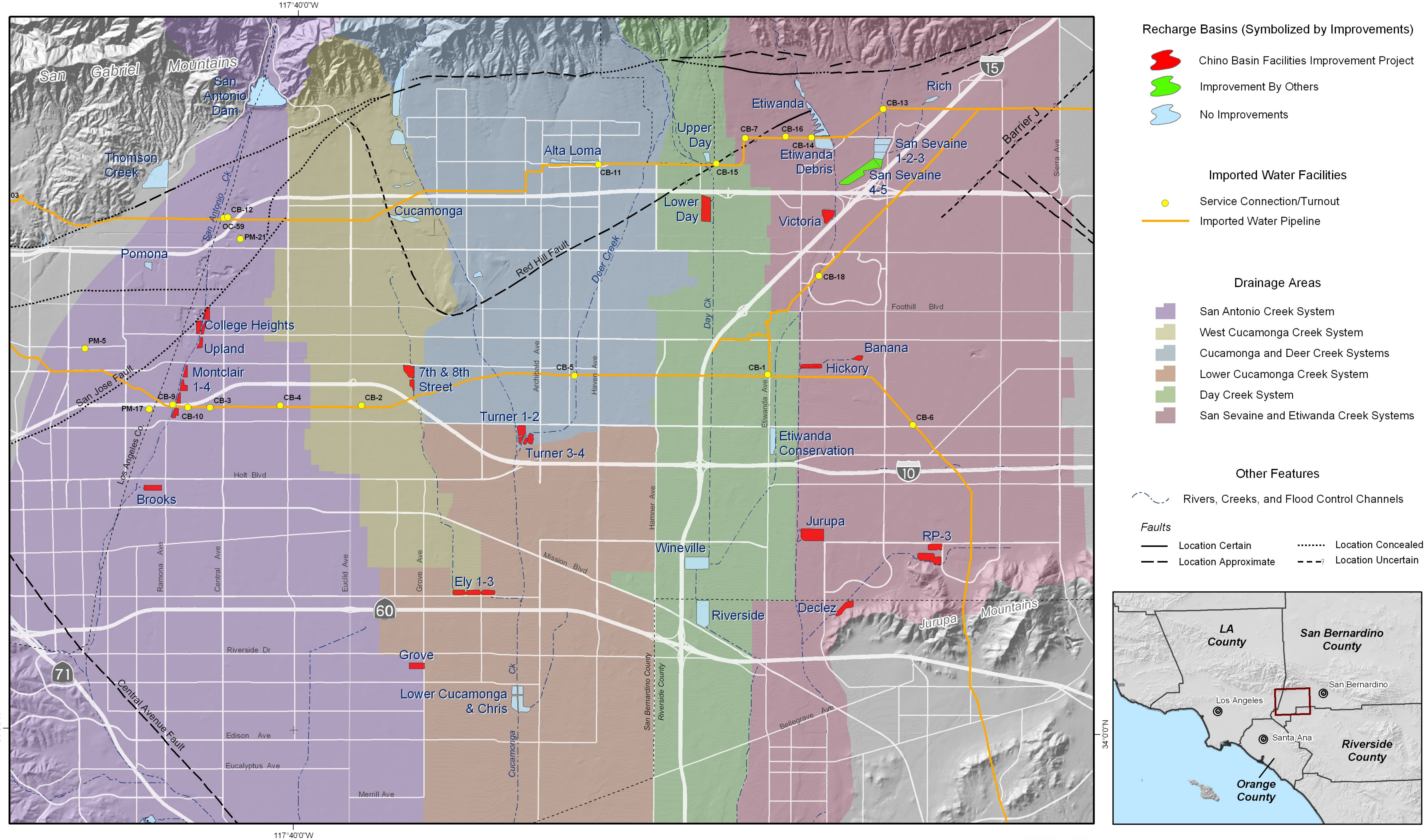
Figure 1 to Wildermuth's April 13, 2007 Declaration Related to the Chino Basin Watermaster's Application No. 31369



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Inland Empire Utilities Agency

Chino Basin Recharge Facilities Operation Procedures

Groundwater Recharge and Imported Water Facilities

Figure 2-1

Figure 2 to Wildermuth's April 13, 2007 Declaration Related to the Chino Basin Watermaster's Application No. 31369

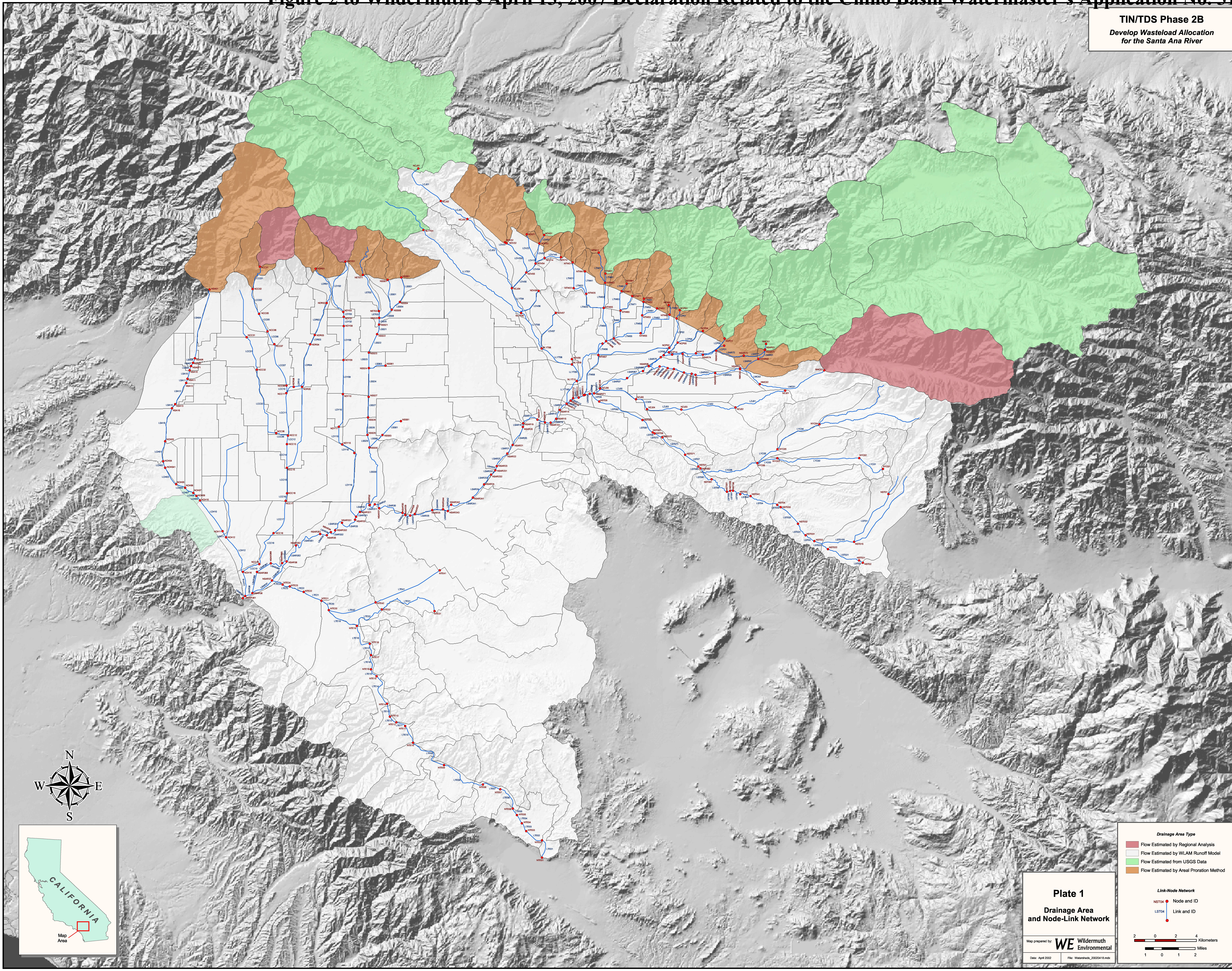

Figure 3 to Wildermuth's April 13, 2007 Declaration Related to the Chino Basin Watermaster's Application No. 31369

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Figure 4 to Wildermuth's April 13, 2007 Declaration Related to the Chino Basin Watermaster's Application No. 31369

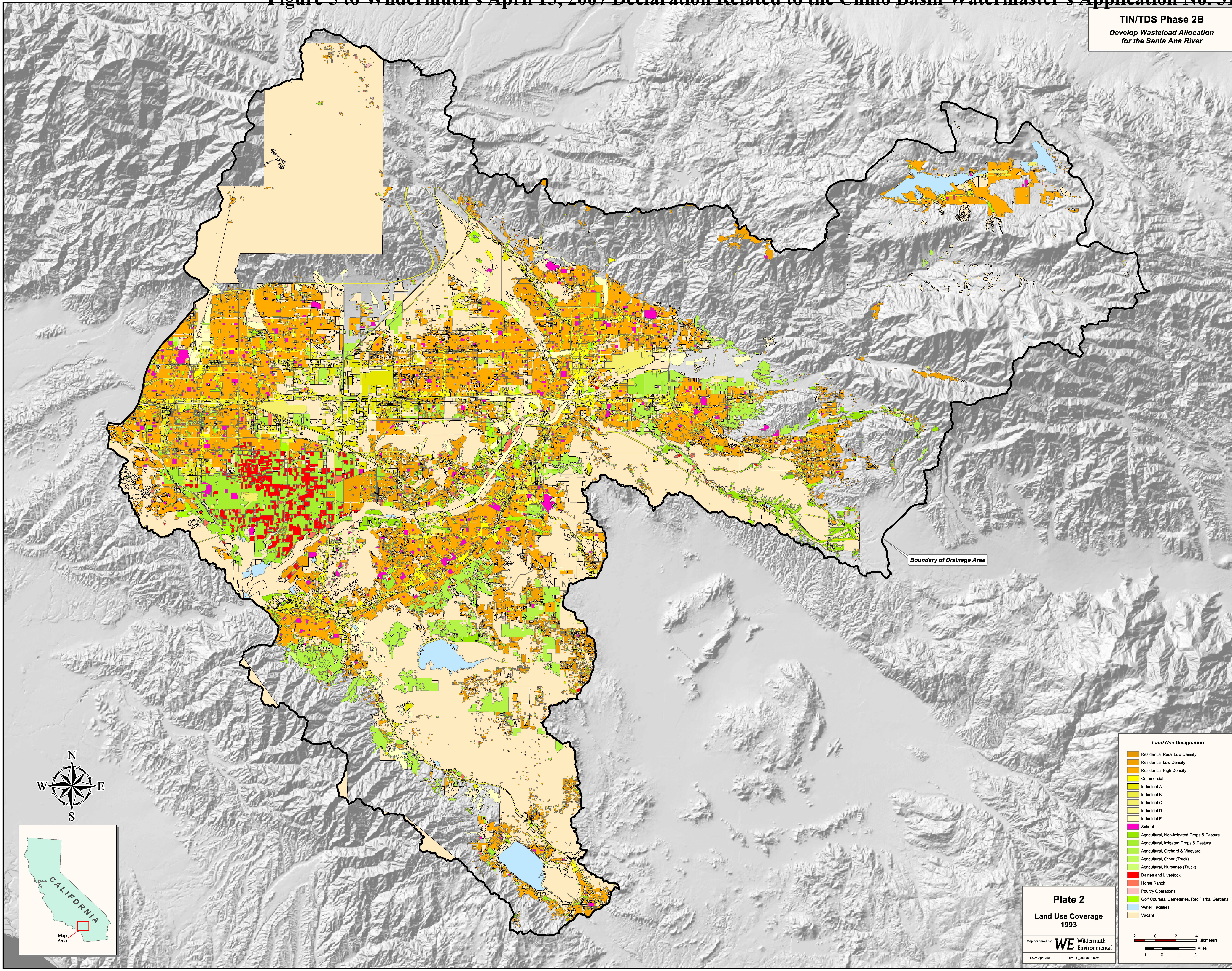
Projected Recycled Water Discharges to the Santa Ana River for 2010

Producer	Surface Water Discharge Baseline A from 2004 Basin Plan Update (mgd)	(cfs)
Western Municipal Water District Service Area		
Western Riverside Co. WWTP	4.4	6.8
Riverside Regional WQCP	35.0	54.1
Corona WWTP #1	3.6	5.6
Corona WWTP #2	0.2	0.3
Corona WWTP #3	2.0	3.1
Lee Lake WRF	1.6	2.4
EVMWD - Horsethief Cyn	0.0	0.0
EVMWD - Railroad Cyn	0.0	0.0
EVMWD - Lake Elsinore Regional	7.2	11.1
Subtotal WMWD	54.0	83.5
Inland Empire Utility Agency Service Area		
Carbon Canyon WRP	8.0	12.4
IEUA Regional Plant #1 IEUA Regional Plant #4	64.0	99.0
IEUA Regional Plant #5	8.0	12.4
Subtotal IEUA Service Area	80.0	123.7
San Bernardino Valley Municipal Water District Service Area		
Rialto	12.0	18.6
RIX[1]	49.4	76.4
YVWD - Wochholz	5.7	8.8
YVWD - Oak Valley	0.0	0.0
Beaumont[2]	2.3	3.5
Subtotal SBVMWD Service Area	69.4	107.4
Total	203.4	314.6

Note [1] -- Includes recharge in the Bunker Hill Basin and export from the watershed;

Note [2] -- Beaumont discharges to Coopers Creek, a tributary of San Timoteo Creek.

Figure 5 to Wildermuth's April 13, 2007 Declaration Related to the Chino Basin Watermaster's Application No. 31369



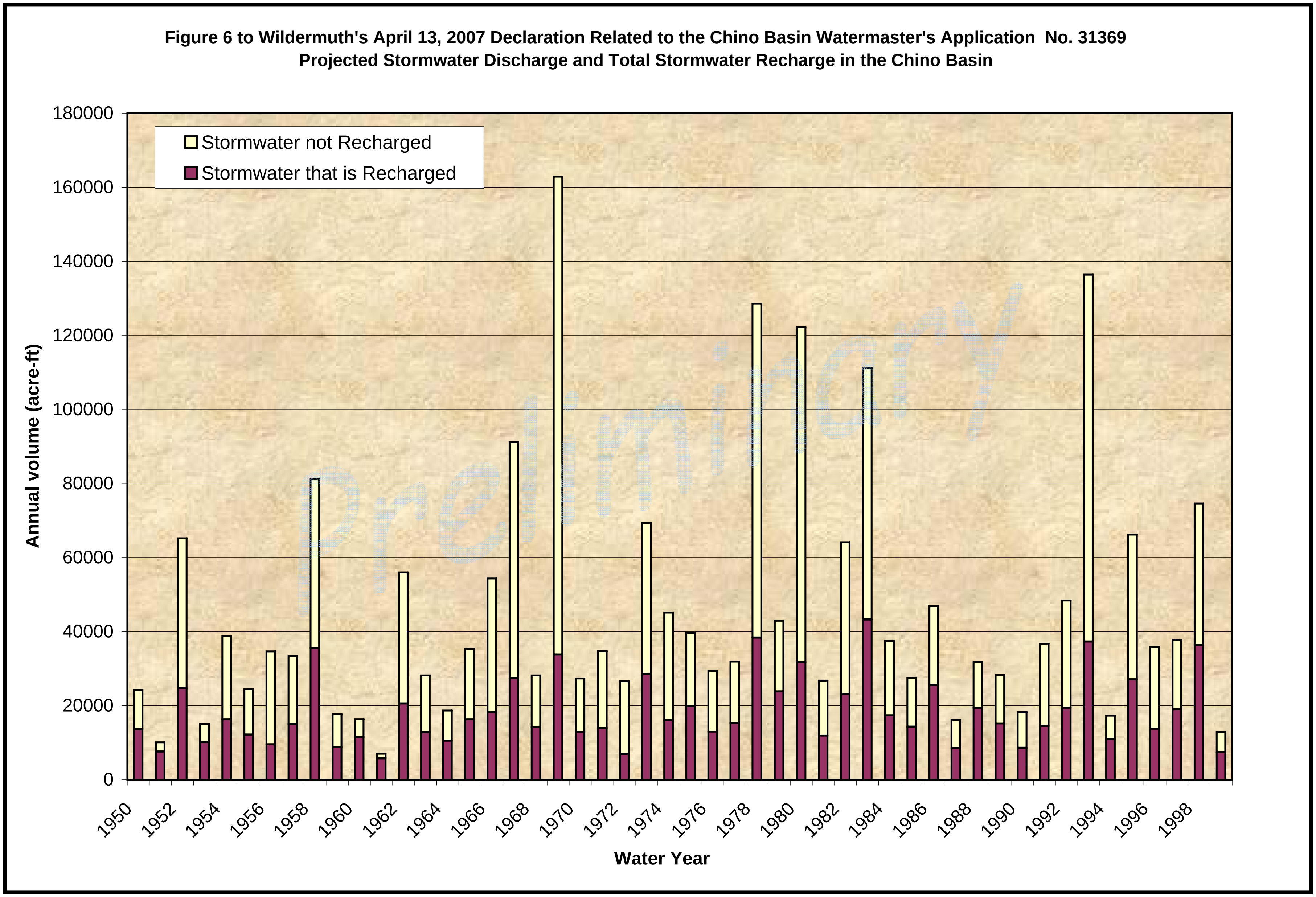


Figure 6 and Figure 9.xls -- Figure 6 Ch9
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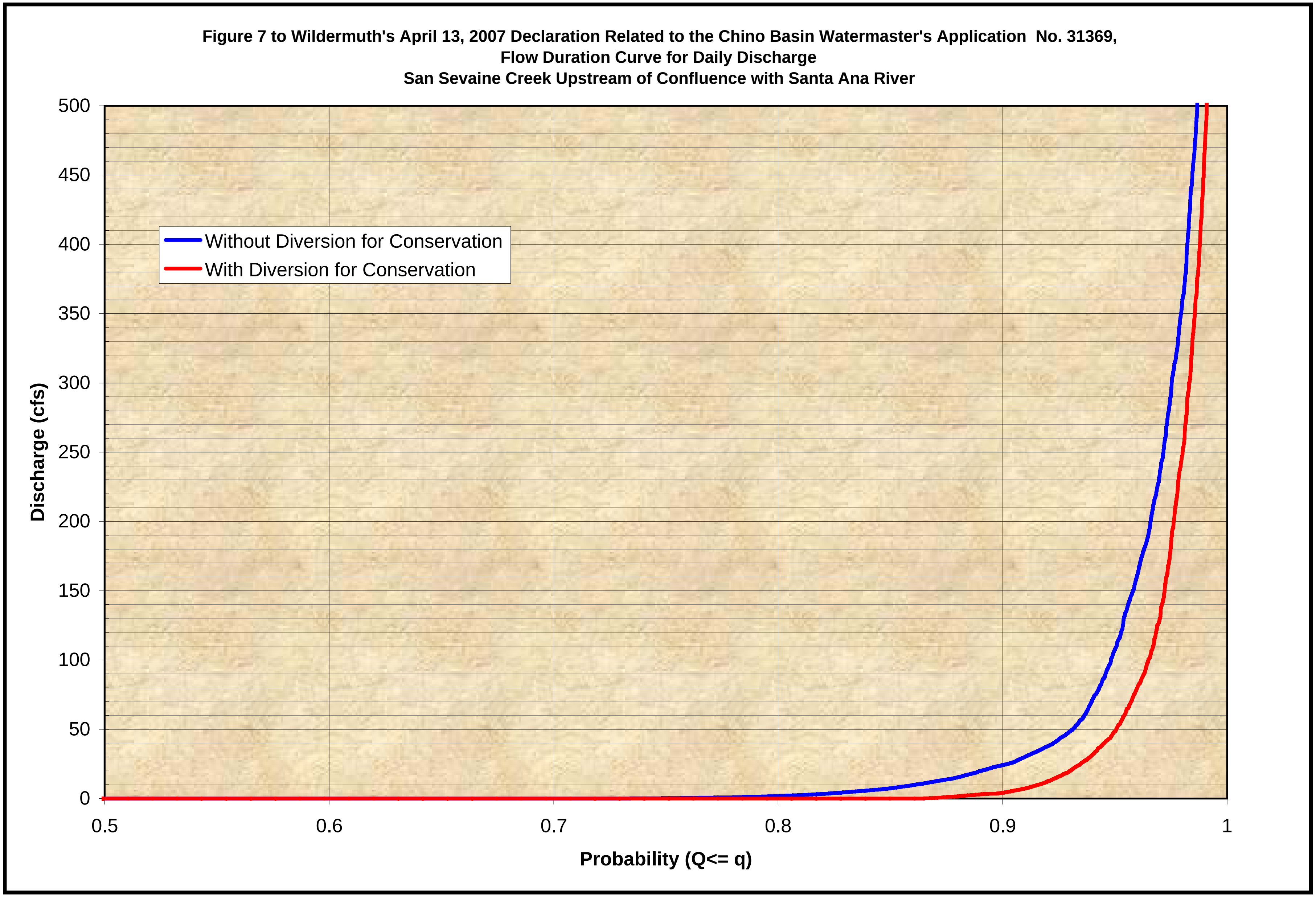
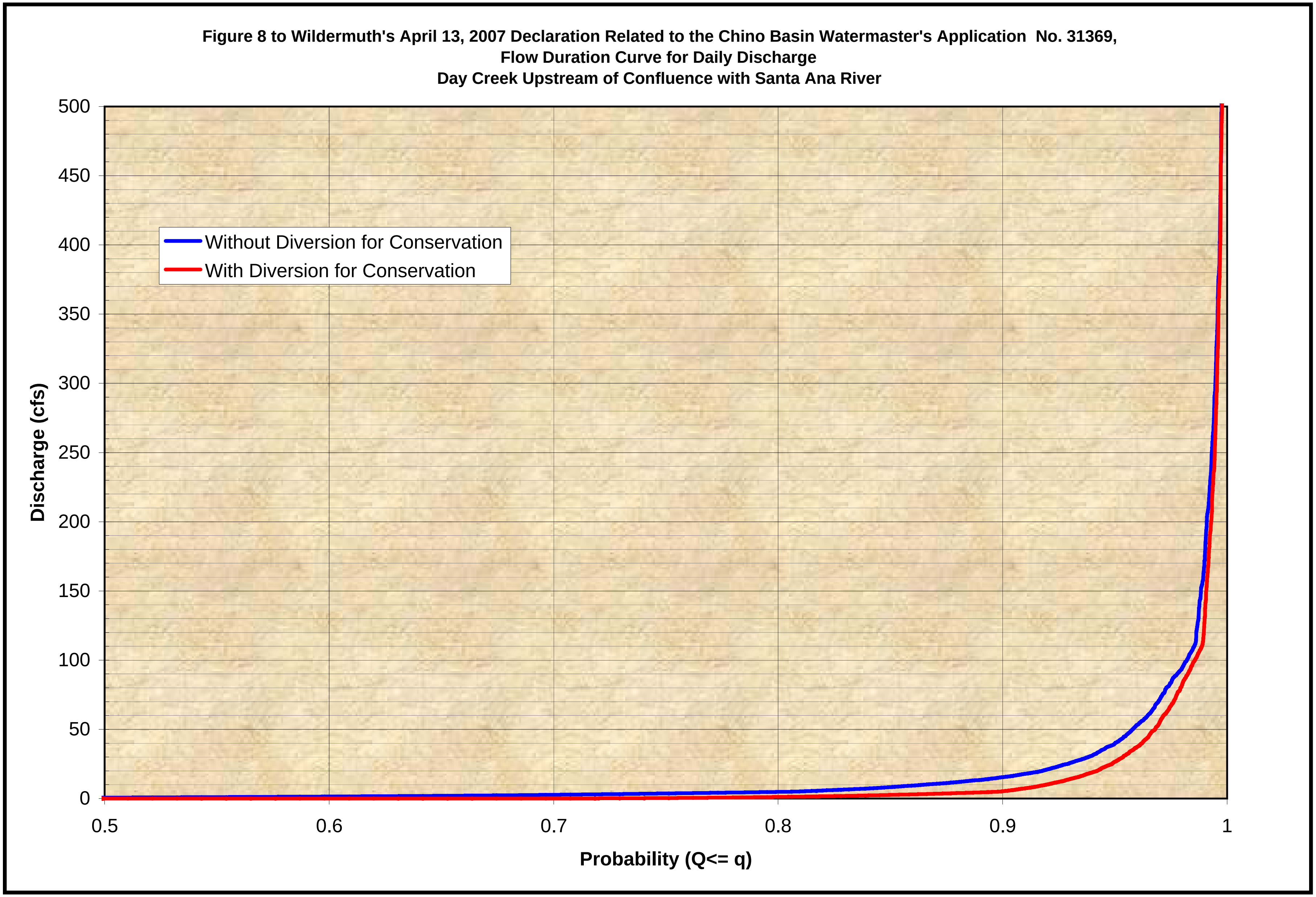


Figure 7 to Wildermuth's April 13, 2007 Declaration Related to the Chino Basin Watermaster's Application No. 31369,
Flow Duration Curve for Daily Discharge
San Sevaine Creek Upstream of Confluence with Santa Ana River
Without Diversion for Conservation
With Diversion for Conservation
Discharge (cfs)
0
50
100
150
200
250
300
350
400
450
500
0.5
0.6
0.7
0.8
0.9
1
Probability (Q<= q)



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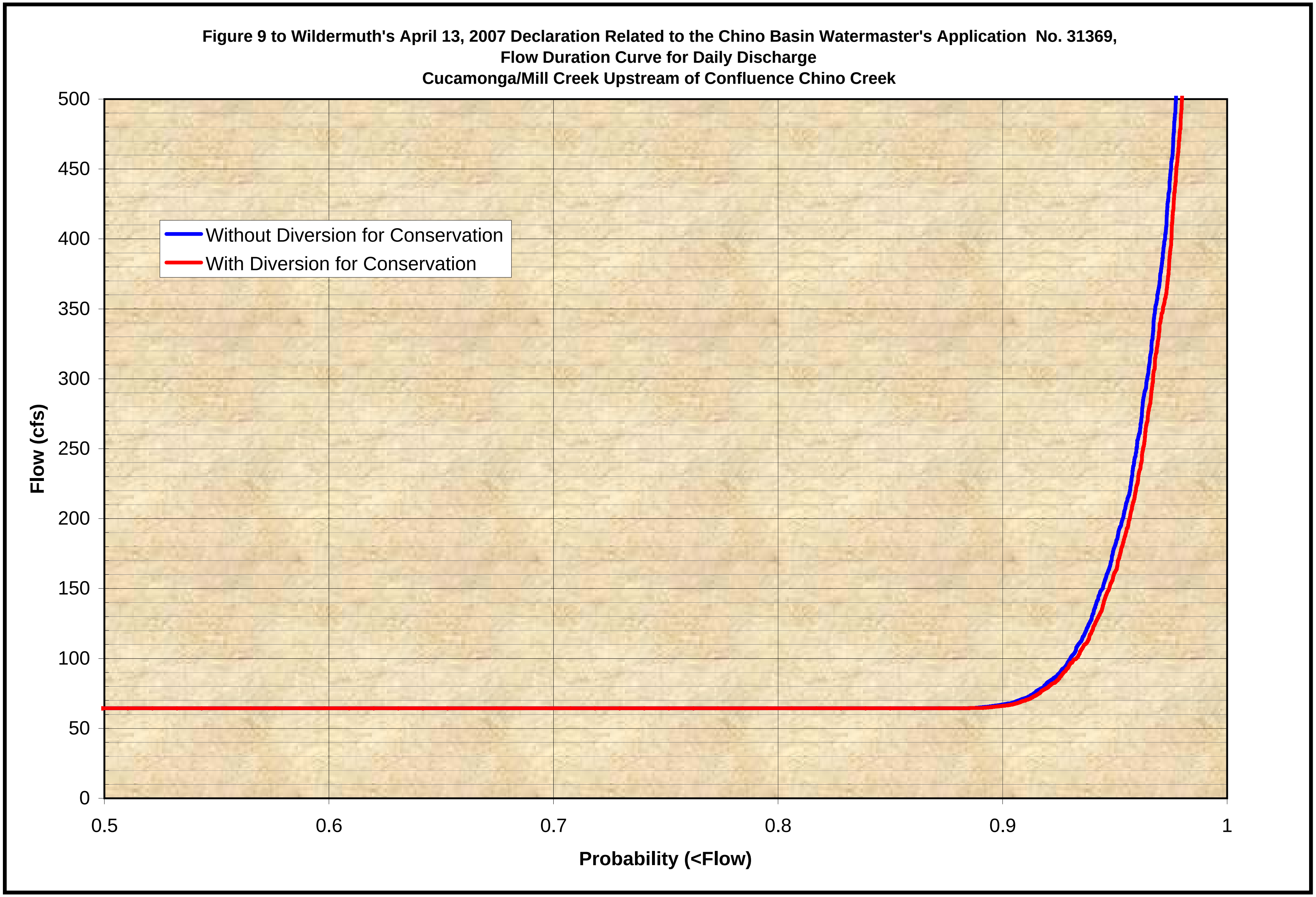

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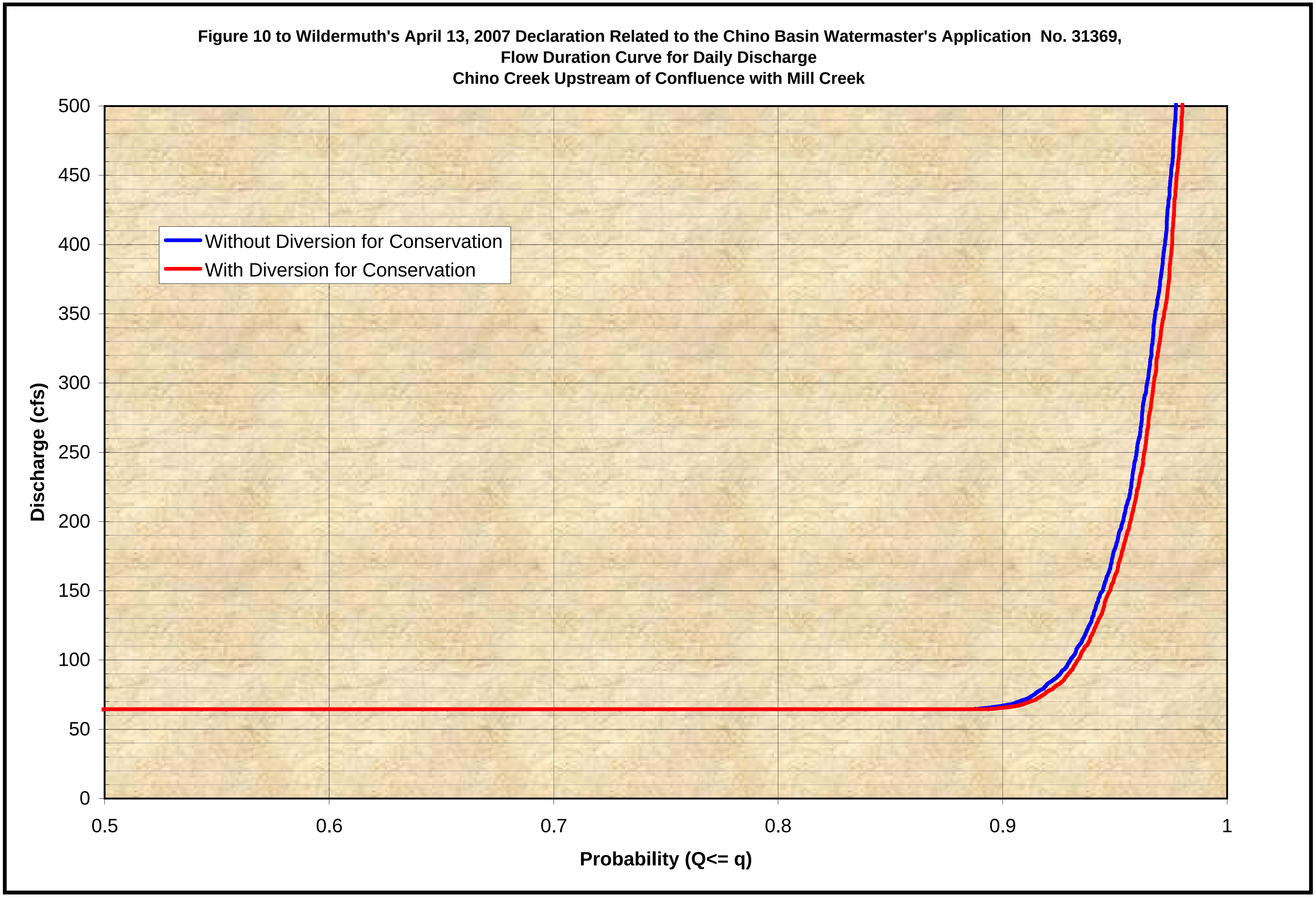

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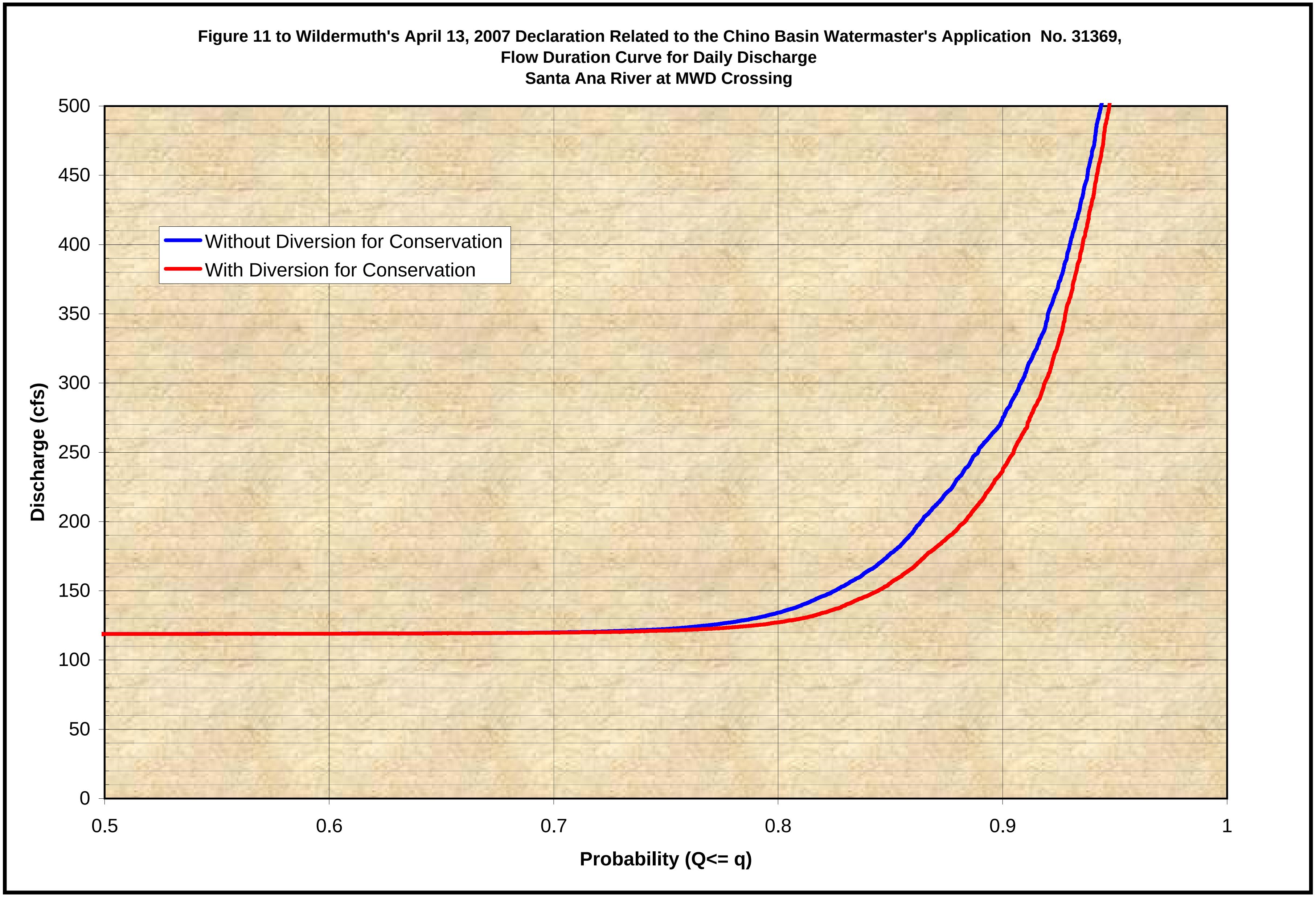

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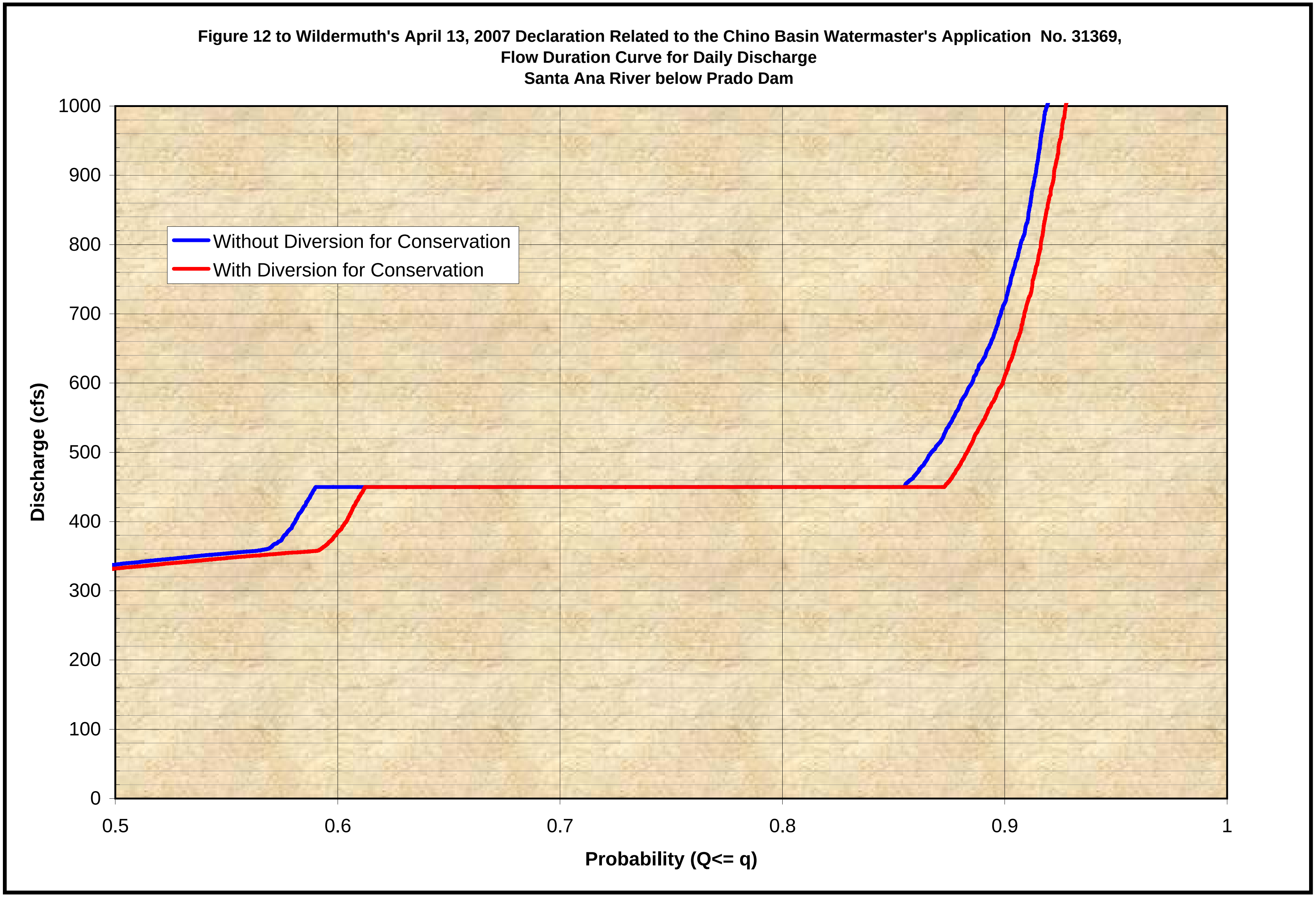

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Figure 13 to Wildermuth's April 13, 2007 Declaration Related to the Chino Basin Watermaster's Application No. 31369
Projected Total Annual Santa Ana River Discharge at MWD Crossing and at Below Prado Dam
(acre-ft)

Water Year	MWD Crossing Without Conservation	MWD Crossing With Conservation	MWD Crossing Difference	Below Prado Dam Without Conservation	Below Prado Dam With Conservation	Below Prado Dam Difference
1950	116,252	116,249	3	311,122	298,566	12,556
1951	108,488	108,488	0	281,230	274,842	6,388
1952	183,100	180,709	2,390	485,469	465,014	20,454
1953	121,746	121,745	0	302,074	293,140	8,934
1954	140,297	138,536	1,761	368,427	351,769	16,657
1955	123,602	123,602	0	318,178	303,701	14,477
1956	130,914	130,783	131	356,176	347,132	9,043
1957	123,206	123,168	37	335,671	320,869	14,802
1958	193,246	186,844	6,401	502,464	469,949	32,515
1959	107,284	107,283	1	278,574	272,160	6,414
1960	119,507	119,507	0	297,208	289,046	8,162
1961	94,894	94,894	0	252,267	247,989	4,278
1962	136,088	135,682	406	400,397	384,433	15,964
1963	118,465	118,465	1	326,980	315,013	11,968
1964	110,265	110,265	0	298,093	290,243	7,851
1965	129,137	129,125	12	347,769	335,849	11,920
1966	157,864	153,204	4,661	407,149	386,339	20,810
1967	195,111	186,687	8,425	496,019	466,912	29,107
1968	119,230	119,229	1	327,433	314,975	12,458
1969	371,183	323,920	47,263	804,739	745,024	59,715
1970	113,221	113,169	52	316,478	302,931	13,547
1971	116,215	115,844	371	321,266	308,498	12,768
1972	112,314	111,187	1,127	310,807	302,670	8,137
1973	161,485	159,697	1,788	437,183	411,536	25,647
1974	127,598	127,594	4	361,747	348,457	13,290
1975	122,501	122,495	6	335,413	316,266	19,147
1976	126,095	125,752	343	328,439	316,473	11,967
1977	120,188	120,187	1	342,600	330,112	12,487
1978	275,800	260,809	14,991	698,369	655,569	42,801
1979	161,869	151,645	10,224	412,244	384,281	27,963
1980	301,810	256,154	45,656	815,089	750,134	64,955
1981	111,429	111,422	7	305,680	291,084	14,596
1982	149,854	148,428	1,426	412,667	389,637	23,030
1983	251,503	223,819	27,684	651,268	590,214	61,054
1984	122,877	122,131	746	339,526	323,526	16,000
1985	118,843	118,833	10	323,529	312,016	11,513
1986	146,084	145,142	942	388,073	366,893	21,181
1987	106,852	106,852	0	289,355	281,803	7,551
1988	122,941	122,941	0	339,443	322,362	17,081
1989	118,619	118,618	1	319,742	307,591	12,151
1990	105,661	105,661	0	286,778	278,907	7,870
1991	157,831	157,568	263	387,369	375,910	11,459
1992	157,247	156,923	324	407,500	393,065	14,435
1993	348,689	315,179	33,510	852,441	794,863	57,578
1994	114,412	114,371	41	295,253	285,291	9,962
1995	239,957	219,837	20,120	545,822	508,409	37,413
1996	127,765	126,684	1,081	336,946	326,199	10,747
1997	145,489	144,047	1,443	353,309	336,142	17,166
1998	259,155	241,093	18,062	563,386	515,919	47,467
1999	103,841	103,841	0	270,276	261,650	8,626
Mean	152,960	147,926	5,034	396,909	377,227	19,681
Median	124,849	124,677	197	339,484	324,862	13,991
Max	371,183	323,920	47,263	852,441	794,863	64,955
Min	94,894	94,894	0	252,267	247,989	4,278

Figure 14 to Wildermuth's April 13, 2007 Declaration Related to the Chino Basin Watermaster's Application No. 31369

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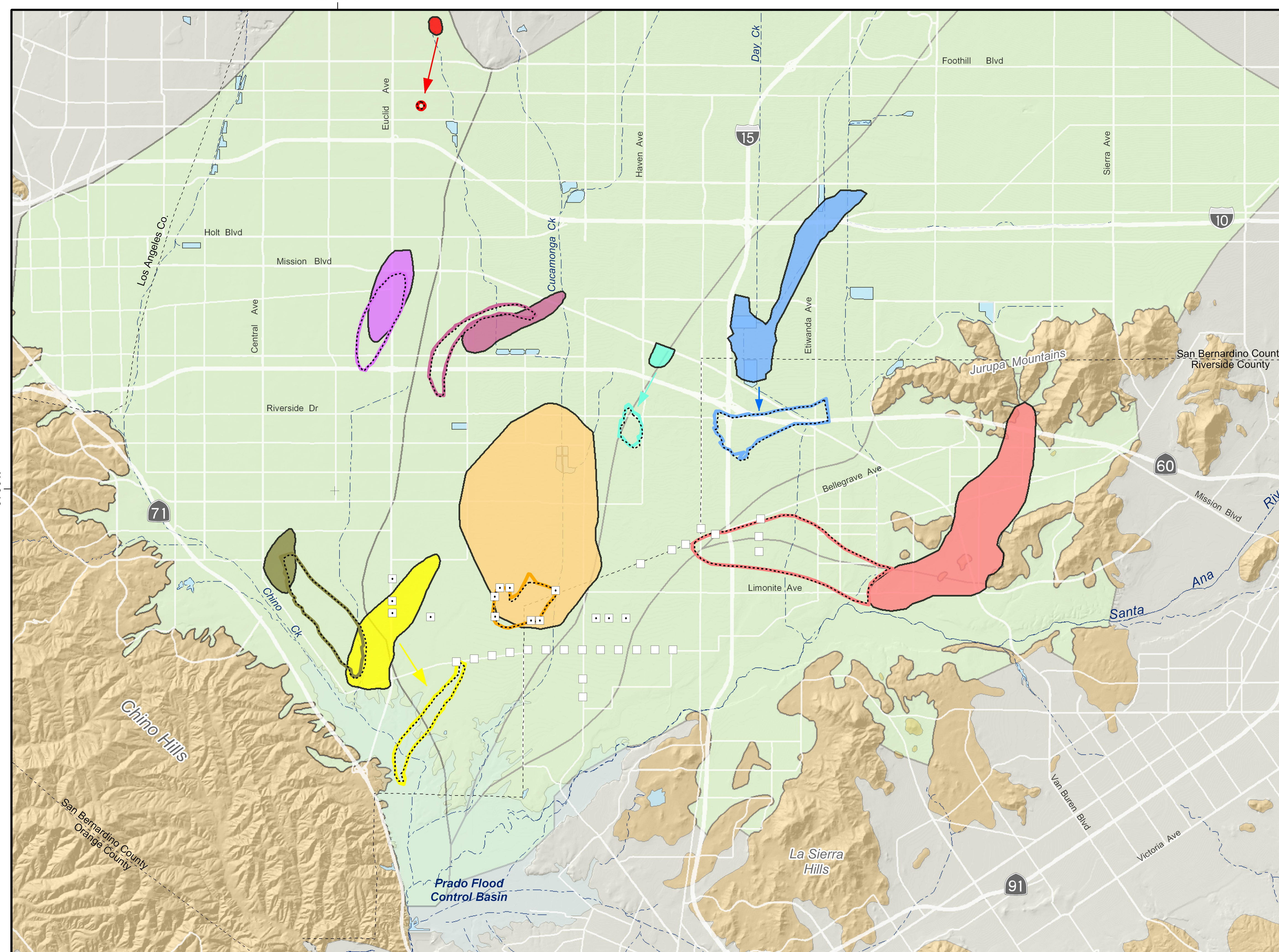
Inland Empire Utilities Agency

Chino Basin Dry-Year Yield Program
Water Quality

Location of Known Contamination Sources and Related Water Quality Anomalies

Figure 3-21

Figure 15 to Wildermuth's April 13, 2007 Declaration Related to the Chino Basin Watermaster's Application No. 31369



Groundwater Contaminant Plumes of Concern (2003)

- Stringfellow
- Un-Named VOC Plume
- Chino Airport
- Kaiser
- GE Flat Iron
- Upland Sanitary Landfill
- GE Test Cell
- Milliken Landfill
- Chino Institution for Men

Model Projected Locations of Plumes (2028)

- Baseline Scenario (Different Colored Outlines)
- Dry-Year-Yield Scenario

Other Features

- Existing Desalter Well
- Proposed Desalter Well
- Flood Control and Conservation Basins
- Chino Basin
- Unconsolidated Sediments
- Consolidated Bedrock

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File: figure_7-4.mxd

0 1 2 3 4 Miles
0 2 4 6 KM

Chino Basin Dry-Year Yield Program
Water Quality

Inland Empire Utilities Agency

Estimated Location of Water Quality Anomalies in 2003 and their Projected Locations in 2028 for Baseline and Dry-Year Yield Scenarios

Figure 7-4

Figure 16 to Wildermuth's April 13, 2007 Declaration Rrelated to the Chino Basin Watermaster's Application No. 31369
Total Chino Basin Production, Watermaster Replenishment Requirement and Replenishment Plan That Balances Recharge and Discharge
Desalters I, II at 33.2 mgd and Chino Creek Well Field A (or B) Pumping at 6.9 mgd, Half Replenishment

						Supplemental Water Recharge Plan																	
						MZ 1 Recharge Basins					MZ 2 Recharge Basins								MZ 3 Recharge Basins				
Fiscal Year	Total Production	Chino Desalter Pumping	Operating Yield	New Stormwater Recharge	Replenishment Obligation	Montclair 1-4	Upland	Brooks	8th & 7th	Subtotal	San Sevaine	Victoria	Hickory	Lower Day	Turner 1	Turner 3&4	Ely	Subtotal	Banana	RP3	Declez	Subtotal	Total
2006	224,844	31,357	145,000	12,000	52,165	12,897	9,251	5,320	3,137	30,605	4,394	562	6,278	2,895	1,568	1,339	4,524	21,560	0	0	0	0	52,165
2007	230,000	31,357	145,000	12,000	57,322	12,897	9,251	5,320	3,137	30,605	8,965	1,147	6,278	2,895	1,568	1,339	4,524	26,717	0	0	0	0	57,322
2008	235,164	31,357	145,000	12,000	62,485	12,897	9,251	5,320	3,137	30,605	13,543	1,733	6,278	2,895	1,568	1,339	4,524	31,880	0	0	0	0	62,485
2009	240,328	31,357	145,000	12,000	67,649	12,897	9,251	5,320	3,137	30,605	18,121	2,319	6,278	2,895	1,568	1,339	4,524	37,044	0	0	0	0	67,649
2010	245,484	31,357	145,000	12,000	72,805	12,897	9,251	5,320	3,137	30,605	22,692	2,904	6,278	2,895	1,568	1,339	4,524	42,200	0	0	0	0	72,805
2011	255,607	42,819	145,000	12,000	77,197	12,897	9,251	5,320	3,137	30,605	26,396	3,378	6,278	2,895	1,568	1,339	4,524	46,378	38	114	62	214	77,197
2012	254,268	42,819	145,000	12,000	75,858	12,897	9,251	5,320	3,137	30,605	25,399	3,250	6,278	2,895	1,568	1,339	4,524	45,253	0	0	0	0	75,858
2013	252,926	42,819	145,000	12,000	74,516	12,897	9,251	5,320	3,137	30,605	24,209	3,098	6,278	2,895	1,568	1,339	4,524	43,911	0	0	0	0	74,516
2014	251,587	42,819	145,000	12,000	73,178	12,897	9,251	5,320	3,137	30,605	23,022	2,946	6,278	2,895	1,568	1,339	4,524	42,573	0	0	0	0	73,178
2015	250,246	42,819	145,000	12,000	71,836	12,897	9,251	5,320	3,137	30,605	21,833	2,794	6,278	2,895	1,568	1,339	4,524	41,231	0	0	0	0	71,836
2016	250,458	42,819	145,000	12,000	72,048	12,897	9,251	5,320	3,137	30,605	22,021	2,818	6,278	2,895	1,568	1,339	4,524	41,443	0	0	0	0	72,048
2017	250,670	42,819	145,000	12,000	72,260	12,897	9,251	5,320	3,137	30,605	22,209	2,842	6,278	2,895	1,568	1,339	4,524	41,655	0	0	0	0	72,260
2018	250,881	42,819	140,000	12,000	77,471	12,897	9,251	5,320	3,137	30,605	26,396	3,378	6,278	2,895	1,568	1,339	4,524	46,378	87	260	141	488	77,471
2019	251,090	42,819	140,000	12,000	77,681	12,897	9,251	5,320	3,137	30,605	26,396	3,378	6,278	2,895	1,568	1,339	4,524	46,378	125	372	201	698	77,681
2020	251,301	42,819	140,000	12,000	77,891	12,897	9,251	5,320	3,137	30,605	26,396	3,378	6,278	2,895	1,568	1,339	4,524	46,378	162	484	262	908	77,891
2021	254,079	42,819	140,000	12,000	80,669	12,897	9,251	5,320	3,137	30,605	26,396	3,378	6,278	2,895	1,568	1,339	4,524	46,378	658	1,966	1,063	3,686	80,669
2022	256,858	42,819	140,000	12,000	83,448	12,897	9,251	5,320	3,137	30,605	26,396	3,378	6,278	2,895	1,568	1,339	4,524	46,378	1,154	3,448	1,864	6,465	83,448
2023	259,636	42,819	140,000	12,000	86,226	12,897	9,251	5,320	3,137	30,605	26,396	3,378	6,278	2,895	1,568	1,339	4,524	46,378	1,650	4,929	2,664	9,243	86,226
2024	262,414	42,819	140,000	12,000	89,005	12,897	9,251	5,320	3,137	30,605	26,396	3,378	6,278	2,895	1,568	1,339	4,524	46,378	2,145	6,411	3,465	12,022	89,005
2025	265,193	42,819	140,000	12,000	91,784	12,897	9,251	5,320	3,137	30,605	26,396	3,378	6,278	2,895	1,568	1,339	4,524	46,378	2,641	7,893	4,266	14,801	91,784
2026	266,163	42,819	140,000	12,000	92,754	12,897	9,251	5,320	3,137	30,605	26,396	3,378	6,278	2,895	1,568	1,339	4,524	46,378	2,814	8,410	4,546	15,771	92,754
2027	267,134	42,819	140,000	12,000	93,725	12,897	9,251	5,320	3,137	30,605	26,396	3,378	6,278	2,895	1,568	1,339	4,524	46,378	2,988	8,928	4,826	16,742	93,725
2028	268,104	42,819	140,000	12,000	94,694	12,915	9,264	5,327	3,141	30,648	26,433	3,383	6,287	2,899	1,570	1,341	4,530	46,443	3,141	9,387	5,074	17,603	94,694
2029	269,074	42,819	140,000	12,000	95,665	13,048	9,359	5,382	3,174	30,962	26,704	3,417	6,351	2,929	1,586	1,355	4,577	46,919	3,174	9,483	5,126	17,783	95,665
2030	270,045	42,819	140,000	12,000	96,635	13,180	9,454	5,437	3,206	31,276	26,975	3,452	6,416	2,958	1,602	1,368	4,623	47,395	3,206	9,580	5,178	17,964	96,635