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Chino Basin Watermaster

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN BERNARDINO

CHINO BASIN MUNICIPAL WATER DISTRICT, Plaintiff, v. CITY OF CHINO, et al., Defendants.	CASE NO. RCV 51010 SUPPLEMENTAL SCOPE AND LEVEL OF DETAIL FOR THE OPTIMUM BASIN MANAGEMENT PROGRAM Hearing Date: 11/5/98 Time: 10:00 ~~8:30~~ a.m. Department: RC-H Specially assigned to the Honorable Judge J. Michael Gunn

PRELIMINARY

On September 9, 1998, the court continued the hearing on the motion of the Watermaster for approval of the Scope and Level of Detail of the Optimum Basin Management Program ("OBMP"). The court instructed the Watermaster to provide additional material on "problems" expected to be encountered in the implementation of the OBMP. The court set November 5, 1998 to hear the continued motion. The following is submitted in response to the court's instructions.

PROBLEMS OF BASIN MANAGEMENT

On September 23 and 24, workshops were conducted on the review of draft Sections 1 and 2 of the OBMP report. Sections 1 and 2 were prepared by Wildermuth Environmental, Inc. An oral presentation of future water demands was prepared by David Ringel of Montgomery Watson

Americas, Inc. Another workshop was held on September 30, 1998, at which the Special Referee attended and participated in the discussions. After these workshops, Traci Stewart, Chief of Watermaster Services, and Mark J. Wildermuth of Wildermuth Environmental, Inc., met with the Special Referee on October 5, 1998, to review the OBMP goals and problems within the Chino Basin. On October 15, 1998, a table containing the OBMP goals, impediments, action items, and implications of the action items was reviewed by the Watermaster, producers, and the Special Referee. Based on that review, the table was modified and the resulting table is attached herein. A summary of groundwater problems based on draft Sections 1 and 2 of the OBMP report is presented herein.

1. Ground-Level Problems

Overall, groundwater levels have declined between 50 to 200 feet in the Chino Basin since the turn of the century (see Figures 1 and 2). The western side of the Basin, notably Management Zones 1a and 1b, has experienced the greatest decline in groundwater levels. The City of Chino and Chino Institute for Men ("CIM") have recently experienced ground-surface fissures that are thought to be related to increased groundwater production in the vicinity of the City of Chino. Subsidence in the center of the City of Chino has reached about 2 feet over the last ten years. Groundwater producers that affect groundwater levels in this area include the cities of Chino, Chino Hills, Ontario, Pomona, the Monte Vista Water District, CIM, and agricultural producers. The City of Chino Hills has reported loss of production at one well due to recently declining groundwater levels. The management steps to eliminate groundwater level problems in this area are described below.

Ground-Level Survey. Conduct a ground-level survey of the area in Management Zone 1 (see Figure 1). This would include a review of past surveys, as well as new surveys. The results of the new survey would be compared to historical surveys to determine the location, rate, and magnitude of subsidence in the Basin. Periodic surveys should be conducted afterwards to monitor for further subsidence.

Monitoring. Develop and implement a groundwater-level and quality-monitoring program that can be used to observe groundwater trends and define local groundwater flow systems. This program should be developed and implemented before a groundwater recharge/production management plan is developed for Management Zone 1.

Balance Groundwater Production and Recharge. Balance groundwater production with recharge in Management Zone 1, or, if necessary, balance production and recharge more locally within Management Zone 1. This may require temporarily reducing production below the level at which balance occurs to bring groundwater levels up to a reasonable operating level. A *reasonable operating level* is defined herein as a groundwater level for which the area no longer suffers subsidence and at which minimum production levels can be sustained. The *reasonable operating level* for Management Zone 1 needs to be determined. Recharge of local or native water and imported water should be increased as much as practical. Given that recharge in the area is maximized, production may still have to be reduced in Management Zone 1 and replaced with either production from Management Zone 2 or some other source of water.

2. Groundwater Storage

The Chino Basin has immense storage capacity. Since the Judgment was implemented, total groundwater storage appears to have stabilized. However, the storage in the Basin has declined by about 1,000,000 acre-feet since 1933. Therefore, there is at least 1,000,000 acre-feet of unused storage capacity available in the Basin. Increasing storage has some costs. There will be losses to the Santa Ana River due to rising groundwater. Previous analyses suggests the losses from local and cyclic storage accounts due to rising groundwater during the period 1978 to 1997 could be as high as 50,000 acre-feet (or 18% of the volume that Watermaster assumes is in storage). Ignoring these losses will result in overdraft of the Chino Basin. A significant increase in groundwater storage, say on the order of 100,000s of acre-feet, may induce large groundwater losses to the Santa Ana River. In addition, a storage increase of this magnitude may have groundwater quality impacts due to flushing of contaminants within the vadose zone. The volume of safe storage from a water quality perspective is unknown. The management steps to mitigate the significant issues with groundwater storage are described below:

Develop Storage Accounting System that Includes Losses. Presently, Watermaster keeps track of transfers to and from local and cyclic storage accounts without accounting for groundwater losses. Watermaster should adopt a loss-estimating procedure and adjust the volume in storage accounts each year.

Water Quality Impacts from Conjunctive Use Programs. Mitigation measures need to be developed to protect producers in the event that large conjunctive-use programs cause unacceptable water quality impacts.

3. Groundwater Production Problems

The primary issues for groundwater production are localized overdraft in Management Zone 1, and the potential changes in safe yield that can occur with changes in the location and magnitude of pumping. The location and amount of groundwater production generally appears to be balanced in the Basin except for Management Zone 1. Groundwater levels need to be increased in Management Zone 1 to minimize future subsidence and ground fissures, maintain production at a sustainable level, and improve groundwater quality.

Groundwater production in the southern half of the Basin will need to be managed to ensure that safe yield is not reduced as agricultural areas convert to urban uses. Losses in safe yield due to decreases in agricultural production in the southern part of the Basin are distributed among the appropriators based on their initial share of safe yield. Thus, the loss in yields is translated throughout the Basin. Increasing production near the Santa Ana River could enhance existing safe yield. The management steps for addressing this issue are listed below.

Optimization Studies. Conduct studies to optimize groundwater production patterns in Southern Chino Basin. These studies will involve intensive monitoring, geologic investigations, and modeling and facility studies.

Southern Basin Water Supply Plan. Develop a groundwater production and treatment plan that matches the emerging water demands of development in Southern Chino Basin with facilities necessary to produce water of appropriate quality.

4. Water Quality

The total dissolved solids ("TDS") and nitrate problems in the Basin are the most costly to deal with and seemingly are being left to municipal water purveyors to solve. Some point-source dischargers of organic solvents and other contaminants are dealing with their related groundwater plumes. The cost of TDS and nitrate removal is estimated to be about $700 per acre foot. The cost to remove solvents is generally under $100 per acre-foot. Figure 3 shows the locations of known point sources and areas with impaired water quality in the Chino Basin.

The primary sources of the TDS and nitrate contamination in the northern part of the Basin have mostly disappeared. The primary sources of TDS and nitrate degradation in the southern part of the Basin are dairies and they will probably remain active for the next 20 years. TDS and nitrate degradation should continue in the Southern Basin for the foreseeable future and the cost to treat contaminated groundwater will escalate over current costs due to past and continued animal waste disposal practices. Legacy contamination in the vadose zone from past irrigated and dairy land uses will continue to degrade groundwater for the foreseeable future. Regulatory agencies do not have adequate resources to assert their authority to prevent degradation and force clean up of degraded groundwater. Producers and other local agencies have not taken a leadership role in comprehensively addressing water quality problems. Elevated TDS and nitrate levels in groundwater limit the recharge of recycled water for basin replenishment. The steps to manage groundwater quality problems in the Basin are described below.

Point-Source Management. Watermaster should work with the Regional Water Quality Control Board ("RWQCB"), Department of Toxic Substances Control ("DTSC"), and other regulatory agencies to identify point-source discharge related problems, facilitate their solution, and where necessary, use its institutional influence to obtain prompt and satisfactory mitigation. In some cases, the solution to a point-source problem and a non-point source problem can be addressed through one coordinated capture and treat project with reduced cost to all parties.

Non-point Source Management. The groundwater contaminated from non-point sources in the northern and southern parts of the Basin will need to be treated through dilution, demineralization or some other process, so that the water can be put to beneficial use. This is absolutely necessary in the Southern Chino Basin to maintain safe yield. The *Optimization Studies* and *Southern Basin Water Supply Plan* steps listed under *Groundwater Production* apply here as well. The export of dairy waste from the Basin should be maximized.

5. Safe Yield Problems

All the problems listed above need to be addressed to maintain safe yield. In addition to those steps, maximizing the capture and recharge of storm water and reclaimed water could increase safe yield. The San Bernardino County Flood Control District ("SBCFCD"), Riverside County Flood Control and Water Conservation District ("RCFCWCD"), and the US Army Corps of Engineers ("USACE") have developed and continue to develop new flood control projects that efficiently convey flood waters out of the Chino Basin and reduce recharge. This has a negative impact on safe yield. Watermaster needs to participate in these flood control projects to maximize recharge. Watermaster and the Chino Basin Water Conservation District ("CBWCD") initiated a multi-phase recharge master plan study and completed Phase 1 in May 1998. This work needs to be completed.

SCOPING ISSUES

Based on discussions with the Special Referee, minor changes to the OBMP scope of work were developed to reflect the goals described in the attached table. Draft Sections 1, 2, and 3 of the OBMP report will be reorganized so the description of the goals will follow the description of the problems and water resources planning issues.

CONCLUSION

Watermaster respectfully requests the court to approve the Scope and Level of Detail for the OBMP as set forth in the moving papers and in this supplement. (See Exhibit 1).

Dated: Oct 23, 1998

Respectfully submitted,

LEMIEUX & O'NEILL

By: [signature]
Wayne K. Lemieux

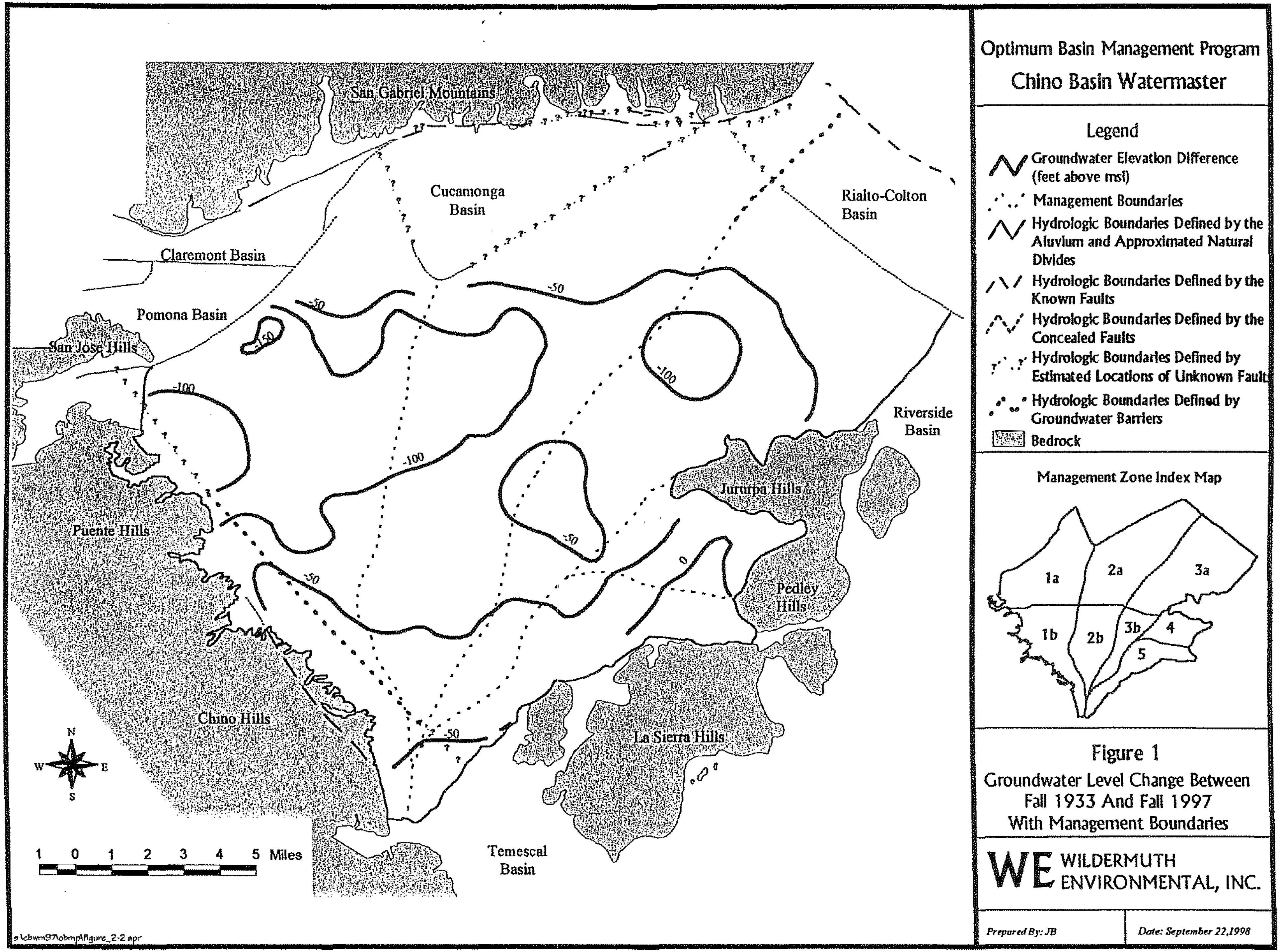
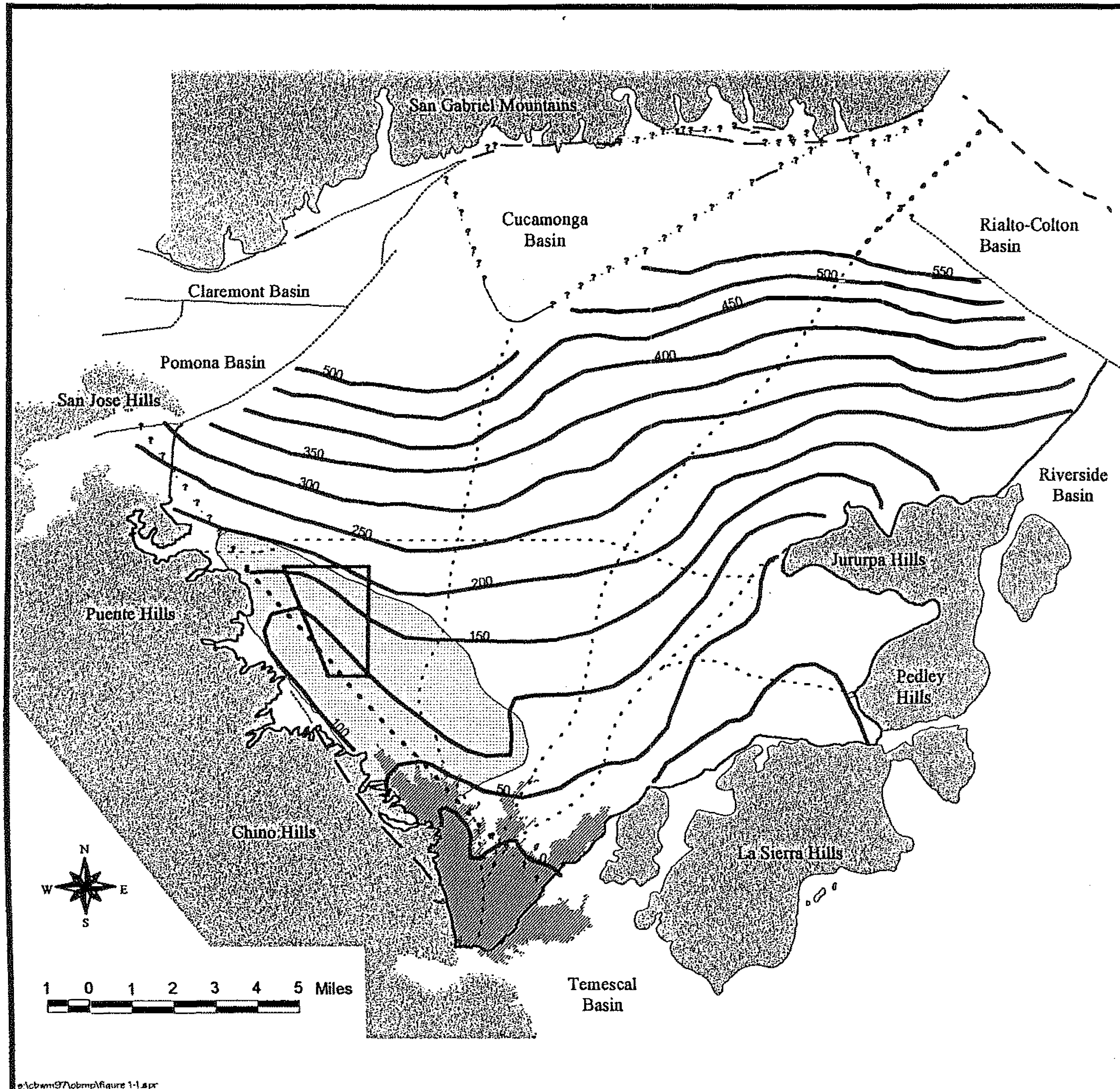


Figure 1
Groundwater Level Change Between Fall 1933 And Fall 1997 With Management Boundaries



Optimum Basin Management Program

Chino Basin Watermaster

Legend

- Depth to Groundwater – Fall 1997 (feet)
- Artesian Well Area (Mendenhall, 1908)
- Estimated Area of Regional Subsidance (Kleinfelder 1993)
- Prado Dam Basin
- Hydrologic Boundaries Defined by the Aluvium and Approx. Natural Divides
- Hydrologic Boundaries Defined by the Known Faults
- Hydrologic Boundaries Defined by the Concealed Faults
- Hydrologic Boundaries Defined by Estimated Locations of Unknown Faults
- Hydrologic Boundaries Defined by Groundwater Barriers
- Bedrock

Management Zone Index Map

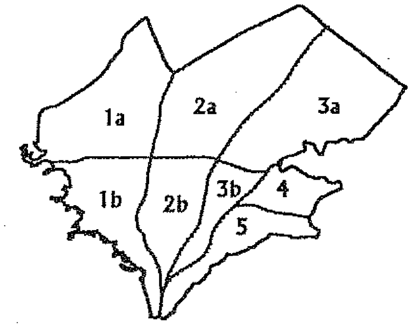


Figure 2

Depth To Water For 1997 And Artesian Area In 1902

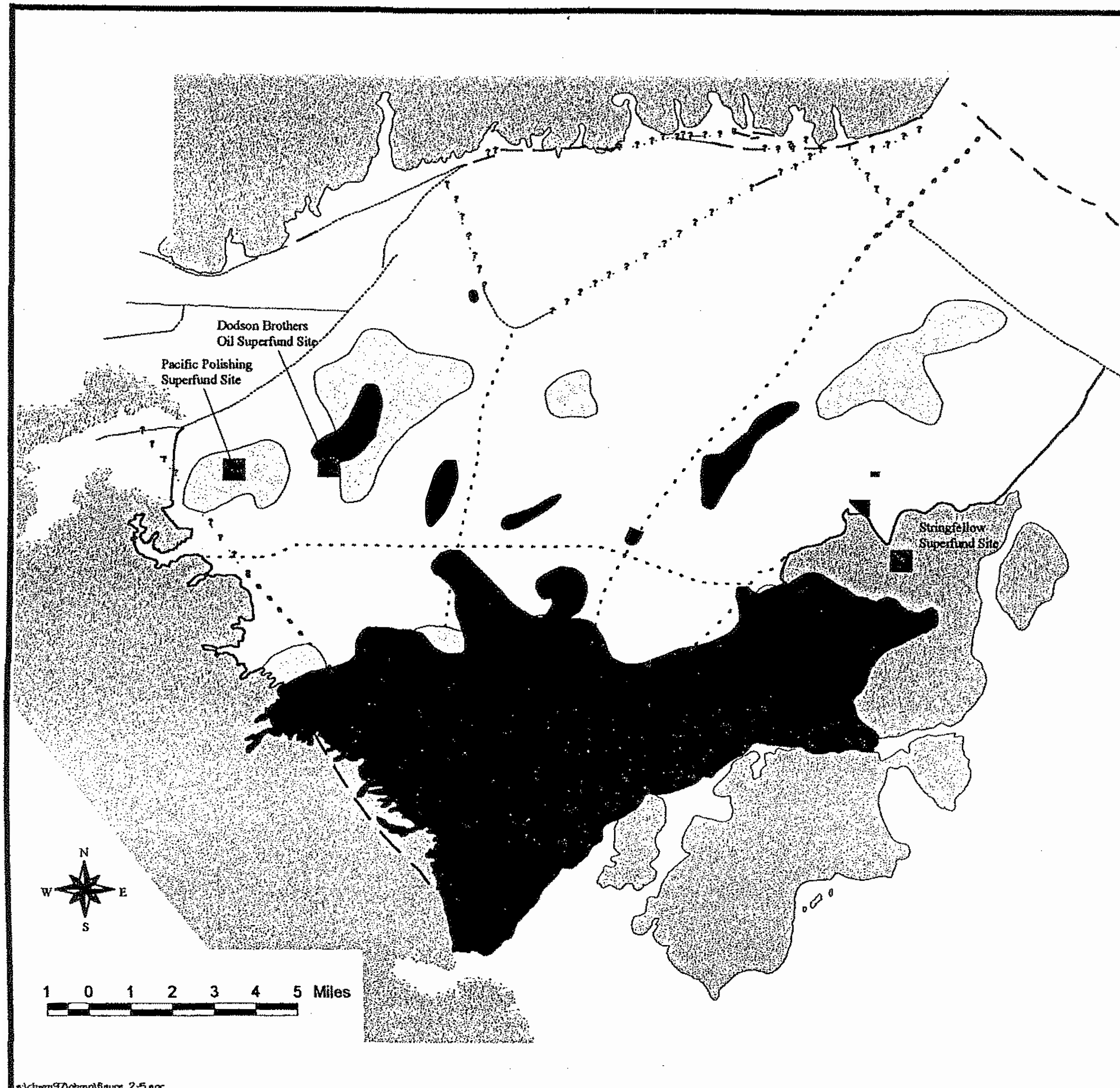
WE WILDERMUTH ENVIRONMENTAL, INC.

Prepared By: JB

Date: September 22,1998

Optimum Basin Management Program

Chino Basin Watermaster



Legend

- Area with TDS > 500 mg/L and NO3-N > 8 mg/L
- Area with TDS > 500 mg/L and NO3-N < 8 mg/L
- Area with TDS < 500 mg/L and NO3-N > 8 mg/L
- Known Point Sources and Plumes
- Superfund Sites

Management Zone Index Map

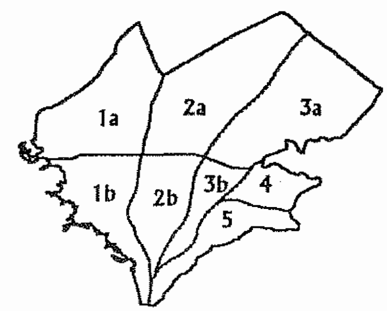


Figure 3

Locations Of Known Point Sources And Areas With Impaired Water Quality In The Chino Basin

WE WILDERMUTH ENVIRONMENTAL, INC.

Prepared By: JB

Date: September 22,1998

Summary Matrix of OBMP Goals, Impediments, Action Items, and Implications

Goal	Impediments to the Goal	Action Items to Implement Goal	Implications
Enhance Basin Water Supplies	1 Unless certain actions are taken the safe yield of the basin will be reduced.		
	1a Basin yield is lost due to groundwater outflow from the southern part of basin.	Maintain or increase groundwater production in southern part of the basin; treat and serve contaminated groundwater from southern third of the basin.	This action will maintain and possibly increase safe yield; reducing production to levels below 1965-74 will result in a loss of safe yield. This action will result in improved water quality in the Santa Ana River.
		Locate new recharge facilities in the upper half of the basin.	Recharge in the upper half of the basin ensures that the water recharged can be recovered and put to beneficial use; recharge in the lower half of the basin may be lost to the Santa Ana River.
		Locate new recharge facilities in the lower half of the basin when recovery of recharged water can be ensured.	This action will result in localized water quality and supply improvements in the lower half of the basin.
		Develop and implement a comprehensive groundwater level, quality, and production monitoring program.	This action will provide Watermaster with the information necessary to determine outflow to the river, actual production, and to design groundwater treatment facilities. This action is necessary to maintain yield.
	1b The basin is not using as much high quality stormwater as it could for recharge.	Develop and implement a comprehensive plan of stormwater recharge.	This action will result in a list of feasible recharge projects that when implemented will maintain/increase basin yield, improve surface water and groundwater quality, and reduce the cost of flood control projects.
		Develop a comprehensive stormwater flow and quality monitoring program in partnership with other agencies charged with flow and quality monitoring.	This action will provide data that can be used to quantify the increase in yield through stormwater recharge and will provide water quality benefits.

Goal	Impediments to the Goal	Action Items to Implement Goal	Implications
			This action will quantify offset credits for recycled water recharge.
		Develop new stormwater recharge projects at existing and future flood control facilities.	This action will maintain/increase yield and improve groundwater quality.
		Maximize recharge capacity at existing recharge facilities through improved maintenance.	This action will maintain/increase yield and improve groundwater quality.
	1c The current manner Watermaster manages cyclic and local storage accounts will cause overdraft.	Develop methods to account for losses from cyclic and local storage accounts; and set limits on storage.	This action will help maintain the safe yield and ensure that basin water is put to maximum beneficial use.
	2 Unless certain actions are taken, groundwater levels in Management Zone (MZ) 1 will continue to decline adding to the potential for additional subsidence and fissures, lost production capability, and water quality problems.	Develop comprehensive ground level, groundwater level and quality monitoring program in MZ 1.	This action will provide engineering and scientific information that can be used to accurately assess groundwater conditions and manage MZ 1.
		Develop groundwater management program for MZ 1 consisting of:	This action will result in a plan that will reduce potential future subsidence and occurrence of ground fissures, maintain minimum levels of production, and improve water quality.
		Increase recharge of stormwater and supplemental water in MZ 1.	This action will help maintain or increase groundwater levels and reduce the potential for subsidence and ground fissures.
		Manage groundwater production in MZ 1 to a sustainable level to minimize subsidence.	This action will help maintain or increase groundwater levels and reduce the potential for subsidence and ground fissures.
		Increase direct use of supplemental water in MZ 1 (including in lieu deliveries).	This action will help maintain or increase groundwater levels and reduce the potential for subsidence and ground fissures.

Goal	Impediments to the Goal	Action Items to Implement Goal	Implications
	3 Because there is limited assimilative capacity for total dissolved solids (TDS) and nitrogen in the basin, there are economic limitations on the recharge of recycled water.	Create new assimilative capacity through the development of offset programs and through other mitigation programs.	This action will result in increased use of reclaimed water and will decrease the dependence on expensive and less reliable imported sources.
	4 Because future demands are increasing and there are limitations on basin and traditional supplemental supplies, new sources of supplemental water need to be developed.	Maximize the direct use of recycled water.	This action will reduce the dependence on expensive and less reliable imported sources.
		Develop new sources of supplemental water from the Bunker Hill Basin, the Santa Ana River and other outside basin sources.	This action will ensure that there will be adequate supplies of high quality water to meet future demands.

Goal	Impediments to the Goal	Action Items to Implement Goal	Implications
Protect and Enhance Water Quality	1 Watermaster lacks comprehensive, long term information on groundwater quality.	Develop and implement a comprehensive groundwater quality monitoring program.	This action will provide a comprehensive assessment of current and future water quality problems and solutions in the basin. This action will contribute to the the least-cost and most expedient plans to protect, enhance and use groundwater to the maximum extent possible.
	2 Point and non-point pollution are not being adequately addressed.		
	2a RWQCB does not have adequate resources to address all the water quality problems within its jurisdiction in the Chino Basin.	Provide funding to RWQCB to ensure that the Board has resources to address problems within the basin.	This action will improve RWQCB timeliness and success in preventing pollution and cleaning up degradation.
		Coordinate with regulatory agencies to share monitoring and other information to detect and define water quality problems.	This action will result in more efficient use of Watermaster, producer and regulatory agency resources.
		Take coordinated action regarding RWQCB priorities.	This action will improve RWQCB timeliness and success in preventing water quality degradation and in cleaning up existing degradation; may include Watermaster entering litigation to assist in clean up.
		Participate in projects of mutual interest.	This action will result in more efficient use of resources of Watermaster, producers, and dischargers.
	2b Neither Watermaster nor other entities have taken a leadership role in comprehensively addressing point and non-point source problems.	Develop and implement programs to address problems posed by specific contaminants such as TDS, nitrate, methyl ter-butyl ether (MTBE), perchlorate and others.	This action will improve timeliness and success in preventing water quality degradation and in cleaning up existing degradation.
	2c There is ongoing salt and nitrogen loading from dairies. Source water quality available to the dairies is often too degraded to be discharged.	Export manure.	This action will reduce TDS and nitrogen degradation of surface water and groundwater at less cost than treatment of receiving waters.

Summary Matrix of OBMP Goals, Impediments, Action Items, and Implications

Goal	Impediments to the Goal	Action Items to Implement Goal	Implications
		Treat dairy sewage and eliminate discharge to groundwater, or export dairy sewage.	This action will reduce TDS and nitrogen degradation of surface water and groundwater at less cost than treatment of receiving waters.
	3 There is ongoing and legacy contamination in vadose zone with TDS and nitrogen from historic dairy and other irrigated agricultural practices.	Develop regional and local groundwater treatment systems to treat groundwater for direct beneficial use.	This action will improve groundwater quality, maintain/increase safe yield, and maximize beneficial use of basin water.
	4 Poor ambient groundwater quality limits direct use of groundwater and can lead to loss of basin yield.	Develop programs (regional treatment, incentives, etc) to pump and treat degraded groundwater and to put the treated water to direct use.	This action will speed up the cleanup of degraded water, stop the spreading of degradation and maintain/increase safe yield.
	5 The basin is not using as much high quality stormwater as it could for recharge.	Develop and implement a comprehensive plan of recharge for stormwater.	This action will result in a list of feasible recharge projects that when implemented will maintain/increase basin yield, improve surface water and groundwater quality, and reduce the cost of flood control projects.
		Develop a comprehensive stormwater flow and quality monitoring program in partnership with other agencies charged with flow and quality monitoring.	This action will provide data that can be used to quantify the increase in yield through stormwater recharge and will provide water quality benefits.
			This action will quantify offset credits for recycled water recharge.
		Develop new stormwater recharge projects at existing and future flood control facilities.	This action will maintain/increase yield and improve groundwater quality.
		Maximize recharge capacity at existing recharge facilities through improved maintenance.	This action will maintain/increase yield and improve groundwater quality.

Goal	Impediments to the Goal	Action Items to Implement Goal	Implications
	6 The basin is hydrologically closed.		
	6a The southern part of the basin will accumulate TDS and nitrogen if yield is maintained or increased.	Periodically assess the salt balance of the basin.	This action will provide one of a group of metrics from which the success of the water quality component of the OBMP will be assessed. A salt balance that shows a declining salt mass in storage will indicate an improvement in water quality.
	6b There is a lack of cost-effective groundwater salt export facilities.	Develop new TDS export facilities and/or find means of using Non Reclaimable Waste Line and the Santa Ana Regional Interceptor with less cost.	This action will result in TDS and and nitrogen removal, improvement in groundwater quality, will maintain/increase basin yield, and improve Santa Ana River quality.
		Establish financial incentives to ensure that existing groundwater is pumped and that high quality water is used to replenish the basin.	This action will result in more TDS and and nitrogen removal, improvement in groundwater quality, will maintain/increase basin yield, and improve Santa Ana River quality.
	6c Existing production patterns in the basin cause salt and nitrate to accumulate in the southern end of the basin.	Increase recharge without an increase in production to cause an increase in rising water	This action will result in a gradual improvement in groundwater quality in the southern part of the basin and an increase in TDS and nitrogen degradation in the Santa Ana River.

Goal	Impediments to the Goal	Action Items to Implement Goal	Implications
Enhance Management of the Basin	1 The way Watermaster manages cyclic and local storage accounts will cause overdraft.	Develop methods to account for losses from cyclic and local storage accounts; set limits on storage.	This action will help maintain the safe yield and ensure that basin water is put to maximum beneficial use.
	2 Existing production patterns are not balanced, cause losses, can cause local subsidence, and water quality problems.	Develop and implement a comprehensive groundwater level, quality, and production monitoring program.	This action will provide information that can be used to understand the groundwater flow system and quality conditions.
		Develop new production patterns that maximize yield and beneficial use; and develop policies that encourage (or rules that enforce) new production patterns.	This action will maximize yield and beneficial use of basin water; improve basin water quality, and improve Santa Ana River quality.
	3 About 500,000 to 1,000,000 acre-ft of storage in the Chino Basin cannot be used due to water quality and institutional issues.	Develop conjunctive use programs with Metropolitan Water District of Southern California, Orange County Water District, and others that take into account water quantity and quality.	This action will result in lower water supply costs to basin producers.
	4 Poor ambient groundwater quality limits direct use of groundwater and can lead to loss of basin yield.	Develop programs (regional treatment, incentives, etc) to pump and treat degraded groundwater and to put the treated water to direct use.	This action will speed up the cleanup of degraded water, stop the spreading of degradation and maintain/increase safe yield.
Equitably Finance the OBMP	1 The equitable distribution of cost associated with the OBMP is not defined.	Identify an equitable approach to spread the cost of OBMP implementation either on a per acre-ft basis or some other equitable means.	This action will improve the likelihood that the OBMP will be implemented.
		Identify ways to recover value from utilizing basin assets including storage and rising water leaving the basin.	This action will lower the cost of the OBMP to producers and improve the likelihood that OBMP will be implemented.
	2 Limited resources restrict potential water resources improvements of the OBMP.	Evaluate project and management components and rank components with equal consideration given to water quantity, water quality and cost.	This action will result in the optimum set of project and management components of the OBMP being implemented.

RECOMMENDED SCOPE OF WORK
for the Development of the
Chino Basin
Optimum Basin Management Program

Prepared by

Chino Basin Watermaster

June 25, 1998
First Revision: August 7, 1998
Second Revision: October 21, 1998

EXHIBIT 1

RECOMMENDED SCOPE OF WORK for the Development of the Chino Basin OPTIMUM BASIN MANAGEMENT PROGRAM

Development of the Optimum Basin Management Program (OBMP) requires three parallel processes: institutional, engineering, and financial. The institutional process defines the management agenda, directs the engineering and financial processes, and builds an institutional consensus for OBMP implementation. The engineering process develops planning data and evaluates the technical and economic performance of the OBMP proposals. The financial process will develop alternative financing plans for the OBMP as it evolves. These processes will provide feedback to each other as the OBMP is developed.

Institutional Process

The institutional process includes the following tasks:

- Task 1 Identify needs and interests of interested parties.
- Task 2 Establish a meeting schedule necessary to complete OBMP within the time-frame allocated.
- Task 3 Develop and refine the recommended scope of work based on needs identified.
- Task 4 Identify early implementation actions and develop list of potential components of the OBMP to balance needs and interests expressed.
- Task 5 Evaluate components and develop recommended management program and implementation plan.

The first three tasks are completed with the submission of the recommended scope of work to the Special Referee and the Court. The meeting schedule has been set for the second and fourth Thursdays of each month, unless more meetings (*e.g.*, subgroups or working committees) are suggested on an as-needed basis. New needs and interests may be identified as progress to complete the OBMP is made and they will be addressed during development of the final OBMP document.

Task 4 work was begun in June 1998 with several early implementation action items having already been approved and with initial management concepts submitted to begin the list of potential components of the OBMP. The management concepts being submitted represent concepts or implementation plans that describe the party's vision of the OBMP. Submission of management concepts will continue into July and August and should reflect the needs and interests that were previously identified for the OBMP. These proposals will be presented to the group for discussion, and the discussion will center on identifying components of the proposals that best balance the competing needs and interests for basin utilization. All proposals submitted will be discussed and listed.

For Task 5, those proposals that appear the most promising will be forwarded to the engineering and financial consultants for reconnaissance-level, technical, economic and financial analyses. The results of the engineering and financial analyses will be submitted back to the producers and Watermaster for review. It is anticipated this will be a lengthy and iterative process that should continue as long as necessary within the time constraints described in the Judge's ruling.

Working together, the producers and the Watermaster Board will, by the conclusion of Task 5, recommend an Optimum Basin Management Program. The recommendation will include a proposed implementation plan. The engineering and financial consultants will prepare the final OBMP documents for Watermaster to submit to the Special Referee and the Court.

Engineering Process

The engineering process is fairly well defined and is included in a subsequent section of this document. The tasks include:

- Task 1 Develop Optimum Basin Management Program Criteria
- Task 2 Assess Current State of the Basin
- Task 3 Prepare Sections 1, 2, and 3 of the Optimum Basin Management Program Document
- Task 4 Develop the Components of the Optimum Basin Management Program
- Task 5 Develop Implementation Plan
- Task 6 Finalize Optimum Basin Management Program Document

Tasks 1 and 2 define the basin problems (Attachment 1), planning environment, needs and interests that forms the basis for the Optimum Basin Management Program. As of October 21, 1998, Tasks 1, 2, and 3 are nearly complete. Tasks 4 and 5 respond directly to the institutional process and include evaluation of OBMP proposals and the preparation of an implementation plan. The OBMP document will be developed in Task 6.

Financial Process

The financial process will review the Optimum Basin Management Program proposals that have been through the institutional and engineering processes. It tentatively includes the following tasks:

- Review the economic analyses of the components of the Optimum Basin Management Program
- List the available funding sources that may be appropriate
- Describe the terms and conditions for these sources
- Describe the requirements and procedures for obtaining funding from these sources
- Describe the timeline for obtaining funding from these sources

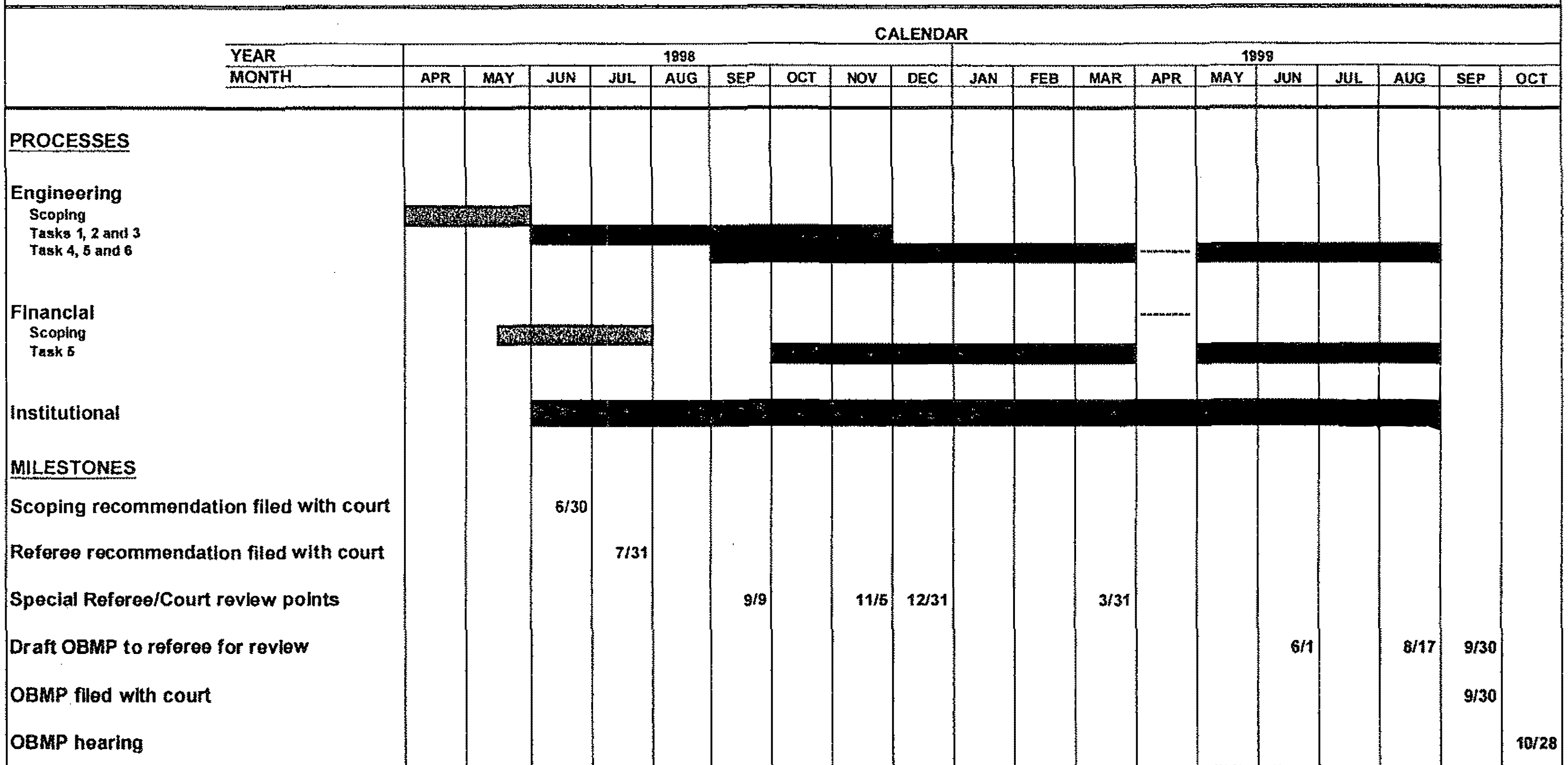
- Develop a robust financial plan for the final Optimum Basin Management Program including:
  - Palette of funding sources
  - Administrative activities
  - Institutional activities (lobbying, partnering, etc.)

A very tentative, draft scope of work for the financial process is included in the final section of this document. It was developed without the review of a financial consultant, and without the benefit of feedback through the institutional process. Therefore, it will change as the program develops.

SCHEDULE

Figure 1 shows the phasing of the tasks and the parallel processes for the development of the OBMP. The timing of specific milestones has been tailored to fit the schedule in the Judge's ruling. It includes review points for the Special Referee and the Court during the development of the OBMP. A written summary entitled "Problems of Basin Management" is attached as Attachment 1. It was developed and attached as a result of the court's request to better define the problems in the basin.

FIGURE 1
OPTIMUM BASIN MANAGEMENT PROGRAM
REVISED DEVELOPMENT SCHEDULE



OUTLINE OF OPTIMUM BASIN MANAGEMENT PROGRAM DOCUMENT

The outline presented below demonstrates what the Optimum Basin Management Program development process will produce for approval by the court and implementation by Watermaster. By *starting with the end in mind*, it demonstrates the timeline and process necessary to develop the program content and implementation plan. The Optimum Basin Management Program document will at a minimum contain five sections:

Section 1 Introduction
Section 2 Current State of the Basin
Section 3 Goals of the Optimum Basin Management Program
Section 4 Components of the Optimum Basin Management Program
Section 5 Implementation Plan

Section 1 is a general introduction that describes the location of the basin, the judgment, Watermaster, the chronology of events leading up to the February 19th ruling requiring Watermaster to develop the Optimum Basin Management Program, and the organization of the OBMP report. Section 2 describes state of thc basin including the hydrologic and hydrogeologic setting, groundwater elevations, current and historical changes in storage, groundwater production, current groundwater quality and recent changes in groundwater quality, safe yield, and current and future water demands and supply plans. Section 2 concludes with a summary description of problems within the basin. Section 3 describes the major issues defined by stakeholders in the OBMP process, the mission statement for the OBMP process and the goals for the OBMP process. Section 4 describes the components of the Optimum Basin Management Program that can be used to accomplish the goals of the OBMP. Section 5 describes the implementation plan for the OBMP including timing and financial aspects. The report outline is listed below:

Section 1 Introduction

- The Chino Basin
- The Chino Basin Judgment
- Watermaster
- Events Leading up to the February 19, 1998 Ruling Requiring Watermaster to develop the Optimum Basin Management Program
- Organization of the Optimum Basin Management Program Report

Section 2 Current State of the Basin

Estimates of the historical groundwater storage and water quality will be prepared to show how the availability and quality of groundwater have changed in response to climate, land use and basin management practices. These estimates will be based on the groundwater monitoring work done by Watermaster, the state of the watershed work being done by the Regional Water Quality

Control Board (RWQCB), the CBWRMS, and other sources. Historical groundwater production patterns will be illustrated with maps and tables. Pollution sources and their strengths will be identified. Estimates of historical, current and future water demands and the cost of production from the Chino Basin will be developed for all municipal and industrial producers and agricultural producers in the aggregate. The water supply plans of municipal and industrial producers will be described. A change in future production patterns could result in a loss of yield if groundwater production is shifted north to find better water quality or better production capability. The purpose of this section is to develop as complete an assessment of the state of the basin as possible. Problem descriptions including source and magnitude, if known, will be described. These problem statements will be utilized to develop goals, identify impediments to the goals, and action items described in Section 3. This section will have the following subsections and content:

- Groundwater Storage Time History
  - Historical Groundwater Level Monitoring
  - Methodology for Estimating Groundwater Storage
  - Time History of Groundwater Storage for the Basin
    - Five to ten maps showing groundwater levels throughout the basin
    - Table showing the time history of groundwater storage in the basin
    - Time history plot of groundwater storage over time
  - Localized Time Histories of Groundwater Storage
    - Table showing the time histories of groundwater storage for each subarea
    - Time history plots of groundwater storage over time for the subarea (grouped)
  - Factors that Change Groundwater Storage
    - Table comparing groundwater storage to time histories of climate, groundwater pumping, volume in storage accounts and artificial recharge
    - Time history plot comparing groundwater storage to time histories of climate, groundwater pumping, volume in storage accounts and artificial recharge
- Groundwater Production Time History
  - Historical Groundwater Production Monitoring
  - Sources of Groundwater Production Data
  - Historical Groundwater Production
    - Tables showing groundwater production by type (pool), and by subarea
    - Time history plots of groundwater production by type (pool) and by subarea
    - Five to ten maps showing spatial distribution of groundwater production
  - Factors that Impact Groundwater Production
    - Table comparing groundwater production to time histories of climate, water quality, and land use.
    - Time history plot comparing groundwater storage to time histories of climate, groundwater pumping, volume in storage accounts and artificial recharge

- Historical and Current Groundwater Quality
  - Historical Groundwater Quality Monitoring Data
  - Sources of Groundwater Quality Data
  - Sources of Water Quality Degradation
    - Non-point Sources
      - Series of TDS, nitrate, herbicide and pesticide maps spanning the period 1960 to 1997
      - Series of land use maps for the period 1933 through 1993
      - Series of representative TDS, nitrate herbicide and pesticide time histories spanning the period 1960 to for subareas
      - Tables showing the current concentration and mass of TDS and nitrate for the basin as a whole and the subareas
    - Point Sources
      - Map showing the location of known and suspected point sources and associated water quality anomalies
    - Role of the Vadose Zone
- Water Supply and Recycled Water Conditions
  - Historical and Current Water Demands
    - Tables listing the time history of water demand by entity
    - Time history plots grouped by type and total
  - Current Water Supply Plans and Costs
    - Tables showing water supply plans and cost for each appropriator, overlying non-agricultural producer and the overlying agricultural pool in aggregate, water supply quality
  - Future Water Demands, Supply Plans and Costs
    - Tables showing future (stepped and ultimate, depending on availability) water supply plans and cost for each appropriator, overlying non-agricultural producer and the overlying agricultural pool in aggregate
    - Map(s) (one to two) showing the showing spatial distribution of future groundwater production

  Water Supply quality
    - Tables showing the current TDS and nitrate concentrations, and other selected constituents in the water supply sources for each appropriator, overlying non-agricultural producer and the overlying agricultural pool in aggregate

  Reclaimed Water Flows
    - Tables showing the current and future reclaimed water discharges and associated TDS and nitrate concentration in reclaimed water for each POTW
- Summary of Groundwater and Water Supply Problems
    - Table and maps summarizing groundwater level, groundwater storage, production, water quality problems, safe yield, water supply and recycled water problems

Section 3 Goals of the Optimum Basin Management Program

The purpose of this section is to describe the major issues defined by stakeholders in the OBMP process, the mission statement for the OBMP process and the goals for the OBMP process. This section will have the following subsections:

- Interests Within the Basin
  - Tables listing the Issues and Interest of the stakeholders of the OBMP process
- Mission Statement and Core Values
- Program Goals
  - Tables that lists the goals, impediments to the goals, action items and expected results of the OBMP implementation

Section 4 Components of the Optimum Basin Management Program

This section will contain descriptions of components of the OBMP. These components will be described in enough detail to allow Watermaster to design appropriate projects and to develop agreements regarding the operation of the Basin. The components described below are based on several years of study by Watermaster. Other components may be necessary and added through the current process. The OBMP will be modified over time and the components described in the first OBMP can be modified, deleted and/or new components can be added in subsequent revisions to the OBMP.

Groundwater Storage Management. This component consists of the establishment of implementation criteria that encourage best use of the available groundwater storage volume for individual producers and the producers in aggregate. Individual producers want to store water temporarily in the groundwater basin to better manage their water supply systems. Some of this water is lost to the Santa Ana River and how these losses are to be accounted for will be determined. The same is true when water is temporarily stored as either cyclic storage or in a conjunctive use program. This section will have the following subsections:

- Losses to River from Storage
- Cyclic Storage and Conjunctive Use
  - Maps showing the location of cyclic storage and conjunctive use features
  - Tables and figures that describe cyclic storage and conjunctive use operations and losses from storage
- Limits on Local Storage Accounts, Cyclic Storage and Conjunctive Use
  - Tables and figures that show the volume of water in local storage accounts, proposed storage limits, and accounting for losses
  - Tables and figures that show the volume of water in cyclic storage and other storage accounts, their proposed storage limits, and accounting for losses

- Groundwater Level and Storage Monitoring Requirements

The technical work to support this component for the first Optimum Basin Management Program has mostly been done by Watermaster.

Production and Recharge Management. This component includes a description of how production and recharge affect safe yield. The tradeoffs between moving future municipal groundwater production north to avoid the construction of expensive groundwater treatment facilities in the south will be described. Areas of localized overdraft will be delineated. The study of production patterns will be done early in the development of the Optimum Basin Management Program.

The optimization of the recharge of local water including runoff and reclaimed water will increase safe yield. A significant part of this work has been done and was reported in the Phase 1 Recharge Master Plan. The Phase 1 findings are being considered in the Optimum Basin Management Program and a comprehensive recharge plan may be developed during implementation of the Optimum Basin Management Program. This section will have the following subsections:

- Methodology for Analyzing Production Patterns
- Optimizing Production Patterns
    - Tables, figures and Maps illustrating the relationship of the spatial distribution of production on safe yield
- Optimizing Recharge of Local Water
    - Runoff
        - Revised tables, figures and maps from the *Recharge Master Plan showing* the recommended storm water, reclaimed water and imported water recharge plan
    - Costs
        - Revised tables and figures that show cost and the phasing of facilities and associated costs over time
- Groundwater Production Monitoring Requirements

Water Quality Management. Water quality is one of the primary motivations behind the Optimum Basin Management Program. Water quality management will vary by constituent. Mineral constituents such as nitrate or TDS are expensive to treat, regional in extent, and are usually the results of non-point sources such as agriculture. Organic chemicals are relatively inexpensive to treat, travel in distinguishable plumes, and are usually associated with point sources. Other constituents of concern include radionuclides, some metals, and perchlorate. Watermaster and the Regional Board have developed a comprehensive database for water quality up through the middle of 1997. A summary of water quality interests by constituent and point of discharge (if known) will be prepared. A series of groundwater treatment projects will be described to provide water of suitable quality for use by producers in the basin. This section will have the following subsections:

- Groundwater Quality Challenge
    - Maps and tables that describe the groundwater quality for each appropriator, overlying non-agricultural producer and the overlying agricultural pool in aggregate
- Groundwater Supply Quality Improvement Projects
    - Alternatives
        - Maps, tables and figures illustrating facilities layouts and descriptions, operating plans, beneficiaries and costs
    - Phasing of Promising Alternatives and Cost
        - Maps, tables and figures illustrating facilities layouts and descriptions, operating plans, beneficiaries and costs
- Groundwater Exchange with Outside of the Basin Interests
    - Alternatives
        - Maps, tables and figures illustrating facilities layouts and descriptions, operating plans, beneficiaries and costs
    - Phasing of Promising Alternatives and Cost
        - Maps, tables and figures illustrating facilities layouts and descriptions, operating plans, beneficiaries and costs
- Groundwater Quality Monitoring Requirements

Integrating the Plan Components. The components described above need to be integrated in the Optimum Basin Management Program. This part of the document describes: the interrelationship of the components and the optimum range of implementation for each component based on the definition of optimality described in Section 1; institutional framework; and principles of agreement that are necessary to implement the components. This section will have the following subsections.

- Range of Implementation Levels and Associated Costs for each Component for the Optimum Basin Management Program
    - Synergies and Tensions Among the Components
    - Recommended Range in Implementation Levels for each Component
        - Maps, tables and figures illustrating facilities layouts and descriptions, operating plans, beneficiaries and costs
- Institutional Framework
- Integrating Monitoring Requirements
- Principles of Agreement

Section 5 Implementation Plan

This section describes how the components of the Optimum Basin Management Program described in Section 4 will be mated with the temporal need for these components and how the components will be implemented. One premise of the program to be determined is how the components will be implemented, as they are actually needed or on a fixed time schedule. The implementation plan will identify a specific list of actions, the entities responsible for implementation and the basis for implementation. Alternatives for financing the program including the use of outside sources of capital will be described. Equitable repayment schemes developed from consensus based criteria will be described and a repayment scheme will be recommended. This section will have the following subsections:

- Action Items to Implement the Optimum Basin Management Program
    - narrative/quantitative description of the action; dependencies on other actions/components; parties involved in the action; institutional arrangements that need to be completed to launch the action; and cost.
- Timeline for Component Implementation
    - Maps, tables and figures illustrating component location and phasing
- Financing the Optimum Basin Management Program
    - Capital Requirements
        - Tables and figures that show the capital requirements over time
    - Funding Programs and Sources
        - Local State and Federal Government Sources – including descriptions of the programs, terms and conditions for these sources, requirements and procedures for obtaining funding from these sources, and a timeline for obtaining funding from these sources.
        - Institutional Sources – same as above as appropriate.
        - Revenue Generation and Repayment Plans
        - Recommended Financial Plan
- Revision and Update Schedule for the Optimum Basin Management Program
    - Trigger Mechanisms
        - Periodic Revisions of Water Supply and Wastewater Plans
        - Periodic Comparison of Monitoring Program Data to Numeric Objectives
    - Recommended Revision and Update Process

Technical Appendices – Contains Task Memorandums for Engineering Work

Financial Appendices – Contains Task Memorandums for Financial Work

Institutional Appendices – Contains Needs and Interests Responses Received; Summary of Needs and Interests Responses Received; and Initial Management Concepts Submitted

SCOPE OF WORK FOR THE ENGINEERING PROCESS

This scope of work has been prepared to describe the tasks necessary to complete the Optimum Basin Management Program report as described in the proposed outline. The scope of work and its deliverables (presentations, technical memoranda, workshops and draft section reports) are structured to provide a constant flow of information to Watermaster and feedback from Watermaster to guide the development of the program.

Some of the tasks described below will be done jointly with the financial consultants or completely by the financial consultant. These Tasks are indicated by the inclusion of either *(to be done jointly by the engineering and financial consultants)* or *(to be done by the financial consultants)* at the end of the task description. The engineering consultants will do all other tasks.

Task 1 Develop Optimum Basin Management Program Criteria

The purpose of Task 1 is to define the physical limits of the Basin, interests within the Basin, goals and objectives, and key definitions and assumptions of the Optimum Basin Management Program. The task deliverable is a draft of Section 1 of the Optimum Basin Management Program report. This task consists of five subtasks as described below:

1.1 Develop Simple Physical and Hydrologic Description of Basin

A simple physical description of the basin will be prepared that will include the Basin's boundaries (legal and physical), area, volume, geology, climate and hydrology in a manner written for basin managers (as opposed to geologists and engineers). The hydrologic description will include historical inflows and outflows. This information is readily available from the CBWRMS and other available reports.

1.2 Describe Interests Within the Basin

An inventory of interests within the basin will be described, and those interests to be addressed by the Optimum Basin Management Program will be identified. Some of these interests have recently been submitted to Watermaster by some of the stakeholders during the OBMP scoping process. Other interest submittals will be solicited from stakeholders that have not commented. All interests will be categorized and summarized in tables and text.

1.3 Develop Optimum Basin Management Program Goals

Given the interests that can be addressed by the Optimum Basin Management Program, the mission statement developed by Watermaster, and the results of the water resources assessments developed in Task 2, a set of draft program goals will be developed. Watermaster will review the program goals memorandum and provide written and oral comments at regularly scheduled meetings.

1.4 Develop Key Definitions and Planning Assumptions

The definition of terms used in the Optimum Basin Management Program will be stated. For example the term *optimal* will be defined so that we will know if the Optimum Basin Management Program satisfies the definition. An example of a key planning assumption to be decided is what will be assumed for Metropolitan Water District of Southern California's (Metropolitan) imported water cost, and whether or not we will allow these costs (or Metropolitan programs) to influence the Optimum Basin Management Program. Assumptions regarding economic evaluation methods and criteria will also be made. If necessary, these assumptions can change during the study. State and Federal regulations regarding drinking water and recycled water will be described including numerical criteria and the relationship between source water quality and recycled water quality discharged to the environment. The numerical criteria include drinking water quality standards, receiving-water quality standards, waste discharge requirements, and waste increments.

Task 2 Assess Current State of the Basin

The objective of this task is to prepare a concise description of the recent changes in groundwater storage and water quality of the Basin. Estimates of the historical groundwater storage, groundwater production, and water quality will be prepared to show how the availability and quality of groundwater have changed in response to climate, land use and basin management practices. These estimates will be based on the groundwater monitoring work done by Watermaster, the *State of the Watershed* work done by the Regional Water Quality Control Board (in preparation), the CBWRMS, and other sources. Pollution sources and their strengths will be identified. Maps and time history plots will be prepared to illustrate the findings. Estimates of historical, current and future water demands and the cost of production from the Chino Basin will be developed for all municipal and industrial producers and agricultural producers in aggregate. The water supply plans of municipal and industrial producers will be described. Problem descriptions including source and magnitude will be described. This task consists of four subtasks as described below:

2.1 Describe Time Histories of Groundwater Storage for the Basin and Subareas within the Basin

A description of historical groundwater level monitoring program will be prepared. Groundwater level maps will be developed for 5 to 10 different years for the period 1960 through 1998. The selection of the years to be mapped will be based in part on extremes in the precipitation record, annual pumping volumes and available data. The groundwater in storage in the basin will be estimated for each of the years that groundwater levels are mapped. Groundwater level time history plots will be developed for a set of representative wells (20 to 30) distributed throughout the Basin. The change in storage in the Basin as a whole and in several (up to 10) subareas of the Basin will be estimated and correlated to climate, production, production in nearby areas, volume of storage accounts, and artificial recharge.

2.2 Describe Temporal and Spatial Distribution of Groundwater Production

A description of historical groundwater production monitoring program will be prepared. The groundwater production histories for the Chino Basin will be compiled for all known producing wells in the Chino Basin. A production time history will be developed with maps to show the changes in the spatial pattern and magnitude of groundwater production in the Basin. Groundwater production information is readily available from Watermaster. The change in groundwater production in the Basin as a whole and in several (up to 10) subareas of the Basin will be estimated and correlated to climate, water quality and land use changes. The safe yield estimates developed for the Judgment and more recent estimates presented in the Phase 1 Report for the *Recharge Master Plan Report* will be described. The impact of past and future activities that could affect safe yield will be described.

2.3 Describe Temporal and Spatial Distribution of Groundwater Quality

A description of historical groundwater quality monitoring program will be prepared. A time series of maps showing the change in concentration of TDS, nitrate, and selected metal and organic constituents will be developed to show the spatial and temporal patterns of groundwater quality. Chemical time histories for a set of representative wells (20 to 30) distributed throughout the Basin will be developed and graphically compared to climatic indices, drinking water standards and Basin Plan objectives. Water quality trends in the Basin as a whole and in several (up to 10) subareas of the Basin will be described and correlated to land use, historical waste discharge, climate, and artificial recharge. Water quality anomalies from known point sources (such as industrial sites and landfills) and unknown sources will be described based on readily available information.

The vadose zone contamination interest described in past Basin Planning documents, the Metropolitan Storage Program Environmental Impact Report, and the CBWRMS will be characterized in the context of current and future water quality.

2.4 Estimate Current and Future Water Demands for Each Member of the Appropriative and Overlying non-Agricultural pools and the Overlying Agricultural Pool in Aggregate

Task 2.4.1 Obtain information from producers. Each member of the appropriative and overlying non-agricultural pools will review the data and assumptions used to develop water demand projections from the CBWRMS and provide comments and revisions, as necessary, to update the information for their entity. The types of data used for demand forecasts are land use (or other units of water use), assumed temporal change in land use, and associated unit water duties. Water supply plan information includes the identification of each source, seasonal capacity and demand on each source. Each member of the overlying non-agricultural pool and appropriative pool will be contacted and requested to review the CBWRMS for their water supply plans, current and projected demands; and to provide comments and suggested changes. One presentation at a meeting will be made to review the CBWRMS methodology and to provide direction to the members.

2.5 Update Demand Estimates and Water Supply Plans for Each Member of the Appropriative and Overlying non-Agricultural pools and the Overlying Agricultural Pool in Aggregate

Task 2.5.1 Revise CBWRMS water demand forecasts. Using the updated data developed in Task 3.1, new water demand forecasts will be prepared and described in tabular and graphical formats.

Task 2.5.2 Revise the CBWRMS water supply plans. The water supply plans associated with the demands will be described in tabular and map formats. The water supply plans will be developed on an annual basis considering seasonal and climatic extremes. A task memorandum that summarizes these results will be prepared and submitted to Watermaster for review and comment. The water demand and supply plan information will be revised based on comments received on the task memorandum. The task memorandum will consist of about 10 to 15 pages of text and about 20 to 30 tables.

2.6 Estimate the Cost of Groundwater Production for Each Member of the Appropriative and Overlying Non-Agricultural Pools and the Overlying Agricultural Pool in Aggregate

Task 2.6.1 Obtain Groundwater Production Costs Information from the Appropriative and Overlying Non-Agricultural pools. A uniform information request form will be developed and provided to the producers in the appropriative and overlying non-agricultural pools. The form will itemize capital and operations and maintenance costs (fixed and variable), so that production costs can be compared among producers in a consistent manner. The request form will be explained to the members at a meeting. Each member of the appropriative and overlying non-agricultural pools will respond to this information request in a timely manner.

Task 2.6.2 Estimate cost of groundwater production. Using the data collected in Task 2.4 and the water supply plan forecasts in Task 2.5; the current and projected costs of groundwater production will be estimated.

2.7 **Estimate the Composite TDS and Nitrate Concentrations of the Water Supplies for Each Member of the Appropriative and Overlying Non-Agricultural pools and the Overlying Agricultural Pool in Aggregate.** Collect and summarize water quality system water quality reports for the producers in the appropriative and overlying non-agricultural pools

2.8 **Estimate the waste increments and waste discharge concentrations to groundwater and the Santa Ana River.** The Inland Empire Utility Agency (IEUA), Upland, JCSD and the WRRWTP-JPA will provide their current and recent past estimates of the TDS waste increments from municipal and industrial use, and waste discharge TDS and nitrogen concentrations from reclamation plants. Estimates of the TDS and nitrate waste increments and waste discharge concentrations to groundwater will be obtained from the CBWRMS and the TIN/TDS study. An estimate of the projected TDS in reclaimed water will be prepared.

2.9 **Demonstrate the sensitivity of reclaimed water quality to source water quality.** The sensitivity of TDS in reclaimed water produced by reclamation plants to TDS in supply sources will be assessed by looking at the trends in TDS in groundwater and other sources, individually and in combination with other sources.

Task 3 Prepare Sections 1, 2 and 3

The objective of this task is to prepare draft of Sections 1, 2, and 3 for review by the stakeholders, special referee, and the court. Sections 1, 2, and 3 will consist of about 40 to 50 pages of text, 20 to 30 tables, and 50 to 60 figures.

Task 4 Develop the Components of the Optimum Basin Management Program

The purpose of this task is to develop program components that, when implemented, will meet the program objectives developed in Task 1. These components will be developed in enough detail to allow Watermaster to design appropriate projects and to develop agreements regarding the operation of the Basin. The deliverable for this task will be a draft of Section 4 of the Optimum Basin Management Program. This task consists of seven subtasks as described below:

4.1 **Develop Groundwater Storage Management Plan Component**

Task 4.1.1 Describe processes for losses from storage, and obtain consensus on methodology and current thinking on storage limits. The previous letter report developed by *Mark J. Wildermuth, Water Resources Engineers,* and the most current proposal developed by Watermaster staff will be distributed to the members for review. A memorandum summarizing the current status of storage limits will be prepared and transmitted with the above.

Task 4.1.2 Develop technical and administrative procedures to set storage limits and to account for losses for water stored in local storage accounts, cyclic storage accounts, and supplemental water storage accounts. This subtask will be an iterative process. Proposals for these procedures will be developed and submitted to Watermaster prior to a regularly scheduled meeting. These proposals will include a groundwater level and storage-monitoring plan that will identify the type and frequency of monitoring, entities responsible for monitoring, and the procedure to analyze monitoring data and report the results of the monitoring program. A presentation on the proposal will be made at the meeting. Comments received will be incorporated and the process will be repeated two to three times. Each proposal will be written in memorandum format and consist of about 12 to 15 pages of text with associated tables and figures.

4.2 Develop Safe Yield Management Plan Component

Task 4.2.1 Describe process for loss of yield if production shifts from the south to the north. A presentation will be made at a regularly scheduled meeting to describe the underlying physical processes that control the relationship between production location and safe yield.

Task 4.2.2 Reconnaissance-level evaluation of the loss of yield that will occur if production is shifted north. The Rapid Assessment Model (RAM) will be used to evaluate the loss of yield if production in the southern part of the basin is moved northward. A baseline groundwater production plan will be developed that maintains groundwater production in the south, and an alternative plan will be developed where groundwater production is moved northward to areas of potable groundwater quality. These plans will be simulated with the RAM tool. The annual increase in groundwater outflow from the basin that will occur when production is moved north is equivalent to the change in yield. Sensitivity studies will be done to characterize the change in yield as a range.

Task 4.2.3 Review Phase 1 Recharge Master Plan, revise findings and adopt key findings. A memorandum will be prepared that describes and updates the key findings of the Phase 1 Recharge Master Plan.

Task 4.2.4 Develop Monitoring Plan. A plan will be developed to monitor and analyze groundwater levels, basin outflow, and production to assess changes in safe yield caused by changes in the location of groundwater production and artificial recharge. The monitoring program will include the type and frequency of monitoring, entities responsible for monitoring, and the procedure to analyze monitoring data and report the results of the monitoring program.

Task 4.2.5 Estimate costs and benefits of the safe yield management component. The costs and benefits associated with changing groundwater production patterns (Task 4.2.2) and artificial recharge will be described using the format and criteria described in Task 1.5. The cost and benefits due to changing (or not changing) groundwater production patterns will be primarily based on avoided replenishment costs. The costs and benefits for artificial recharge will be primarily an update of the cost and benefit analysis done in the Phase 1 Recharge Master Plan Report.

Task 4.2.6 Prepare Task 4.2 Memorandum. A task memorandum will be prepared to document the findings of Task 4.2. The memorandum will consist of about 15 to 20 pages of text and contain numerous tables, figures and maps.

4.3 Develop Water Quality Management Plan Component

Task 4.3.1 Describe the historical, current and anticipated challenges to produce water of suitable quality for each member of the appropriative and overlying non-agricultural pools, and the overlying agricultural pool in the aggregate. This task is an expansion of Task 3.4.1 and will include other contaminants that have been found or threaten groundwater use in the Chino Basin.

Task 4.3.2 Develop list of local and/or regional projects to ensure that groundwater quality will improve or can be treated and put to beneficial use. A list of projects will be developed to produce groundwater of suitable quality for beneficial use. These projects could include in situ and well head treatment, well field relocation (dodge and drill), and dilution. For each project the following will be developed:

- An operating plan
- Facilities layout and description
- Direct beneficiaries
- Costs

- Monitoring requirements

The cost analysis will be based on the criteria and format developed in Task 1.5, the groundwater quality conditions described in Tasks 3.4.1 and 4.3.1. The project list and descriptions developed in the CBWRMS will be used as a starting point.

Task 4.3.3 Evaluate potential for groundwater exchange with outside basin interests. Another way to provide potable water to the southern part of the Chino Basin would be to provide treated imported water (or other potable imported supplies) to the Cities of Chino, Chino Hills, Norco and Ontario, and JCSD, in lieu of treated groundwater. The additional cost of pipelines and treatment plants necessary to provide treated state water project (SWP) water to these areas would be offset by allowing water agencies outside of the basin to purchase un-pumped groundwater yield. In theory, the maximum cost of water developed by this project should be less than the cost of treated imported water. This alternative will be evaluated in this task. Up to three alternative plans to accomplish the exchange will be evaluated. Each exchange plan will be evaluated in an identical manner as the water quality projects are in Task 4.3.2. Each exchange plan will include a monitoring plan that will identify the type and frequency of monitoring and the procedures to analyze the monitoring data.

Task 4.3.4 Prepare Task 4.3 Memorandum. A task memorandum will be prepared to document the findings of Task 4.3. The memorandum will consist of about 30 to 35 pages of text and contain numerous tables, figures and maps.

4.4 Describe Monitoring Plan to Assess Compliance with Numeric Goals developed in Task 1.

If numeric goals are developed in Task 1, monitoring plan(s) will be developed to describe current ambient and future ambient groundwater conditions for comparison to numerical goals developed in Task 1. These plans will describe the type and frequency of monitoring, the procedures for analyzing the resulting monitoring data, and the entities responsible for data collection and analysis. The monitoring plans will be described in the Task 4.5 memorandum.

4.5 Describe a Range of Implementation Levels and Associated Costs for each Component for the Optimum Basin Management Program

Task 4.5.1 Describe the synergies and tensions among the components. The components described in Tasks 4.1, 4.2, 4.3, and 4.4 are not mutually independent. In some cases the components are complementary and in others they are in conflict. For example, the relocation of groundwater production to avoid groundwater quality problems may reduce the yield of the basin. Artificial recharge can augment safe yield and sometimes improve or degrade groundwater quality.

Task 4.5.2 Recommend a range in implementation levels and costs for each component. Based on the results of Tasks 4.1 through 4.4 and Task 1, a range of implementation levels for each component will be recommended. The range will be based on technical feasibility, water demands and cost.

Task 4.5.3 Prepare Task 4.4 Memorandum. A task memorandum will be prepared to document the findings of Tasks 4.4 and 4.5. The memorandum will consist of about 15 to 20 pages of text and contain numerous tables, figures and maps.

4.6 Describe Consistency of Optimum Basin Management Program Components with Responsibilities and Authorities of Watermaster Pursuant to the Judgment and Other Agencies

Task 4.6.1 Describe institutional framework. List and describe entities that can participate in the implementation of the Optimum Basin Management Program, and for each entity describe its:

- Geographic jurisdiction

- Responsibilities and powers
- Other attributes
- Ability to implement components of the Optimum Basin Management Program

The need for a new entity (such as a Joint Powers Agency) will be assessed based on the responsibilities and powers of existing entities and the responsibilities and powers needed to implement the Optimum Basin Management Program components.

Task 4.6.2 Prepare Task 4.6 Memorandum. A task memorandum will be prepared to document the findings of Task 4.6. The memorandum will consist of about 15 to 20 pages of text and contain an unknown number of tables, figures and maps.

4.7 Develop Principles of Agreement

Task 4.7.1 Develop initial set of principles of agreement. Agreements and other types of legal documents will need to be developed to implement the Optimum Basin Management Program components. In this task, the principles of these agreements will be described for each component and the entities that would participate in those agreements will be identified. A draft Task memorandum will be prepared and submitted to members for review and comment.

Task 4.7.2 Conduct meetings and workshops to forge consensus. Meetings with individual entities and a workshop will be done to obtain comments and suggestions, and to help move Watermaster to consensus. The task memorandum will be revised as necessary during the course of this task.

4.8 Prepare *Section 4 Components of the Optimum Basin Management Program*

A draft Section 4 will be prepared using products of Tasks 4.1 through 4.7 and the comments received on the task memorandums. Copies of draft Section 4 will be prepared and submitted to Watermaster for review and comment. The draft Section 4 will contain approximately 50 to 75 pages of text with numerous tables, figures and maps.

4.9 Review Economic Analyses of the Components of the Optimum Basin Management Program

The financial consultant will perform an independent review the economic analyses done in Tasks 4.1 through 4.4 and provide comments and suggestions. *(to be done by the financial consultants)*

Task 5 Develop Implementation Plan

This section describes how the components of the Optimum Basin Management Program described in Section 4 will be mated with the temporal need for these components and how the components will be implemented. The deliverable for this task is a draft Section 5 of the Optimum Basin Management Program. This task consists of four subtasks as described below:

5.1 Define the Actions to Implement the Optimum Basin Management Program

Task 5.1.1 Develop approximate criteria for phasing of components. An initial timeline will be developed that will show the approximate phasing and staging of the Optimum Basin Management Program components based on projected water demands and other factors. Other factors include the availability of supplemental supplies, regulatory compliance (mandated groundwater cleanup, etc.) and economics. Potential variations in the timeline due to climatic and regional economic factors will be developed.

Task 5.1.2 Develop list of action items. Develop a list of actions necessary to implement the components of the Optimum Basin Management Program that for each component include:

- Narrative/quantitative description of the action
- Dependencies on other actions/components
- Parties involved in the action
- Institutional arrangements that need to be completed to launch the action
- Cost

The time line developed in Task 5.1.1 will be expanded to show the timing and schedule dependencies of individual actions.

Task 5.1.3 Prepare Task 5.1 Memorandum. A task memorandum will be prepared to document the findings of Task 5.1. The memorandum will consist of about 10 to 15 pages of text and contain an unknown number of tables, figures and maps.

5.2 Financing the Optimum Basin Management Program

Task 5.2.1 Estimate the capital needs over time for the components of the Optimum Basin Management Program. Using the costs developed in Task 4 and the time line from Task 5.1, a future projection of the capital needs to implement the Optimum Basin Management Program will be developed. *(to be done jointly by the engineering and financial consultants)*

Task 5.2.2 Describe funding sources. Funding sources available for the components of the Optimum Basin Management Plan will be listed and described. The description will include the applicability to various components or sub-components, and terms and conditions. *(to be done by the financial consultants)*

Task 5.2.3 Describe revenue and repayment schemes. Describe revenue generation and repayment mechanisms within Watermaster or other assessment schemes that can be used to pay for the components in the Optimum Basin Management Plan. *(to be done by the financial consultants)*

Tasks 5.2.4 Develop Robust Financial Plan. Based on the results of Task 5.1 and the previous subtasks in Task 5.2, a robust financial plan will be developed to fund the implementation of the OBMP. The financial plan will include a palette of funding sources for each component of the OBMP, description of the administrative processes within Watermaster for generating revenues and repayment of OBMP related costs and institutional and advocacy activities such as partnering and legislative lobbying. *(to be done by the financial consultants)*

Task 5.2.5 Prepare Task 5.2 Memorandum. A task memorandum will be prepared to document the findings of Task 5.2. The memorandum will consist of about 5 to 10 pages of text and contain an unknown number of tables, figures and maps. *(to be done jointly by the engineering and financial consultants)*

5.3 Develop Procedure to Review and Update the Optimum Basin Management Program

Task 5.3.1 Develop Trigger Mechanisms to Determine When the Optimum Basin Management Program Should be Reviewed and Updated. The Optimum Basin Management Program should be periodically reviewed to ensure that the program is meeting it's goals as described in Task 1 and that the program is consistent with then current planning, technological, social, and financing conditions. This will require periodic review of monitoring data, and water resources planning conditions including water supply and wastewater plans, and financing conditions. The inability to achieve a numerical goal by a fixed time may trigger an automatic review of the Optimum Basin Management Program. The trigger mechanisms and periodic review frequency will be defined in this task.

Task 5.3.2 Define the Revision and Update Process. The process used to revise and update the OBMP will be described. The results of Tasks 5.3.1 and 5.3.2 will be described in a task memorandum. The memorandum will consist of about 5 to 10 pages of text and contain an unknown number of tables, figures and maps. *(to be done jointly by the engineering and financial consultants)*

5.4 Conduct meetings and workshops to forge consensus.

Meetings with individual entities and a workshop will be held to obtain comments, suggestions and help move Watermaster to consensus. The task memorandums developed in Tasks 5.1 through 5.3 will be revised as necessary during the course of this task. *(to be done jointly by the engineering and financial consultants)*

5.5 Prepare *Section 5 Implementation Plan*

A draft Section 5 will be prepared using products of Tasks 5.1 through 5.4 and the comments received on the task memorandums. Copies of draft Section 5 will be prepared and submitted to Watermaster for review and comment. The draft Section 5 will contain approximately 35 to 40 pages of text with numerous tables, figures and maps.

Task 6 Finalize Optimum Basin Management Program Document

The purpose of this task is to combine the draft sections of the Optimum Basin Management Program into one complete draft report for review by Watermaster and the Special Referee and a final report for the court. The deliverables will be a draft report and a final report. This task consists of two subtasks as described below:

6.1 Compile Task Reports and Associated Comments into a Draft Report

A draft report will be compiled from draft Sections 1 through 5. The task memoranda and supporting technical work will be included as technical appendices. The draft report will be submitted to Watermaster and Special referee for review and comment. Comments will be received in writing and at regularly scheduled meetings

6.2 Prepare Final Report

Comments on the draft report will be incorporated and included in a final report. The final report will be submitted to Watermaster. Watermaster will submit the final report to the Special Referee and the court.

TENTATIVE SCOPE OF WORK FOR THE FINANCIAL PROCESS

This scope of work has been prepared without input from a financial consultant and without significant discussion in the institutional process. The intent is to describe possible tasks necessary to complete the financial portion of the Optimum Basin Management Program report as described in the proposed outline. The scope of work and its deliverables (presentations, technical memorandums, workshops and draft section reports) are structured to provide constant information flow to Watermaster and feedback from Watermaster to guide the development of the program.

Some of the tasks described below will be done jointly with the engineering consultants These Tasks are indicated by the inclusion of *(to be done jointly by the engineering and financial* *consultants).* The financial consultants will do all other tasks. The financial process will review the Optimum Basin Management Program proposals that have been through the institutional and engineering processes. It includes the following tasks:

Task 4 Develop the Components of the Optimum Basin Management Program

4.9 Review Economic Analyses of the Components of the Optimum Basin Management Program

The financial consultant will perform an independent review of the economic analyses done in Tasks 4.1 through 4.4 and provide comments and suggestions.

Task 5 Develop Implementation Plan

The tasks that are part of the financial process include:

5.2 Financing the Optimum Basin Management Program

Task 5.2.1 Estimate the capital needs over time for the components of the Optimum Basin Management Program. Using the costs developed in Task 4 and the time line from Task 5.1, a future projection of the capital needs to implement the Optimum Basin Management Program will be developed. *(to be done jointly by the engineering and financial consultants)*

Task 5.2.2 Describe funding sources. Funding sources available for the components of the Optimum Basin Management Plan will be listed and described. The description will include the applicability to various components or sub-components, terms and conditions, and the procedures for obtaining funding from these sources. The timeline for obtaining funding from these sources will be described.

Task 5.2.3 Describe revenue and repayment schemes. Describe revenue generation and repayment mechanisms within Watermaster or other schemes that can be used to pay for the components in the Optimum Basin Management Plan.

Tasks 5.2.4 Develop Robust Financial Plan. Based on the results of Task 5.1 and the previous subtasks in Task 5.2, a robust financial plan will be developed to fund the implementation of the OBMP. The financial plan will include a palette of funding sources for each component of the OBMP, description of the administrative processes within Watermaster for generating revenues and repayment of OBMP related costs and institutional and advocacy activities such as partnering and legislative lobbying.

Task 5.2.5 Prepare Task 5.2 Memorandum. A task memorandum will be prepared to document the findings of Task 5.2. The memorandum will consist of about 5 to 10 pages of text and contain an unknown number of tables, figures and maps. *(to be done jointly by the engineering and financial consultants)*

5.3 Conduct meetings and workshops to forge consensus.

Meetings with individual entities and a workshop will be held to obtain comments, suggestions and help move Watermaster to consensus. The task memorandums developed in Tasks 5.1 and 5.2 will be revised as necessary during the course of this task. *(to be done jointly by the engineering and financial consultants)*

PROBLEMS OF BASIN MANAGEMENT

On September 23 and 24, workshops were conducted on the review of draft Sections 1 and 2 of the Optimum Basin Management Program (OBMP) report. Sections 1 and 2 were prepared by Wildermuth Environmental, Inc. An oral presentation of future water demands was presented by David Ringel of Montgomery Watson Americas, Inc. Another workshop was held on September 30, 1998 at which the Special Referee attended and participated in the discussions. After these workshops, Traci Stewart, Chief of Watermaster Services and Mark J. Wildermuth of Wildermuth Environmental, Inc., met with the Special Referee on October 5, 1998 to review the OBMP goals and problems within the Chino Basin. On October 15, 1998, a table containing the OBMP goals, impediments, action items, and implications of the action items was reviewed by the Watermaster, producers, and the Special Referee. Based on that review, the table was modified and the resulting table is attached herein. A summary of groundwater problems based on draft Sections 1 and 2 of the OBMP report is presented herein.

Groundwater-Level Problems

Overall, groundwater levels have declined between 50 to 200 feet in the Chino Basin since the turn of the century (see attached Figures 1 and 2). The western side of the basin, notably Management Zones 1a and 1b, has experienced the greatest decline in groundwater levels. The City of Chino and the Chino Institute for Men (CIM) have recently experienced ground-surface fissures that are thought to be related to increased groundwater production in the vicinity of the City of Chino. Subsidence in the center of the City of Chino has reached about 2 feet over the last ten years. Groundwater producers that affect groundwater levels in this area include the cities of Chino, Chino Hills, Ontario, Pomona, the Monte Vista Water District, CIM, and agricultural producers. The City of Chino Hills has reported loss of production at one well due to recently declining groundwater levels. The management steps to eliminate groundwater level problems in this area are described below.

Ground-Level Survey. Conduct a ground-level survey of the area in Management Zone 1 (see Figure 1). This would include a review of past surveys, as well as new surveys. The results of the new survey would be compared to historical surveys to determine the location, rate, and magnitude of subsidence in the basin. Periodic surveys should be conducted afterwards to monitor further subsidence.

Monitoring. Develop and implement a groundwater-level and quality-monitoring program that can be used to observe groundwater trends and define local groundwater flow systems. This program should be developed and implemented before a groundwater recharge/production management plan is developed for Management Zone 1.

Balance Groundwater Production and Recharge. Balance groundwater production with recharge in Management Zone 1, or, if necessary, balance production and recharge more locally within Management Zone 1. This may require temporarily reducing production below the level at which balance occurs to bring groundwater levels up to a reasonable operating level. A *reasonable operating level* is defined herein as a groundwater level at which the area no longer suffers subsidence and at which minimum production levels can be sustained. The *reasonable operating level* for Management Zone 1 needs to be determined. Recharge of local or native water and imported water should be increased as much as practical. Given that recharge in the area is maximized, production may still have to be reduced in Management Zone 1 and replaced with either production from Management Zone 2 or some other source of water.

Groundwater Storage

The Chino Basin has immense storage capacity. Since the Judgment was implemented, total groundwater storage appears to have stabilized. However, the storage in the basin has declined by about 1,000,000 acre-ft since 1933. Therefore, there is at least 1,000,000 acre-ft of unused storage capacity available in the basin. Increasing storage has some costs. There will be losses to the Santa Ana River due to rising groundwater. Previous analyses suggest that the losses from local and cyclic storage accounts due to rising groundwater during the period 1978 to 1997 could be as high as 50,000 acre-ft (or 18 percent of the volume that Watermaster assumes is in storage). Ignoring these losses will result in overdraft of the Chino Basin. A significant increase in groundwater storage, say on the order of 100,000s of acre-feet (acre-ft), may induce large groundwater losses to the Santa Ana River. In addition, a storage increase of this magnitude may have groundwater quality impacts due to flushing of contaminants within the vadose zone. The volume of safe storage from a water quality perspective is unknown. The management steps to mitigate the significant issues with groundwater storage are described below:

Develop Storage Accounting System that Includes Losses. Presently, Watermaster keeps track of transfers to and from local and cyclic storage accounts without accounting for groundwater losses. Watermaster should adopt a loss-estimating procedure and adjust the volume in storage accounts each year.

Water Quality Impacts from Conjunctive Use Programs. Mitigation measures need to be developed to protect producers in the event that large conjunctive-use programs cause unacceptable water quality impacts.

Groundwater Production Problems

The primary issues for groundwater production are localized overdraft in Management Zone 1 and the potential changes in safe yield that can occur with changes in the location and magnitude of pumping. The location and amount of groundwater production generally appears to be balanced in the basin except for Management Zone 1. Groundwater levels need to be increased in Management Zone 1 to minimize future subsidence and ground fissures, maintain production at a sustainable level, and improve groundwater quality.

Groundwater production in the southern half of the basin will need to be managed to ensure that safe yield is not reduced as agricultural areas convert to urban uses. Losses in safe yield due to decreases in agricultural production in the southern part of the basin will be distributed among the appropriators based on their initial share of safe yield. Thus, the loss in yield is translated throughout the basin. Increasing production near the Santa Ana River could enhance exiting safe yield. The management steps for addressing this issue are listed below.

Optimization Studies. Conduct studies to optimize groundwater production patterns in southern Chino Basin. These studies will involve intensive monitoring, geologic investigations, and modeling and facility studies.

Southern Basin Water Supply Plan. Develop a groundwater production and treatment plan that matches the emerging water demands of development in southern Chino Basin with facilities necessary to produce water of appropriate quality.

Water Quality Problems

The total dissolved solids (TDS) and nitrate problems in the basin are the most costly to deal with and seemingly are being left to municipal water purveyors to solve. Some point-source dischargers of organic solvents and other contaminants are dealing with their related groundwater plumes. The cost of TDS and nitrate removal is estimated to be about $700 per acre-ft. The cost to remove solvents is generally around $100 per acre-ft. Figure 3 shows the locations of known point sources and areas with impaired water quality in the Chino Basin.

The primary sources of the TDS and nitrate degradation in the northern part of the basin have mostly disappeared. The primary sources of TDS and nitrate degradation in the southern part of the basin are dairies and they will probably remain active for the next 20 years. TDS and nitrate degradation should continue in the southern basin for the foreseeable future and the cost to treat contaminated groundwater will escalate over current costs due to past and continued animal waste disposal practices. Legacy contamination in the vadose zone from past irrigated and dairy land uses will continue to degrade groundwater for the foreseeable future. Regulatory agencies do not have adequate resources to assert their authority to prevent degradation and force clean up of degraded groundwater. Producers and other local agencies have not taken a leadership role in comprehensively addressing water quality problems. Elevated TDS and nitrate levels in groundwater limit the recharge of recycled water for basin replenishment. The steps to manage groundwater quality problems in the basin are described below.

Point-Source Management. Watermaster should work with the Regional Water Quality Control Board (RWQCB), Department of Toxic Substances Control (DTSC), and other regulatory agencies to identify point-source discharge related problems, facilitate their solution, and where necessary, use its institutional influence to obtain prompt and satisfactory mitigation. In some cases, the solution to a point-source problem and a non-point source problem can be addressed through one coordinated capture and treat project with reduced cost to all parties.

Non-point Source Management. The groundwater contaminated from non-point sources in the northern and southern parts of the basin will need to be treated through dilution, demineralization or some other process, so that the water can be put to beneficial use. This is absolutely necessary in the southern Chino Basin to maintain safe yield. The *Optimization Studies* and *Southern Basin Water Supply Plan* steps listed under *Groundwater Production* apply here as well. The export of dairy waste from the basin should be maximized.

Safe Yield Problems

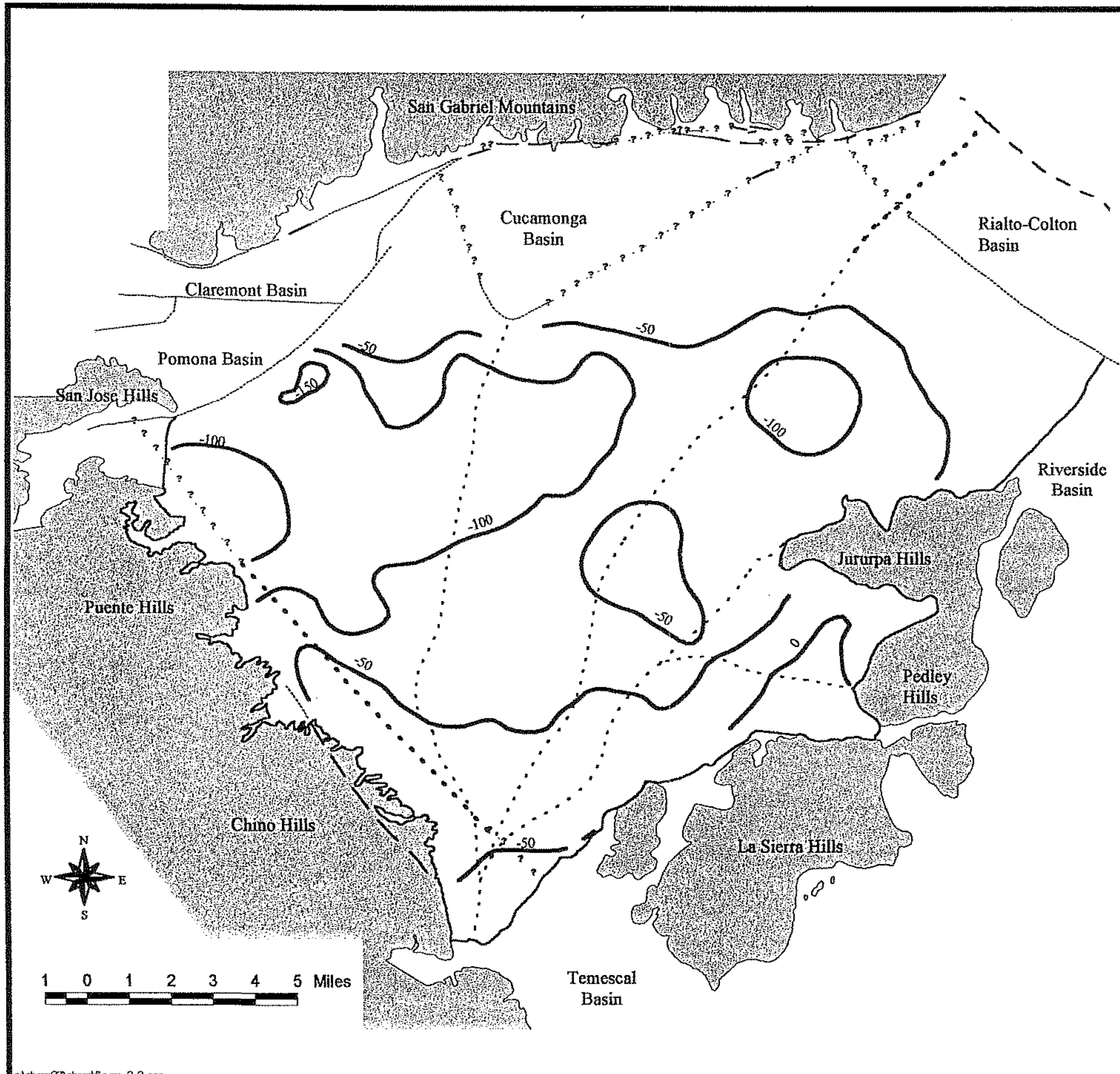
All the problems listed above need to be addressed to maintain safe yield. In addition to those steps, maximizing the capture and recharge of storm water and recycled water could increase safe yield. The San Bernardino County Flood Control District (SBCFCD), Riverside County Flood Control and Water Conservation District (RCFCWCD), and the US Army Corps of Engineers (USACE) have developed and continue to develop new flood control projects that efficiently convey flood waters out of the Chino Basin and reduce recharge. This has a negative impact on safe yield. Watermaster needs to participate in these flood control projects to maximize recharge. Watermaster and the Chino Basin Water Conservation District (CBWCD) initiated a multiphase recharge master plan study and completed Phase 1 in May 1998. This work needs to be completed.

SCOPING ISSUES

Based on discussions with the Special Referee, minor changes to the OBMP scope of work were developed to reflect the goals described in the attached table. Draft Sections 1, 2, and 3 of the OBMP report will be reorganized so that the description of the goals will follow the description of the problems and water resources planning issues.

Optimum Basin Management Program

Chino Basin Watermaster



Legend

- Groundwater Elevation Difference (feet above msl)
- Management Boundaries
- Hydrologic Boundaries Defined by the Aluvium and Approximated Natural Divides
- Hydrologic Boundaries Defined by the Known Faults
- Hydrologic Boundaries Defined by the Concealed Faults
- Hydrologic Boundaries Defined by Estimated Locations of Unknown Faults
- Hydrologic Boundaries Defined by Groundwater Barriers
- Bedrock

Management Zone Index Map

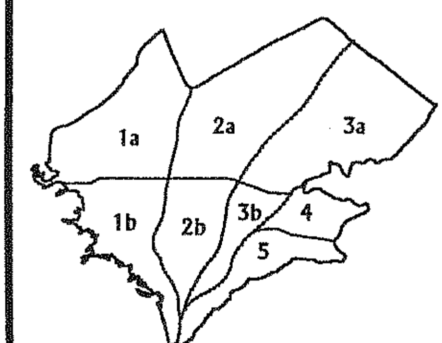


Figure 1

Groundwater Level Change Between Fall 1933 And Fall 1997 With Management Boundaries

WE WILDERMUTH ENVIRONMENTAL, INC.

Prepared By: JB | Date: September 22,1998

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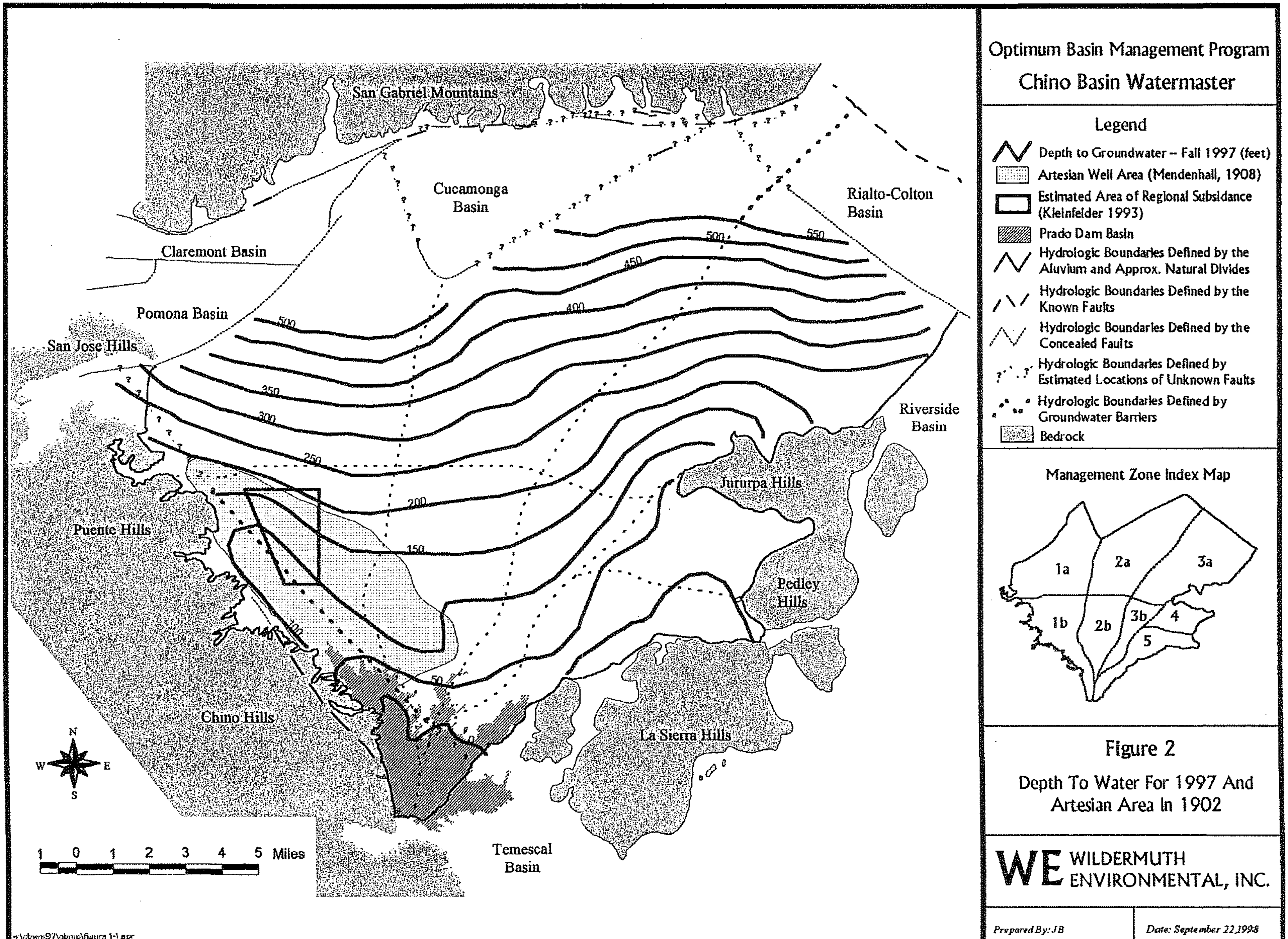
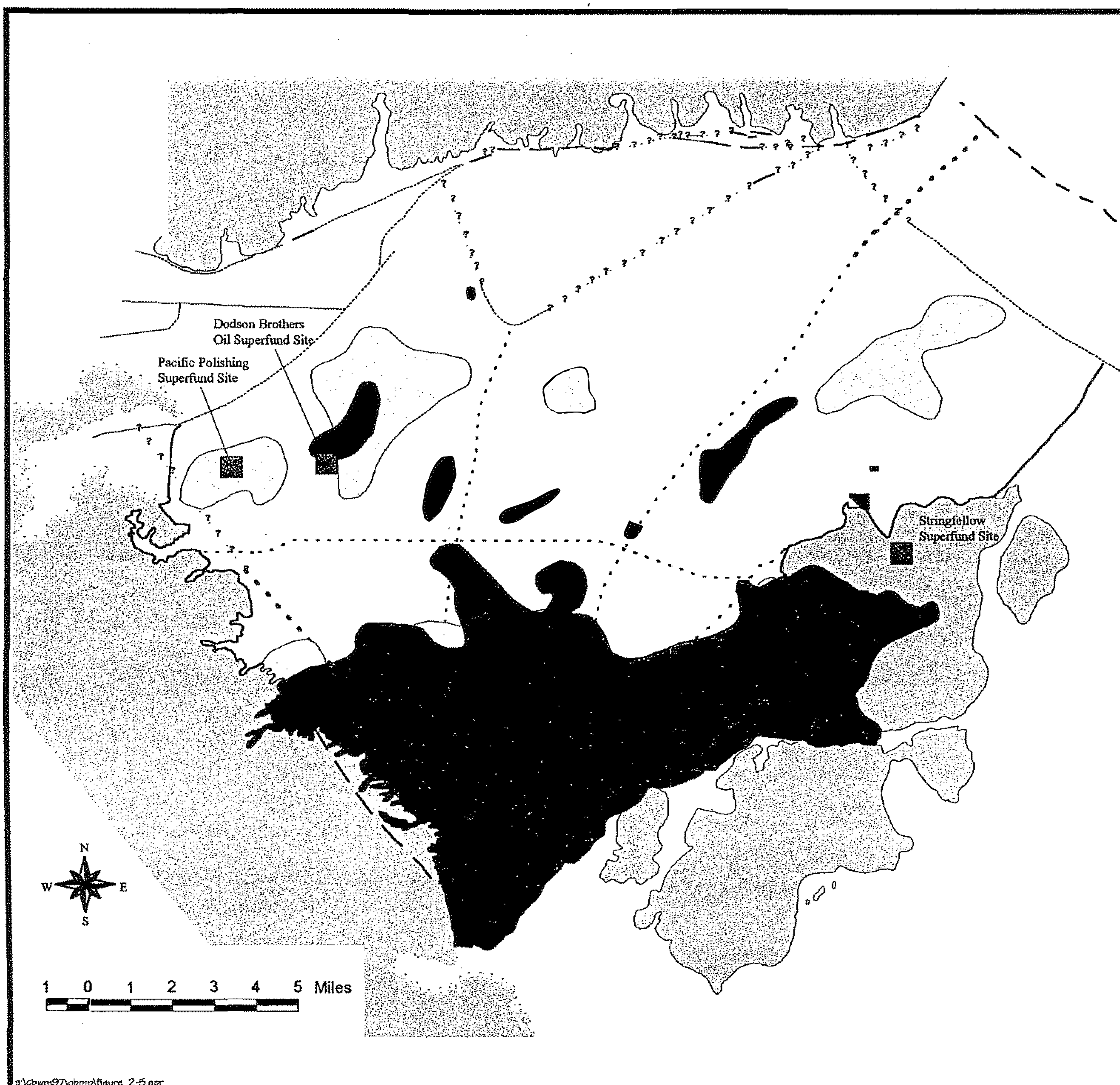


Figure 2

Depth To Water For 1997 And Artesian Area In 1902



Optimum Basin Management Program

Chino Basin Watermaster

Legend

- Area with TDS > 500 mg/L and NO3-N > 8 mg/L
- Area with TDS > 500 mg/L and NO3-N < 8 mg/L
- Area with TDS < 500 mg/L and NO3-N > 8 mg/L
- Known Point Sources and Plumes
- Superfund Sites

Management Zone Index Map

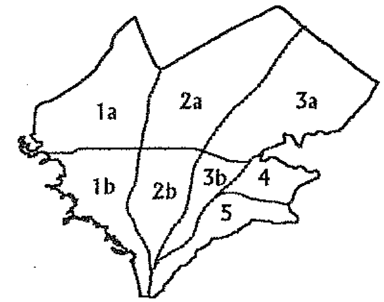


Figure 3

Locations Of Known Point Sources And Areas With Impaired Water Quality In The Chino Basin

WE WILDERMUTH ENVIRONMENTAL, INC.

Prepared By: JB | *Date: September 22,1998*

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October 30, 1998

Traci Stewart, Chief of Watermaster Services
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WATERMASTER SERVICES

OBMP Review Process

At the October 29 meetings, there was some frustration over revisiting issues that seemed to be resolved earlier. Part of the problem was confusion over the limited role of the supplemental report to be presented to the court but the prospect for more repetition seems great. The ability of the Watermaster to meet the court's deadline will be compromised unless this difficulty is overcome.

Can the process be improved if the Watermaster and Advisory Committee form working groups for the topics in the OBMP?

Here's what we have in mind. The "group", i.e., Advisory Committee and Watermaster, will create 3-6 committees on a logical basis, e.g., subareas of the basin; institutional v. engineering issues or other approach. Any member of the Advisory Committee or Watermaster can volunteer for the committee. The committees will conduct work shops, noncommittee members can attend and offer testimony. The committee will submit a draft report to the Advisory Committee, the Watermaster and anyone concerned enough to be a witness at the workshop. The Advisory Committee and the Watermaster will receive recommendations of the committee and testimony from those still unhappy and adopt a tentative finding. The Advisory Committee and the Watermaster will not discuss the topic again until all components of the OBMP are approved. (The committees can also be asked to look at the total document and repeat the process at that level.)

This approach has the advantage of directing the interested persons to specific topics and close the discussion (at least temporarily) so additional topics can be resolved. To control demands on the Watermaster staff, the committee chair can assume responsibility for calling meetings at a convenient place, conducting the meeting at a time convenient to the committee members, and reporting on the work of the committee.

Very truly yours,
LEMIEUX & O'NEILL

Wayne K. Lemieux
WKL/lms

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October 2, 1998

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Supplemental Documents on Scope of OBMP

We enclose a draft of the supplemental report to be filed with the court on the scope of the OBMP. (Related documents will be prepared for the filing but they are routine and therefore not included at this stage.) The enclosure is based on the information presented at the workshops by Mr. Wildermuth and by the exchange at the September 30 workshop with Mr. Scalamini and Ms. Schneider. We must discuss this soon. Because of time constraints, we have simultaneously solicited Mark's comments by copy of this letter and the enclosure. A draft must be sent to Scalamini/Schneider and a meeting with them scheduled, if appropriate.

Very truly yours,

LEMIEUX & O'NEILL

Wayne K. Lemieux

WKL/lms
Enclosure
cc: Mark Wildermuth

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DRAFT

SUPPLEMENTAL SCOPE AND LEVEL OF DETAIL FOR THE OPTIMUM BASIN MANAGEMENT PROGRAM

Preliminary

On September 9, 1990, the court continued the hearing on the motion of the Watermaster for approval of the Scope and Level of Detail of the Optimum Basin Management Program ("OBMP"). The court instructed the Watermaster to provide additional material on "problems" expected to be encountered in the implementation of the OBMP. The court set November 5, 1998 to hear the continued motion. The following is submitted in response to the court's instructions.

Problems of Basin Management

On September 23 & 24, workshops were conducted on the adoption of Sections 1, 2 & 3 of the OBMP. Another workshop was held on September 30; this workshop was attended by the Special Referee. These Sections were prepared by Wildermuth Environmental, Inc., and provided the basis for the following statement of problems expected to be encountered in the implementation of the OBMP.

The successful implementation of the OBMP will require the Watermaster to overcome the following problems: ***[The following is based on Mark's report at pp2-24 to 2-27]***

1. <u>Groundwater Level</u>: Water levels in the basin have declined from 50 to 200 feet. This creates problems with subsidence, increase in the cost of pumping and, in some cases, loss of production capacity. Basin management must address the problems associated with the drop of water level by a number of approaches, including: conducting a survey in affected zones of current and past water levels; establish a program to monitor water levels; and balance production and recharge.

2. <u>Groundwater Storage</u>: About 1,000,000 acre feet ("AF") of storage is available in the Basin but increasing the amount of water in storage can have adverse affects such as increasing

the amount of water lost to downstream areas and the transportation of contaminants. Increasing storage is an opportunity which the Watermaster cannot take full advantage of without confronting several serious problems. The problems of increased storage can be addressed in a number of ways, including: development of a storage accounting system that includes losses and mitigating quality impacts by conjunctive use.

3. <u>Groundwater Production:</u> There are localized overdrafts causing subsidence, ground fissures, and other adverse impacts normally associated with overproduction. Management steps to address this problem, include: optimization studies and development of a Southern basin water supply plan

4. <u>Water Quality:</u> Nitrate, high TDS, organic solvents and other chemicals contaminate parts of the basin. The sources of contamination are varied; many of the sources are no longer present. The problems of water quality include the identification of specific sources of contamination ("point sources"), such as an unlined settling pond, and from diffuse sources ("non-point sources"), such as feed lots. Because the Federal and State government actively regulated the discharge of contaminants and actively promote groundwater clean-up, the Watermaster must carefully coordinate its efforts with those of regulatory agencies.

5. <u>Safe Yield:</u> The above-problems are related to the maximization of the safe yield of the basin. Other problems to be addressed include: maximization of the capture of storm water and maximization of the use of recycled water. Many governmental agencies are involved in flood control and recycled water regulation. The Watermaster must develop close coordination with these agencies to successfully manage the basin.

[Are "groundwater production" (#3), "groundwater level" (#1) and "safe yield (#5) the same basic thing? If so we have really only identified three problems. Another way of expressing Mark's conclusions which highlights the number of problems follows]

1. <u>Subsidence:</u> In parts of the basin, production has reduced ground water levels to such an extent the use of overlying lands are affected by subsidence. The problem of subsidence must be addressed by identifying the affected areas, monitoring the course of subsidence and, as

appropriate, by adjusting pumping or replenishment practices.

2. Increased Pumping Costs: In parts of the basin, the depth to water has increased enough to significantly affect pumping costs. The Watermaster is not primarily concerned with adverse economic impacts but the increase in the cost of production affects the feasibility of other mitigation measures. The cost of pumping can be addressed by raising water levels by the introduction of replenishment water. The OBMP must identify these opportunities.

3. Loss of Production Capacity: In parts of the basin, water levels have declined to such an extent it is no longer feasible to pump water. The loss of production capacity affects distribution; this may affect implementation of programs to address water quality and quantity problems. Replenishment can address this problem and the OBMP must be sensitive to this need.

4. Downstream Loses: Available storage in the basin cannot be used to address the supply and quality problems unless the potential loss of replenishment water to downstream areas is addressed by the OBMP.

5 Transportation of Contaminants: Contaminants can be most effectively removed from the basin when localized. Increased replenishment can diffuse the contaminants into new areas. The OBMP must take the diffusion of contaminants into consideration when increased storage is addressed.

6. Point Sources of Contamination: Contamination caused by "point sources", i.e., individual sources such as gasoline stations, can be removed at a relatively modest cost and usually by the person responsible. While many state and federal agencies actively seek out point sources, budget cutbacks threaten their efforts. The OBMP must address the problem of identifying point sources and monitor the enforcement efforts of regulatory agencies.

7. Non-point Sources of Contamination: Contamination from "non-point sources", i.e. diffused sources such as feed lots, can be extremely expensive to remediate. The problem of under funded regulatory agencies must be addressed by active monitoring and planning by the OBMP.

8. Capture of Storm Water: Flood water is potentially the cheapest and most plentiful source of groundwater recharge but flood control projects are sometimes operated without regard to water conservation. This problem must be addressed by the OBMP by developing a close

working relationship with flood control agencies. (Flood water is also often a non-point source of contamination.)

9. Maximize Use of Recycled Water: The tremendous potential of water reuse is only beginning to be realized in Southern California. The pace of utilization has been slow because of complicated health, environmental and institutional issues. In the Chino Basin, the problem is compounded by efforts of downstream entities to "capture" recycled water generated in the area. The OBMP can become the focal point for ;increasing recycled water use.

10. Data Acquisition: Segments of the basin chronically fail to report groundwater production. The Watermaster has attempted to deal with the deficiency in data by estimating use based on land use patterns. Data must include information to address water quality issue. Quality data can be expensive and the target contaminants change as technology advances. The problem of water quantity and quality data gathering is a ongoing problem to be addressed by the OBMP.

11. Coordination with Other Agencies: In recent decades the public has come to expect state and federal government to actively address water quality and drinking water issues but simultaneously revenue sources are being restricted. As a result, regulatory agencies have jurisdiction over problems they are unable to address. The OBMP must identify how the Watermaster can coordinate and assist regulatory agencies.

Other Scoping Issues

The Watermaster's earlier report on the Scope and Level of Detail of the OBMP included several topics. Watermaster was instructed to reexamine the other parts of the scoping document in light of the problems identified above. The Watermaster finds the remainder of the earlier report need not be changed to reflect the above-problems.

Conclusion

Watermaster respectfully requests the court to approve the Scope and Level of Detail for the OBMP as set forth in the moving papers and in this supplement.