

CHINO BASIN WATERMASTER



NOTICE OF MEETINGS

Thursday, March 9, 2006

9:00 a.m. – Joint Appropriative and Non-Agricultural Pool Meeting

AT THE CHINO BASIN WATERMASTER OFFICES

*9641 San Bernardino Road
Rancho Cucamonga, CA 91730
(909) 484-3888*

Tuesday, March 21, 2006

9:00 a.m. – Agricultural Pool Meeting

AT THE INLAND EMPIRE UTILITIES AGENCY OFFICES

*6075 Kimball Ave. Bldg. A Board Room
Chino, CA 91710
(909) 993-1600*



CHINO BASIN WATERMASTER

March 9, 2006

9:00 a.m. - Joint Appropriative & Non-Agricultural
Pool Meeting

March 21, 2006

9:00 a.m. - Agricultural Pool Meeting

AGENDA PACKAGE



**CHINO BASIN WATERMASTER
JOINT MEETING APPROPRIATIVE
& NON-AGRICULTURAL POOLS**

9:00 a.m. – March 9, 2006

At The Offices Of

Chino Basin Watermaster
9641 San Bernardino Road
Rancho Cucamonga, CA 91730

AGENDA

CALL TO ORDER

AGENDA - ADDITIONS/REORDER

I. CONSENT CALENDAR

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

A. MINUTES

1. Minutes of the Joint Appropriative and Non-Agricultural Pool Meeting held February 9, 2006
(Page 1)

B. FINANCIAL REPORTS

5. Cash Disbursements for the month of February 2006 (Page 13)
6. Combining Schedule of Revenue, Expenses and Changes in Working Capital for the Period July 1, 2005 through January 31, 2006 (Page 18)
7. Treasurer's Report of Financial Affairs for the Period January 1, 2006 through January 31, 2006 (Page 19)
8. Profit & Loss Budget vs. Actual July through January 2006 (Page 21)

II. BUSINESS ITEMS

A. CONTRACT FOR DRILLING AND CONSTRUCTION OF A NESTED PIEZOMETER

Consider Approval of the Contract with Layne Christensen Company to Drill and Construct a Nested Piezometer at Ayala Park in Chino (Page 23)

B. MZ1 SUMMARY REPORT

Consider Approval of the February 2006 MZ-1 Summary Report (Page 29)

C. IEUA/DWR GRANT FUNDING AGREEMENT

Consider Approval of the Agreement Regarding Recharge Facilities Improvements Matching Funds Cost Sharing Agreement between Inland Empire Utilities Agency and Chino Basin Watermaster Dated March, 2006 (Page 99)

D. ALLOCATION OF VOLUME VOTE

Consider Comparison of Approaches for the Allocation of the Appropriative Pool Volume Vote (Page 107)

III. REPORTS/UPDATES

A. WATERMASTER GENERAL LEGAL COUNSEL REPORT

- 1. Attorney Manager Process/Discussion of Peace II Agreement
- 2. 85/15 Update

B. WATERMASTER ENGINEERING CONSULTANT REPORT

- 1. Update on Report on Balance of Recharge and Discharge

C. CEO/STAFF REPORT

- 1. USGS-GAMA Program
- 2. Legislative Update
- 3. SAW DMS Data Coordination (*Page 115*)
- 4. Department of Health Services Public Hearing on Recycled Water
- 5. Monthly Recharge Update

IV. INFORMATION

- 1. Newspaper Articles (*Page 119*)

V. POOL MEMBER COMMENTS

VI. OTHER BUSINESS

VII. FUTURE MEETINGS

March 9, 2006	9:00 a.m.	Joint Appropriative & Non-Agricultural Pool Meeting
March 14, 2006	9:00 a.m.	GRCC Meeting
March 21, 2005	9:00 a.m.	Agricultural Pool Meeting @ IEUA
March 23, 2006	9:00 a.m.	Advisory Committee Meeting
March 23, 2006	11:00 a.m.	Watermaster Board Meeting
March 23, 2006	11:00 a.m.	Watermaster Board Meeting
March 28, 2006	9:00 a.m.	GRCC Meeting

Meeting Adjourn

**CHINO BASIN WATERMASTER
AGRICULTURAL POOL MEETING**

9:00 a.m. – March 21, 2006

At The Offices Of

Inland Empire Utilities Agency
6075 Kimball Ave., Bldg. A, Board Room
Chino, CA 91710

AGENDA

CALL TO ORDER

AGENDA - ADDITIONS/REORDER

I. CONSENT CALENDAR

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A. MINUTES

1. Minutes of the Agricultural Pool Meeting held February 21, 2006 *(Page 7)*

B. FINANCIAL REPORTS

5. Cash Disbursements for the month of February 2006 *(Page 13)*
6. Combining Schedule of Revenue, Expenses and Changes in Working Capital for the Period July 1, 2005 through January 31, 2006 *(Page 18)*
7. Treasurer's Report of Financial Affairs for the Period January 1, 2006 through January 31, 2006 *(Page 19)*
8. Profit & Loss Budget vs. Actual July through January 2006 *(Page 21)*

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1. USGS-GAMA Program
2. Legislative Update
3. SAW DMS Data Coordination (*Page 115*)
4. Department of Health Services Public Hearing on Recycled Water
5. Monthly Recharge Update
6. Data Request/SAWPA

IV. INFORMATION

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March 23, 2006	11:00 a.m.	Watermaster Board Meeting
March 28, 2006	9:00 a.m.	GRCC Meeting

Meeting Adjourn



CHINO BASIN WATERMASTER

I. CONSENT CALENDAR

A. MINUTES

1. Joint Appropriative & Non-Agricultural Pool Meeting – February 9, 2006



Draft Minutes
CHINO BASIN WATERMASTER
JOINT APPROPRIATIVE & NON-AGRICULTURAL POOL MEETING
February 9, 2006

The Annual Appropriative Pool Meeting was held at the offices of Chino Basin Watermaster, 9641 San Bernardino Road, Rancho Cucamonga, CA, on February 9, 2006 at 9:00 a.m.

APPROPRIATIVE POOL MEMBERS PRESENT

Robert DeLoach, Chair	Cucamonga Valley Water District
Raul Garibay	City of Pomona
Dave Crosley	City of Chino
Ken Jeske	City of Ontario
Bill Stafford	Marygold Mutual Water Company
Mike McGraw	Fontana Water Company
Charles Moorrees	San Antonio Water Company
Rosemary Hoerning	City of Upland
Rich Atwater	Inland Empire Utilities Agency
Mark Kinsey	Monte Vista Water District

NON-AGRICULTURAL POOL MEMBERS PRESENT

Justin Scott-Coe	Vulcan Materials Company (Calmat Division)
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WATERMASTER BOARD MEMBERS PRESENT

Bob Kuhn	Three Valleys Municipal Water District
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Watermaster Staff Present

Kenneth R. Manning	Chief Executive Officer
Sheri Rojo	CFO/Asst. General Manager
Danielle Maurizio	Senior Engineer
Gordon Treweek	Project Engineer
Sherri Lynne Molino	Recording Secretary

Watermaster Consultants Present

Michael Fife	Hatch & Parent
Mark Wildermuth	Wildermuth Environmental Inc.

Others Present

Justin Brokaw	Marygold Mutual Water Company
Bill Curley	City of Upland
Bill Kruger	City of Chino Hills
Manuel Carrillo	Senator Soto's Office
Craig Stewart	Geomatrix
Mohamad Elamamy	City of Ontario
Curtis Aaron	City of Fontana

Chair DeLoach called the meeting to order at 9:10 a.m.

AGENDA - ADDITIONS/REORDER

There were no additions or reorders made to the agenda.

I. **CONSENT CALENDAR**

A. MINUTES

1. Minutes of the Annual Appropriative Pool Meeting held January 12, 2006
2. Minutes of the Annual Non-Agricultural Pool Meeting held January 12, 2006

B. FINANCIAL REPORTS

1. Cash Disbursements for the month of December 2005
2. Combining Schedule of Revenue, Expenses and Changes in Working Capital for the Period July 1, 2005 through November 30, 2005
3. Treasurer's Report of Financial Affairs for the Period November 1, 2005 through November 30, 2005
4. Profit & Loss Budget vs. Actual July through November 2005
5. Cash Disbursements for the month of January 2006
6. Combining Schedule of Revenue, Expenses and Changes in Working Capital for the Period July 1, 2005 through December 31, 2005
7. Treasurer's Report of Financial Affairs for the Period December 1, 2005 through December 31, 2005
8. Profit & Loss Budget vs. Actual July through December 2005

C. INDEPENDENT AUDITOR'S REPORT ON FINANCIAL STATEMENTS FOR FISCAL YEAR ENDED JUNE 30, 2005

Receive and File the Annual Audited Financial Statements for Fiscal Year Ended June 30, 2005.

D. WATER TRANSACTION

Consider Approval for Transaction of Notice of Sale or Transfer – Cucamonga Valley Water District has agreed to purchase from West Valley Water District water in storage in the amount of 500 acre-feet. Date of application: January 10, 2006.

Motion by Jeske, second by Kinsey, and by unanimous vote

Moved to approve Consent Calendar Items A through D, as presented

II. BUSINESS ITEMS

No comment was made regarding this item.

III. REPORTS/UPDATES**A. WATERMASTER GENERAL LEGAL COUNSEL REPORT**1. Attorney Manager Process/Discussion of Peace II Agreement

Counsel Fife stated the two items under legal reports will be reported as one item today. There have been a number of pleadings filed within the last ten days; the most recent are available on the back table and will be the subject of the court hearing scheduled for today at 2:00 p.m. There is an Attorney-Manager meeting scheduled today for 11:00 a.m. in order to discuss the pleadings that have been filed and a strategy for approaching the hearing at 2:00 p.m. Counsel is anticipating a quiet hearing as we have had for the past several years. Questions and major comments can be heard and addressed at the 11:00 a.m. meeting today.

2. Court Hearing

No comment was made regarding this item.

B. WATERMASTER ENGINEERING CONSULTANT REPORT1. Evaluation of the Cumulative Effects of Transfers Pursuant to the Peace Agreement

Mr. Wildermuth stated one of the items the Special Referee noted in her comments/report that she was concerned about regarded the Accumulative Effect of Transfers Pursuant to the Peace Agreement, which is done every two years starting in 2003. This analysis was completed last summer, on time; it has not been brought forward through the Watermaster process to date. Wildermuth Environmental had produced a report in draft form in dealing with hydraulic control issues, balance of recharge and discharge, and that report contains

this required analysis within it since these issues are all drawn together and relate to one another. This report is now ready for internal staff review within the next few days and will go through the Watermaster process for approval.

2. Hydraulic Control Update

Mr. Wildermuth commented on the status of the State of the Basin Report. Mr. Kinsey inquired into a short summary of the Accumulative Effect Pursuant to the Peace Agreement. Mr. Wildermuth stated 261,000 acre-feet of water has been avoided in wet water recharge due to transfers from storage accounts and the assessment is that there is no negative impact in this regard. Mr. Wildermuth stated this process has been of great benefit to the Chino Basin and to disallow the transfers could end up being a financial burden on the parties involved. Mr. Kinsey offered comment on Mr. Wildermuth's summary. A discussion ensued regarding the accumulative effect and recharge within the basin. It was asked if the report can be brought back to this committee to be given in presentation form to bring parties up to full speed on its content and intent in a timely manner. Mr. Manning and Mr. Wildermuth stated it will be brought back for review as requested.

C. **CEO/STAFF REPORT**

1. 85/15 Update

Mr. Manning stated this item was asked to be reviewed by staff and to be agendized for review and/or discussion at a future pool meeting. Mr. Manning stated a full report has not been completed at this date and time and noted this item will be brought back at the March meeting for review and/or discussion.

2. Volume Vote Update

Mr. Manning stated this item was brought up at the November 2005 pool meeting and it was noted, at that meeting, that this item would be addressed early in 2006. The volume vote was relative to the fact that Watermaster includes the payments for replenishment water as overproduction as part of the assessments paid in relationship to this volume voting issue. Watermaster staff asked counsel to do some research on this issue and some scenarios have been formulated for contemplation today. Counsel Fife referred to the memorandum regarding the Volume Vote which is available on the back table. Counsel Fife stated the issue with the volume voting is that under the Judgment which means under the Appropriative Pool pooling plan, there are 1,000 votes within the Appropriative Pool, 500 of those votes are distributed based on initial shares of safe yield and 500 of them are allocated according to "assessments paid to Watermaster". Watermaster has interpreted the phrase, "assessments paid to Watermaster", to include all assessments which means administrative, OBMP, and replenishment assessments and it is the replenishment assessments category that raised the issue at hand. Counsel Fife stated there is a reason replenishment assessments would be included as a policy counter balance to parties who were fully developed or had high water usages back in the 1970's when the Judgment was created and initial shares of safe yield were allocated; versus parties who have developed later and who have very low shares of safe yield but who now produce a lot of water. By including replenishment assessments in that equation sort of creates a balance. The question is that some parties, who may be over producers, in any given year, may cover their replenishment not by paying an assessment to Watermaster but by rather taking water out of storage or buying water from another party. This leads into the discussion that once the basin in balance and there can be more transfers across zones, parties may be covering a greater portion of their replenishment assessments this way. Counsel Fife questions the parties by asking does this analysis create an inequity – should Watermaster's policies concerning the allocation of volume votes be changed? Feedback was solicited from parties that resulted in a few approaches that we could take in resolving the issue. Counsel Fife read the four sample approaches that were listed in the memo and noted these approaches are intended to generate discussion and receive possible direction. Mr. Kinsey offered comment on the history of how this calculation was

first formulated during the creation of the Judgment. A lengthy discussion ensued by several committee members regarding the initial process and the issue at hand. It was noted this discussion and the decisions only involves/effects the "Appropriative Pool" and action will be taken only by this pool. Mr. Manning stated staff is looking for guidance to either have a decision today to bring this issue back for a motion in March or to come up with a few options today to have the parties explore the options with their agencies and bring it back for a motion at a later date. A further discussion ensued with regard to the presented sample approaches counsel brought forth. Mr. Garibay noted that he would like to see some numbers crunched prior to making a decision. Counsel Fife stated the direction would be to bring back a proposal in March and not to make a final decision today. Mr. Manning stated that numbers could be brought back with the proposal at the March pool meeting.

It was asked if the committee members could get an explanation of what will be brought up regarding the 85/15 rule and how this inquiry came about. It was noted that the City of Chino had brought up the issue at the November pool meeting. Mr. Crosley stated that during the review of last assessment package that was distributed, the City of Chino noticed application of the 85/15 rule in a few instances where he thought that it was a misapplication and at that time Watermaster staff was asked to research that and come back at a later time with the findings. A brief discussion ensued with regard to the 85/15 rule and it was noted that staff is not prepared to go into detail and that this item will be brought back at the March meeting with a full report.

3. Department of Water Resources Grant Financing Update

Mr. Manning stated that staff fully expects that next month the Pools, Advisory Committee, and Watermaster Board will be dealing with a contract wherein terms will be discussed relative to the financing of the Department of Water Resources (DWR) Grant – a grant that totals over \$10M; that is a 50/50 split between Chino Basin Watermaster (CBWM) and Inland Empire Utilities Agency (IEUA). Included at the back table is a handout which is a breakdown of the projects that are included within this DWR grant, it is a \$5M dollar grant with a \$5M dollar match; half paid by CBWM and half paid by IEUA, meaning that Watermaster will agree to contribute \$2.5M towards this grant. The terms of debt repayment are presently being worked out with IEUA. Mr. Manning reviewed several of the items listed in the handout. Mr. Atwater offered history on past funding agreements and debt services for improvements and noted the new debt service for this new grant will be a policy issue brought through the Watermaster process in the near future. A discussion regarding the possible additional and/or increase of acre-feet of water created by these improvements and who will benefit ensued. Ms. Rojo stated that the actual value of the increase in recharge capacity it is not known merely on potential storm water yield but more of a increase in recharge capacity. As our basin is constantly being overdrawn and is expected to be done in the future as well – we have an obligation to get water in the ground and we need places to do that. Mr. Atwater noted that given the quantity and involvement of the questions presented today he would not hesitate in putting together a workgroup to be able to elaborate better on what has been presented today. It was noted by several pool members that it is a good idea to put together a workgroup and be given the opportunity to discuss this issue in greater detail. Mr. Treweek offered comment on some of the Phase III improvements and how those improvements will enhance the capture of water.

4. San Diego County Water Authority RFP for Groundwater Conjunctive Use Project

Mr. Manning stated that the San Diego County Water Authority has released their RFP and staff has had the opportunity to review that proposal and staff is inclined to submit a proposal. It was asked if the RFP was available and Ms. Rojo noted she had copies available for those who wanted them. Mr. Manning noted that San Diego is anxious to have Watermaster involved and staff feels they are willing to discuss terms with us.

Added Item:

Mr. Manning noted that available on the back table is an additional handout regarding supplemental and storm water recharge; it was asked at a past meeting that parties be kept informed on a monthly basis of how we are doing on recharge. As was noted by Mr. Treweek, we appear to be on target for our recharge from more supplemental than storm water at this point in time. This chart will be made available with updates each month.

IV. INFORMATION

1. Newspaper Articles

No comment was made regarding this item.

V. POOL MEMBER COMMENTS

No comment was made regarding this item.

VI. OTHER BUSINESS

No comment was made regarding this item.

VII. FUTURE MEETINGS

February 9, 2006	9:00 a.m.	Joint Appropriative & Non-Agricultural Pool Meeting
February 9, 2006	11:00 a.m.	Attorney Manager Meeting
February 14, 2006	9:00 a.m.	GRCC Meeting
February 21, 2005	9:00 a.m.	Agricultural Pool Meeting @ IEUA
February 23, 2006	9:00 a.m.	Advisory Committee Meeting
February 23, 2006	11:00 a.m.	Watermaster Board Meeting

The Joint Appropriative & Non-Agricultural Pool Meeting Adjourned at 10:07 a.m.

Secretary: _____

Minutes Approved: _____

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CHINO BASIN WATERMASTER

I. CONSENT CALENDAR

A. MINUTES

1. Agricultural Pool Meeting –
February 21, 2006



Draft Minutes
**CHINO BASIN WATERMASTER
AGRICULTURAL POOL MEETING**
February 21, 2006

The Agricultural Pool Meeting was held at the offices of the Inland Empire Utilities Agency, 6075 Kimball Avenue, Chino, CA, on February 21, 2006 at 9:00 a.m.

Agricultural Pool Members Present

Nathan deBoom, Chair	Dairy
Glen Durrington	Crops
Jeff Pierson	Crops
John Huitsing	Dairy
Pete Hettinga	Dairy
Robert Feenstra	Dairy
Nate Mackamul	State of California CIW

Watermaster Board Member Present

Paul Hofer	Crops
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Watermaster Staff Present

Kenneth R. Manning	Chief Executive Officer
Sheri Rojo	CFO /Asst. General Manager
Gordon Treweek	Project Engineer
Danielle Maurizio	Senior Engineer
Sherri Lynne Molino	Recording Secretary

Watermaster Consultants Present

Michael Fife	Hatch & Parent
Mark Wildermuth	Wildermuth Environmental Inc.

Others Present

Steve Lee	Reid & Hellyer
Rich Atwater	Inland Empire Utilities Agency

Chair deBoom called the meeting to order at 9:10 a.m.

AGENDA - ADDITIONS/REORDER

There were no additions or reorders made to the agenda.

I. CONSENT CALENDAR

A. MINUTES

1. Minutes of the Annual Agricultural Pool Meeting held January 17, 2006

B. FINANCIAL REPORTS

1. Cash Disbursements for the month of December 2005
2. Combining Schedule of Revenue, Expenses and Changes in Working Capital for the Period July 1, 2005 through November 30, 2005
3. Treasurer's Report of Financial Affairs for the Period November 1, 2005 through November 30, 2005
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C. INDEPENDENT AUDITOR'S REPORT ON FINANCIAL STATEMENTS FOR FISCAL YEAR ENDED JUNE 30, 2005

Receive and File the Annual Audited Financial Statements for Fiscal Year Ended June 30, 2005.

D. WATER TRANSACTION

Consider Approval for Transaction of Notice of Sale or Transfer – Cucamonga Valley Water District has agreed to purchase from West Valley Water District water in storage in the amount of 500 acre-feet. Date of application: January 10, 2006.

Motion by Durrington, second by Feenstra, and by unanimous vote

Moved to approve Consent Calendar Items A through D, as presented

II. BUSINESS ITEMS

No comment was made regarding this item.

III. REPORTS/UPDATES

A. WATERMASTER GENERAL LEGAL COUNSEL REPORT

Item 2 was received/discussed prior to item 1.

2. Court Hearing

Counsel Fife stated there are several court related handouts available on the back table. Counsel Fife noted that he would present a summary of events since the last Agricultural Pool meeting. Watermaster filed a motion to reappoint the nine member board, there were some last minute discussion on how that motion be written/presented and the Watermaster Board ultimately instructed counsel to not only ask for a reappointment for another five year term but to also express a commitment by the Board to convene a Governance Committee. The Governance Committee would review the overall governance of Watermaster along with several other items which will be determined by that committee. The commitment of forming a Governance Committee was put into the pleading noting a result had to come forth within a two year time frame from that committee on issues of governance. After the pleading was filed, the Special Referee filed a response to the Watermaster's pleading. Counsel Fife stated that the Special Referee's report recommended reappointment of the Board and it was noted that the report did not acknowledge any of the good progress that has been made over the last five years. The Special Referee was also under the impression that our reappointment request was for a two year term instead of the full five year term; that notion was rectified at the February 9, hearing. The Special Referee's report sparked a lot of response from several parties. Watermaster filed a response that stated Watermaster was asking for a five year reappointment and also responded that we "Watermaster" have done a lot of good things and made a lot of progress over the last five years. Joinders were also attached to our pleading by Three Valleys Municipal Water District, Inland Empire Utilities Agency, and the Water Conservation District. The City of Ontario and Cucamonga Valley Water District also each filed their own objections to the Special Referees report; those two pleadings stated they wanted a five year term and that Watermaster has done a lot of great things over the last five years. A hearing took place on February 9, 2006 that was well attended and the court did put out an order at that hearing. The order indicated that Watermaster is doing a good job and the nine member board is reappointed for another five year term; it was also stated that the court is not satisfied with where Watermaster is at presently with our desalting planning. A discussion ensued with regard to the pleadings which were filed and the court responses to the desalters. It was noted that the court ordered Watermaster to hold a workshop in July 2006 with the Special Referee where

Watermaster will present our plan for getting to the next increment of desalting. There were no consequences laid out in the order if we get to the workshop and have nothing to offer on the desalting issue; however, there was a strong implication in the order while the five year reappointment is not a conditional reappointment, that it is really conditioned upon Watermaster showing the court forward movement on the desalter planning. Mr. Feenstra noted that he and Mr. Atwater are going to be going to Washington shortly and maybe the item of recycling water can be brought up by one of them to get the word out to our legislators. Mr. Manning stated that he too would be attending the Washington meetings and would speak to Mr. Feenstra and Mr. Atwater regarding this issue after the meeting.

1. Attorney Manager Process/Discussion of Peace II Agreement

Counsel Fife stated we are moving forward with the Peace II process; there are items under discussion which should be resolved in a timely manner. A brief discussion ensued with regard to the two new board members which came on board in January 2006. Mr. Manning described Mr. Ken Willis from the City of Upland including some of his water background and noted that Mr. Willis is the newly appointed 2006 Watermaster Board Chairman. Mr. Manning stated Ms. Sandra Rose from Monte Vista Water District now sits on the board and noted she is the newly appointed 2006 Board Secretary. It was noted that Mr. Willis was able to join some of the Watermaster staff in the recent trip to Sacramento and Mr. Willis proved he knows his water issues. Mr. Manning noted that prior to the July workshop a pre-workshop will need to be called for parties to get together to discuss issues. A brief discussion ensued with regard to the Peace II process. Mr. Hofer stated that he felt there is a genuine consensus among the parties to resolve the Peace II issues and to come up with a workable plan.

B. WATERMASTER ENGINEERING CONSULTANT REPORT

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

Mr. Wildermuth stated that Watermaster has an obligation every two years, ending in odd years, to prepare an analysis of the balance of recharge and discharge in every area and sub area of the basin as well as to evaluate the cumulative effect of transfers. As of July of 2005 those analyses have been completed as best as they could be at that time but because of the negotiations under Peace II, that work was put on hold. An administration draft report was produced which sat un-acted upon until now. Since then, a lot of model work to analyze the balance of recharge and discharge in the basin in support of the Peace II process has taken place. That work is now complete and the final touches with maps and such are being completed and will be forthcoming. Internally there will be an administrative draft of that effort and shortly the report will be out for review by all parties. Inside of that report is the analysis of cumulative effect of transfers which can't be looked at independently because both the hydraulic control and the cumulative effect of transfers are used by Watermaster to figure out a supplemental water recharge plan. The purpose of the balance of recharge and discharge is for Watermaster to look at how the basin is functioning relative to pumping and to try and design a supplemental water recharge plan to bring the basin into balance hydrologically. This is an issue that came up also during the Peace I discussions by the Management Zone 1 pumpers. There is an excerpt in the meeting packet for review which is basically the same excerpt released in July of 2005. The accumulative effect of transfers has resulted in the avoidance of about 26,000 acre-feet of wet water recharge; that is primarily a result of transfers among parties and using water from storage accounts. The market system put into place by the Judgment which allows parties to buy water from under-producers and move it to over-producers has been a good thing overall. Mr. Wildermuth referred to page 80 of the meeting packet to review the four outcomes that describe the results of doing the transfers. The conclusion is that there has been no material physical injury from the transfer process and the actual transfer process has been a good thing. Mr. Wildermuth referred to page 86 of the meeting packet to review the water transfers, to and from, in management zone 1. Mr. Atwater offered comment on recycled water and a discussion ensued with regard to recycled water programs and noted a workgroup could be held in March to get ready for the public hearing that is scheduled for April.

2. Hydraulic Control Update

This item was discussed under item B1. No further discussion took place regarding this item.

C. CEO/STAFF REPORT

1. 85/15 Update

Mr. Manning noted this is a notification item only and this item is being addressed at the Appropriative Pool meetings by a request from the Appropriative Pool Members.

2. Volume Vote Update

Mr. Manning noted this is a notification item only and this item is being addressed at the Appropriative Pool meetings by a request from the Appropriative Pool Members. Once this item has been resolved the resolution will be brought through the Watermaster process as an information item.

3. Department of Water Resources Grant Financing Update

Mr. Manning stated that staff fully expects that next month the Pools, Advisory Committee, and Watermaster Board will be dealing with a contract wherein terms will be discussed relative to the financing of the Department of Water Resources (DWR) Grant – a grant that totals over \$10M; that is a 50/50 split between Chino Basin Watermaster (CBWM) and Inland Empire Utilities Agency (IEUA). Included at the back table is a handout which is a breakdown of the projects that are included within this DWR grant, it is a \$5M dollar grant with a \$5M dollar match; half paid by CBWM and half paid by IEUA, meaning that Watermaster is agreeing to contribute \$2.5M towards this grant. The terms of repayment are presently being worked out with IEUA. Mr. Atwater offered history on past funding agreements and debt services for improvements and noted the debt service for this new grant will be a policy issue brought through the Watermaster process in the near future. Mr. Manning reviewed several of the items listed in the handout and Mr. Treweek reviewed some of the potential projects in detail.

4. San Diego County Water Authority RFP for Groundwater Conjunctive Use Project

Mr. Manning stated that the San Diego County Water Authority has released their RFP and staff has had the opportunity to review that proposal and staff is inclined to submit a proposal. It was asked if the RFP was available and Ms. Rojo noted she had copies available for those who wanted them. Mr. Manning noted that San Diego is anxious to have Watermaster involved and staff feels they are willing to discuss terms with us.

Added Item:

Mr. Manning noted that available on the back table is an additional handout regarding supplemental and storm water recharge; it was asked at a past meeting that parties be kept informed on a monthly basis of how we are doing on recharge. As was noted by Mr. Treweek, we appear to be on target for our recharge from more supplemental than storm water at this point in time. This chart will be made available with updates each month.

IV. INFORMATION

1. Newspaper Articles

No comment was made regarding this item.

V. POOL MEMBER COMMENTS

Mr. Durrington commented on flooding issues in the Northern California and the importance of the Peripheral Cannel project. It was noted this topic might be mentioned to our local legislators. Mr. Feenstra stated during the general manager search at Metropolitan Water District one of the candidates stated that it is urgent that we address issues regarding the Peripheral Cannel. A brief discussion ensued with the regard to the suggestion of pipe installation.

VI. OTHER BUSINESS

No comment was made regarding this item.

VII. FUTURE MEETINGS

February 9, 2006	9:00 a.m.	Joint Appropriative & Non-Agricultural Pool Meeting
February 9, 2006	11:00 a.m.	Attorney Manager Meeting
February 14, 2006	9:00 a.m.	GRCC Meeting
February 21, 2005	9:00 a.m.	Agricultural Pool Meeting @ IEUA
February 23, 2006	9:00 a.m.	Advisory Committee Meeting
February 23, 2006	11:00 a.m.	Watermaster Board Meeting

The Agricultural Pool Meeting Adjourned at 10:06 a.m.

Secretary: _____

Minutes Approved: _____

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CHINO BASIN WATERMASTER

I. CONSENT CALENDAR

B. FINANCIAL REPORTS

1. Cash Disbursements for the month of February 2006
2. Combining Schedule of Revenue, Expenses and Changes in Working Capital for the Period July 1, 2005 through January 31, 2006
3. Treasurer's Report of Financial Affairs for the Period January 1, 2006 through January 31, 2006
4. Profit & Loss Budget vs. Actual July through January 2006





CHINO BASIN WATERMASTER

9641 San Bernardino Road, Rancho Cucamonga, Ca 91730
Tel: 909.484.3888 Fax: 909.484.3890 www.cbwm.org

KENNETH R. MANNING
Chief Executive Officer

STAFF REPORT

DATE: March 9, 2006
March 21, 2006
March 23, 2006

TO: Committee Members
Watermaster Board Members

SUBJECT: Cash Disbursement Report – February 2006

SUMMARY

Issue – Record of cash disbursements for the month of February 2006.

Recommendation – Staff recommends the Cash Disbursements for February 2006 be received and filed as presented.

Fiscal Impact – All funds disbursed were included in the FY 2005-06 Watermaster Budget.

BACKGROUND

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

DISCUSSION

Total cash disbursements during the month of February 2006 were \$1,324,400.49. The most significant expenditures during the month were Inland Empire Utilities Agency in the amount of \$897,752.90, Wildermuth Environmental Inc. in the amount of \$169,794.65, and Hatch and Parent in the amount of \$43,249.35.

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CHINO BASIN WATERMASTER
Cash Disbursement Detail Report
February 2006

Type	Date	Num	Name	Amount
Feb 06				
Bill Pmt -Check	2/2/2006	10215	APPLIED COMPUTER TECHNOLOGIES	-2,548.55
Bill Pmt -Check	2/2/2006	10216	COMPUSA, INC.	-73.72
Bill Pmt -Check	2/2/2006	10217	CONRAD & ASSOCIATES, L.L.P.	-5,119.00
Bill Pmt -Check	2/2/2006	10218	DIRECTV	-74.98
Bill Pmt -Check	2/2/2006	10219	MEDIA JIM	-995.00
Bill Pmt -Check	2/2/2006	10220	OFFICE DEPOT	-403.95
Bill Pmt -Check	2/2/2006	10221	PURCHASE POWER	-2,016.99
Bill Pmt -Check	2/2/2006	10222	R&D PEST SERVICES	-85.00
Bill Pmt -Check	2/2/2006	10223	RICOH BUSINESS SYSTEMS-Maintenance	-848.18
Bill Pmt -Check	2/2/2006	10224	UNION 76	-155.99
Bill Pmt -Check	2/2/2006	10225	VELASQUEZ JANITORIAL	-1,200.00
Bill Pmt -Check	2/2/2006	10226	VERIZON	-41.44
Bill Pmt -Check	2/2/2006	10227	VIP AUTO DETAILING	-479.20
Bill Pmt -Check	2/2/2006	10228	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-5,062.16
Bill Pmt -Check	2/2/2006	10229	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	0.00
Bill Pmt -Check	2/2/2006	10230	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-5,063.83
Bill Pmt -Check	2/2/2006	10231	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-5,078.83
Bill Pmt -Check	2/2/2006	10232	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-5,202.67
Bill Pmt -Check	2/2/2006	10233	CITISTREET	-1,000.00
Bill Pmt -Check	2/2/2006	10234	CITISTREET	-975.68
Bill Pmt -Check	2/2/2006	10235	CITISTREET	-1,250.00
Bill Pmt -Check	2/2/2006	10236	CITISTREET	-4,217.38
Bill Pmt -Check	2/2/2006	10237	CITISTREET	-2,750.00
Bill Pmt -Check	2/2/2006	10238	CALIFORNIA PUBLIC EMPL RETIREMENT SYSTEM	-1,487.00
Bill Pmt -Check	2/2/2006	10239	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-1,548.70
Bill Pmt -Check	2/2/2006	10240	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-1,548.70
Bill Pmt -Check	2/2/2006	10241	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-1,548.70
Bill Pmt -Check	2/2/2006	10242	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-61.70
Bill Pmt -Check	2/2/2006	10243	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-1,182.86
General Journal	2/5/2006	06/02/4	PAYROLL	-6,440.84
General Journal	2/5/2006	06/02/4	PAYROLL	-20,905.55
Bill Pmt -Check	2/9/2006	10244	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-35.75
Bill Pmt -Check	2/9/2006	10245	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-35.76
Bill Pmt -Check	2/9/2006	10246	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-35.74
Bill Pmt -Check	2/9/2006	10247	AWWA	-150.00
Bill Pmt -Check	2/9/2006	10248	BOWCOCK, ROBERT	-375.00
Bill Pmt -Check	2/9/2006	10249	COSTCO WHOLESALE MEMBERSHIP	-205.00
Bill Pmt -Check	2/9/2006	10250	FRANKLIN COVEY	-8.06
Bill Pmt -Check	2/9/2006	10251	HAMRICK, PAUL	-125.00
Bill Pmt -Check	2/9/2006	10252	HSBC BUSINESS SOLUTIONS	-381.13
Bill Pmt -Check	2/9/2006	10253	INLAND COUNTIES INSURANCE SERVICES, INC.	-477.14
Bill Pmt -Check	2/9/2006	10254	INLAND EMPIRE UTILITIES AGENCY	-897,752.90
Bill Pmt -Check	2/9/2006	10255	KRUGER, W. C. "BILL"	-250.00
Bill Pmt -Check	2/9/2006	10256	KUHN, BOB	-375.00
Bill Pmt -Check	2/9/2006	10257	NEUFELD, ROBERT	-875.00
Bill Pmt -Check	2/9/2006	10258	PARK PLACE COMPUTER SOLUTIONS, INC.	-2,200.00
Bill Pmt -Check	2/9/2006	10259	PAYCHEX	-354.12
Bill Pmt -Check	2/9/2006	10260	QUILL	-58.92
Bill Pmt -Check	2/9/2006	10261	REID & HELLYER	-4,347.68
Bill Pmt -Check	2/9/2006	10262	RICOH BUSINESS SYSTEMS-Maintenance	-40.00
Bill Pmt -Check	2/9/2006	10263	ROSE, SANDRA	-250.00
Bill Pmt -Check	2/9/2006	10264	SAN BERNARDINO COUNTY FLOOD CONTROL DI...	-36.00
Bill Pmt -Check	2/9/2006	10265	UNITED PARCEL SERVICE	-552.04
Bill Pmt -Check	2/9/2006	10266	VANDEN HEUVEL, GEOFFREY	-375.00
Bill Pmt -Check	2/9/2006	10267	VERIZON	-340.85
Bill Pmt -Check	2/9/2006	10268	WILDERMUTH ENVIRONMENTAL INC	-5,938.00
Bill Pmt -Check	2/9/2006	10269	WILLIS, KENNETH	-375.00
Bill Pmt -Check	2/15/2006	10270	ACWA SERVICES CORPORATION	-256.12
Bill Pmt -Check	2/15/2006	10271	BANK OF AMERICA	-1,008.10
Bill Pmt -Check	2/15/2006	10272	CA SOCIETY OF MUNICIPAL FINANCE OFFICERS	-100.00
Bill Pmt -Check	2/15/2006	10273	FIRST AMERICAN REAL ESTATE SOLUTIONS	-125.00
Bill Pmt -Check	2/15/2006	10274	HATCH AND PARENT	-43,249.35
Bill Pmt -Check	2/15/2006	10275	MCI	-908.17
Bill Pmt -Check	2/15/2006	10276	RICOH BUSINESS SYSTEMS-Lease	-3,591.31
Bill Pmt -Check	2/15/2006	10277	STATE COMPENSATION INSURANCE FUND	-1,132.85
Bill Pmt -Check	2/15/2006	10278	STAULA, MARY L	-136.61
Bill Pmt -Check	2/15/2006	10279	THE FURMAN GROUP, INC.	-2,625.00
Bill Pmt -Check	2/15/2006	10280	WHEELER METER MAINTENANCE	-900.00

CHINO BASIN WATERMASTER
Cash Disbursement Detail Report
February 2006

Type	Date	Num	Name	Amount
Bill Pmt -Check	2/15/2006	10281	RICOH BUSINESS SYSTEMS-Lease	-888.94
Bill Pmt -Check	2/15/2006	10282	CUCAMONGA VALLEY WATER DISTRICT	-5,076.00
Bill Pmt -Check	2/15/2006	10283	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-123.84
Bill Pmt -Check	2/22/2006	10284	A & R TIRE	-466.26
Bill Pmt -Check	2/22/2006	10285	EXCEL LANDSCAPE	-407.00
Bill Pmt -Check	2/22/2006	10286	MATHIS & ASSOCIATES	-978.30
Bill Pmt -Check	2/22/2006	10287	PUMP CHECK	-5,291.55
Bill Pmt -Check	2/22/2006	10288	UNITEK TECHNOLOGY INC.	-231.66
Bill Pmt -Check	2/22/2006	10289	WILDERMUTH ENVIRONMENTAL INC	-169,794.65
Bill Pmt -Check	2/23/2006	10290	JAMES JOHNSTON	-1,295.00
General Journal	2/24/2006	06/02/7	PAYROLL	-5,733.22
General Journal	2/24/2006	06/02/7	PAYROLL	-19,447.59
Bill Pmt -Check	2/24/2006	10291	VIP AUTO DETAILING	-299.40
Bill Pmt -Check	2/24/2006	10292	CALPERS	-2,650.83
Bill Pmt -Check	2/24/2006	10293	CITISTREET	-1,750.00
Bill Pmt -Check	2/24/2006	10294	ELLISON, SCHNEIDER & HARRIS, LLP	-34,715.71
Bill Pmt -Check	2/24/2006	10295	IDEAL GRAPHICS	-694.00
Bill Pmt -Check	2/24/2006	10296	OFFICE DEPOT	-678.20
Bill Pmt -Check	2/24/2006	10297	PRE-PAID LEGAL SERVICES, INC.	-129.50
Bill Pmt -Check	2/24/2006	10298	PRINTING RESOURCES	-70.37
Bill Pmt -Check	2/24/2006	10299	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-6,692.71
Bill Pmt -Check	2/24/2006	10300	RICOH BUSINESS SYSTEMS-Maintenance	-274.48
Bill Pmt -Check	2/24/2006	10301	SPRINT	-600.80
Bill Pmt -Check	2/24/2006	10302	STANDARD INSURANCE CO.	-579.88
Bill Pmt -Check	2/24/2006	10303	STATE COMPENSATION INSURANCE FUND	-1,133.45
Bill Pmt -Check	2/24/2006	10304	CITISTREET	-2,850.00
Bill Pmt -Check	2/24/2006	10305	PUBLIC EMPLOYEES' RETIREMENT SYSTEM	-6,692.70
Bill Pmt -Check	2/24/2006	10306	PUMP CHECK	-5,506.25
				-1,324,400.49

Feb 06

CHINO BASIN WATERMASTER
 COMBINING SCHEDULE OF REVENUE, EXPENSES AND CHANGES IN WORKING CAPITAL
 FOR THE
 PERIOD JULY 1, 2005 THROUGH JANUARY 31, 2006

	WATERMASTER ADMINISTRATION	OPTIMUM BASIN MANAGEMENT	POOL ADMINISTRATION AND SPECIAL PROJECTS APPROPRIATIVE POOL	AGRICULTURAL POOL	NON-AGRIC. POOL	GROUNDWATER OPERATIONS GROUNDWATER REPLENISHMENT	SB222 FUNDS	EDUCATION FUNDS	GRAND TOTALS	BUDGET 2004-05
Administrative Revenues										
Administrative Assessments			4,781,347		66,160				4,847,507	\$3,984,888
Interest Revenue			100,514	9,255	3,278			37	113,084	78,330
Mutual Agency Project Revenue		29,763							29,763	0
Grant Income									-	0
Miscellaneous Income									-	0
Total Revenues	-	29,763	4,881,861	9,255	69,438	-	-	37	4,990,354	4,063,218
Administrative & Project Expenditures										
Watermaster Administration	302,376								302,376	621,784
Watermaster Board-Advisory Committee	32,525								32,525	37,018
Pool Administration			12,087	74,889	2,846				89,822	91,153
Optimum Basin Mgmt Administration		799,322							799,322	1,019,183
OBMP Project Costs		1,017,024							1,017,024	3,733,694
Education Funds Use								375	375	375
Mutual Agency Project Costs	18,380								18,380	80,004
Total Administrative/OBMP Expenses	353,281	1,816,346	12,087	74,889	2,846			375	2,259,824	5,583,211
Net Administrative/OBMP Income	(353,281)	(1,786,583)								
Allocate Net Admin Income To Pools	353,281		274,340	73,946	4,994				-	0
Allocate Net OBMP Income To Pools		1,786,583	1,387,371	373,955	25,257				-	0
Agricultural Expense Transfer			516,640	(516,640)					-	0
Total Expenses			2,190,438	6,150	33,098	-	-	375	2,259,824	5,583,211
Net Administrative Income			2,691,423	3,105	36,340			(338)	2,730,530	(1,519,993)
Other Income/(Expense)										
Replenishment Water Purchases						6,635,065			6,635,065	0
MZ1 Supplemental Water Assessments									-	2,179,500
Water Purchases									-	0
MZ1 Imported Water Purchase									-	(2,278,500)
Groundwater Replenishment						(4,007,547)			(4,007,547)	0
Net Other Income						2,627,518			2,627,518	(99,000)
Net Transfers To/(From) Reserves			2,691,423	3,105	36,340	2,627,518		(338)	5,358,048	(1,618,993)
Working Capital, July 1, 2005			4,450,869	464,653	187,298	3,580,499	158,251	2,238	8,843,808	
Working Capital, End Of Period			7,142,292	467,758	223,638	6,208,017	158,251	1,900	14,201,856	
04/05 Production			127,810.967	34,450.449	2,326.836				164,588.252	
04/05 Production Percentages			77.655%	20.931%	1.414%				100.000%	

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**CHINO BASIN WATERMASTER
TREASURER'S REPORT OF FINANCIAL AFFAIRS FOR THE PERIOD
JANUARY 1 THROUGH JANUARY 31, 2006**

DEPOSITORIES:

Cash on Hand - Petty Cash		\$	500
Bank of America			
Governmental Checking-Demand Deposits	\$	180,974	
Savings Deposits		9,685	
Zero Balance Account - Payroll		-	190,659
Vineyard Bank CD - Agricultural Pool			415,275
Local Agency Investment Fund - Sacramento			<u>12,345,566</u>
TOTAL CASH IN BANKS AND ON HAND	1/31/2006		\$ 12,952,000
TOTAL CASH IN BANKS AND ON HAND	12/31/2005		3,692,630
PERIOD INCREASE (DECREASE)			<u>\$ 9,259,370</u>

CHANGE IN CASH POSITION DUE TO:

Decrease/(Increase) in Assets: Accounts Receivable	\$	667,277
Assessments Receivable		8,874,166
Prepaid Expenses, Deposits & Other Current Assets		-
(Decrease)/Increase in Liabilities: Accounts Payable		54,461
Accrued Payroll, Payroll Taxes & Other Current Liabilities		57,739
Transfer to/(from) Reserves		<u>(394,273)</u>
PERIOD INCREASE (DECREASE)		<u>\$ 9,259,370</u>

SUMMARY OF FINANCIAL TRANSACTIONS:

	Petty Cash	Govt'l Checking Demand	Zero Balance Account Payroll	Savings	Vineyard Bank	Local Agency Investment Funds	Totals
Balances as of 12/31/2005	\$ 500	\$ 493,387	\$ (25,393)	\$ 9,685	\$ 413,970	\$ 2,800,481	\$ 3,692,630
Deposits	-	9,506,241	-	-	1,305	45,085	9,552,631
Transfers	-	(9,552,651)	52,651	-	-	9,500,000	-
Withdrawals/Checks	-	(266,003)	(27,258)	-	-	-	(293,261)
Balances as of 1/31/2006	\$ 500	\$ 180,974	\$ -	\$ 9,685	\$ 415,275	\$ 12,345,566	\$ 12,952,000
PERIOD INCREASE OR (DECREASE)	\$ -	\$ (312,413)	\$ 25,393	\$ -	\$ 1,305	\$ 9,545,085	\$ 9,259,370

**CHINO BASIN WATERMASTER
TREASURER'S REPORT OF FINANCIAL AFFAIRS FOR THE PERIOD
JANUARY 1 THROUGH JANUARY 31, 2006**

INVESTMENT TRANSACTIONS

Effective Date	Transaction	Depository	Activity	Redeemed	Days to Maturity	Interest Rate(*)	Maturity Yield
1/15/2006	Interest	L.A.I.F.	\$ 45,085				
1/12/2006	Deposit	L.A.I.F.	\$ 9,500,000				
TOTAL INVESTMENT TRANSACTIONS			\$ 9,545,085	-			

* The earnings rate for L.A.I.F. is a daily variable rate; 3.63% was the effective yield rate at the Quarter ended December 31, 2005

**INVESTMENT STATUS
January 31, 2006**

<u>Financial Institution</u>	<u>Principal Amount</u>	<u>Number of Days</u>	<u>Interest Rate</u>	<u>Maturity Date</u>
Local Agency Investment Fund	\$ 12,345,566			
TOTAL INVESTMENTS	\$ 12,345,566			

Funds on hand are sufficient to meet all foreseen and planned Administrative and project expenditures during the next six months.

All investment transactions have been executed in accordance with the criteria stated in Chino Basin Watermaster's Investment Policy.

Respectfully submitted,



Sheri M. Rojo, CPA
Chief Financial Officer & Assistant General Manager
Chino Basin Watermaster

	<u>Jul '05 - Jan 06</u>	<u>Budget</u>	<u>\$ Over Budget</u>	<u>% of Budget</u>
Ordinary Income/Expense				
Income				
4010 · Local Agency Subsidies	29,762.50	132,000.00	-102,237.50	22.55%
4110 · Admin Asmnts-Approp Pool	4,781,346.88	4,804,121.00	-22,774.12	99.53%
4120 · Admin Asmnts-Non-Agri Pool	66,160.17	73,425.00	-7,264.83	90.11%
4700 · Non Operating Revenues	113,084.36	78,330.00	34,754.36	144.37%
Total Income	<u>4,990,353.91</u>	<u>5,087,876.00</u>	<u>-97,522.09</u>	<u>98.08%</u>
Gross Profit	4,990,353.91	5,087,876.00	-97,522.09	98.08%
Expense				
6010 · Salary Costs	279,041.35	404,153.00	-125,111.65	69.04%
6020 · Office Building Expense	50,086.74	97,850.00	-47,763.26	51.19%
6030 · Office Supplies & Equip.	13,786.45	47,500.00	-33,713.55	29.02%
6040 · Postage & Printing Costs	46,215.33	75,700.00	-29,484.67	61.05%
6050 · Information Services	74,192.64	103,500.00	-29,307.36	71.68%
6060 · Contract Services	7,057.98	130,500.00	-123,442.02	5.41%
6080 · Insurance	-691.20	24,210.00	-24,901.20	-2.86%
6110 · Dues and Subscriptions	2,752.40	14,000.00	-11,247.60	19.66%
6140 · WM Admin Expenses	1,031.77	6,500.00	-5,468.23	15.87%
6150 · Field Supplies	-1,826.63	4,050.00	-5,876.63	-45.1%
6170 · Travel & Transportation	45,468.29	45,200.00	268.29	100.59%
6190 · Conferences & Seminars	7,317.75	17,500.00	-10,182.25	41.82%
6200 · Advisory Comm - WM Board	8,524.68	14,082.00	-5,557.32	60.54%
6300 · Watermaster Board Expenses	24,000.54	29,782.00	-5,781.46	80.59%
8300 · Appr PI-WM & Pool Admin	12,086.73	15,347.00	-3,260.27	78.76%
8400 · Agri Pool-WM & Pool Admin	11,122.52	18,756.00	-7,633.48	59.3%
8467 · Agri-Pool Legal Services	57,616.53	45,000.00	12,616.53	128.04%
8470 · Ag Meeting Attend -Special	6,150.00	10,000.00	-3,850.00	61.5%
8500 · Non-Ag PI-WM & Pool Admin	2,845.50	7,423.00	-4,577.50	38.33%
6500 · Education Funds Use Expens	375.00	375.00	0.00	100.0%
9500 · Allocated G&A Expenditures	<u>-222,056.43</u>	<u>-378,284.00</u>	<u>156,227.57</u>	<u>58.7%</u>
Subtotal G&A Expenditures	425,097.94	733,144.00	-308,046.06	57.98%
6900 · Optimum Basin Mgmt Plan	724,032.30	996,767.00	-272,734.70	72.64%
6950 · Mutual Agency Projects	18,380.00	75,000.00	-56,620.00	24.51%
9501 · G&A Expenses Allocated-OBMP	<u>75,289.70</u>	<u>109,541.00</u>	<u>-34,251.30</u>	<u>68.73%</u>
Subtotal OBMP Expenditures	817,702.00	1,181,308.00	-363,606.00	69.22%
7101 · Production Monitoring	39,734.82	68,755.00	-29,020.18	57.79%
7102 · In-line Meter Installation	20,486.87	97,954.00	-77,467.13	20.92%
7103 · Grdwtr Quality Monitoring	45,619.48	66,503.00	-20,883.52	68.6%
7104 · Gdwtr Level Monitoring	63,027.90	184,812.00	-121,784.10	34.1%
7105 · Sur Wtr Qual Monitoring	7,663.28	90,223.00	-82,559.72	8.49%
7106 · Wtr Level Sensors Install	0.00	5,734.00	-5,734.00	0.0%
7107 · Ground Level Monitoring	80,586.93	554,825.00	-474,238.07	14.53%
7108 · Hydraulic Control Monitoring	155,853.25	495,368.00	-339,514.75	31.46%
7109 · Recharge & Well Monitoring Prog	109,265.65	133,061.00	-23,795.35	82.12%
7200 · PE2- Comp Recharge Pgm	187,302.28	759,105.00	-571,802.72	24.67%

	<u>Jul '05 - Jan 06</u>	<u>Budget</u>	<u>\$ Over Budget</u>	<u>% of Budget</u>
7300 · PE3&5-Water Supply/Desalte	338.93	12,548.00	-12,209.07	2.7%
7400 · PE4- Mgmt Plan	106,973.70	1,081,014.00	-974,040.30	9.9%
7500 · PE6&7-CoopEfforts/SaltMgmt	46,555.90	255,769.00	-209,213.10	18.2%
7600 · PE8&9-StorageMgmt/Conj Use	6,848.56	77,268.00	-70,419.44	8.86%
7690 · Recharge Improvement Debt Pymt	0.00	300,000.00	-300,000.00	0.0%
7700 · Inactive Well Protection Prgm	0.00	12,128.00	-12,128.00	0.0%
9502 · G&A Expenses Allocated-Projects	146,766.71	268,742.00	-121,975.29	54.61%
Subtotal Special Project Expenditures	<u>1,017,024.26</u>	<u>4,463,809.00</u>	<u>-3,446,784.74</u>	<u>22.78%</u>
Total Expense	<u>2,259,824.20</u>	<u>6,378,261.00</u>	<u>-4,118,436.80</u>	<u>35.43%</u>
Net Ordinary Income	2,730,529.71	-1,290,385.00	4,020,914.71	-211.61%
Other Income/Expense				
Other Income				
4231 · MZ1 Assigned Water Sales	0.00	600,000.00	-600,000.00	0.0%
4210 · Approp Pool-Replenishment	6,635,065.45			
Total Other Income	<u>6,635,065.45</u>	<u>600,000.00</u>	<u>6,035,065.45</u>	<u>1,105.84%</u>
Other Expense				
5010 · Groundwater Replenishment	4,007,546.70	699,000.00	3,308,546.70	573.33%
9999 · To/(From) Reserves	5,358,048.46	-1,389,385.00	6,747,433.46	-385.64%
Total Other Expense	<u>9,365,595.16</u>	<u>-690,385.00</u>	<u>10,055,980.16</u>	<u>-1,356.58%</u>
Net Other Income	<u>-2,730,529.71</u>	<u>1,290,385.00</u>	<u>-4,020,914.71</u>	<u>-211.61%</u>
Net Income	<u>0.00</u>	<u>0.00</u>	<u>0.00</u>	<u>0.0%</u>



CHINO BASIN WATERMASTER

II. BUSINESS ITEMS

- A. CONTRACT FOR DRILLING
AND CONSTRUCTION OF
NESTED PIEZOMETER





CHINO BASIN WATERMASTER

9641 San Bernardino Road, Rancho Cucamonga, Ca 91730
Tel: 909.484.3888 Fax: 909.484.3890 www.cbwm.org

KENNETH R. MANNING
Chief Executive Officer

STAFF REPORT

DATE: March 9, 2006
March 21, 2006
March 23, 2006

TO: Committee Members
Watermaster Board Members

SUBJECT: Contract for Drilling and Construction of a Nested Piezometer

SUMMARY

Issue – A nested set of piezometers needs to be drilled and constructed to replace a malfunctioning set of piezometers that are used for monitoring and management of subsidence in MZ-1. Through a competitive bidding process, Layne Christensen Company of Fontana has been selected as the drilling contractor, and pending approval of Watermaster, is ready to sign the contract and begin work.

Recommendation – Approve the contract with Layne Christensen Company to drill and construct a nested piezometer.

Fiscal Impact – The cost to Watermaster (*i.e.* the contract amount of the lump sum bid) is \$292,000. Watermaster's approved budget for FY 2005-06 has a line-item for this work in the amount of \$342,000.

BACKGROUND

Accurate, depth-specific water level data is necessary to effectively monitor and manage land subsidence in the southern portion of MZ-1. A nested set of piezometers located at Ayala Park in the Chino were designed to monitor water levels in the deep portions of the aquifer system. These piezometers have periodically malfunctioned, and need to be replaced (a consensus decision of the MZ-1 Technical Committee).

The piezometer replacement process will include the drilling of a 1,200 foot borehole, the construction of two, 4-inch, stainless steel piezometers, and a well-head completion within an underground vault. The park property that is impacted during the drilling and construction process will be restored to pre-project conditions to the satisfaction of the City of Chino.

Through a competitive bidding process, Layne Christensen Company of Fontana (Layne) has been selected as the drilling contractor, and pending approval of Watermaster, is ready to sign the contract and begin work. Layne was the drilling contractor for (1) the highly-sophisticated extensometer facility at Ayala Park in 2003, (2)

the nine monitoring wells that were constructed in the southern Chino Basin to support the Hydraulic Control Monitoring Program in 2005, and (3) the recently-completed monitoring wells that are down-gradient of recharge basins that percolate recycled water in Chino Basin. These construction projects, performed for Watermaster and/or IEUA, have been completed satisfactorily and within budget.

The contract for the drilling and construction of the piezometers at Ayala Park is based on the contracts executed for all prior work with Layne referenced above. Watermaster staff and legal counsel has reviewed and approved contract and all supporting documents and construction specifications. The contract is attached. A complete set of contract documents is available for review at the Watermaster's office.

SECTION IV

CONTRACT

THIS CONTRACT and AGREEMENT, made and entered into this ___ day of ____, 2006, by and between Layne Christensen Company, Fontana, California hereinafter referred to as "Contractor," and The Chino Basin Watermaster, Rancho Cucamonga, California, hereinafter referred to as "Watermaster".

WITNESSETH:

That for and in consideration of the promises and agreements hereinafter made and exchanged, the Watermaster and the Contractor agree as follows:

1. Contractor agrees to perform and complete in a workmanlike manner all work required under the bidding schedule of said Watermaster's specifications entitled SPECIFICATIONS FOR One Nested Piezometer in accordance with the specifications and drawings. Therefore, to furnish at their own expense all labor, materials, equipment, tools, and services necessary, except such materials, equipment, and services as may be stipulated in said specifications to be furnished by said Watermaster, and to do everything required by this Contract and the said specifications and drawings.

2. For Furnishing all said labor, materials, equipment, tools, and services, furnishing and removing all plant, temporary structures, tools and equipment, and doing everything required by this Contract and the said specifications and drawings; also for all loss and damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen difficulties which may arise during the prosecution of the work until its acceptance by said Watermaster, and for all risks of every description connected with the work; also for all expenses resulting from the suspension or discontinuance of work, except as in the said specifications are expressly stipulated to be borne by said Watermaster; and for completing the work in accordance with the requirements of said specifications and drawings, said Watermaster will pay and said Contractor shall receive, in full compensation therefore, the price(s) set forth in this Contract.

3. That the Watermaster will pay the Contractor progress payments and the final payment, in accordance with the provisions of the contract documents, with warrants drawn on the appropriate fund or funds as required, at the prices bid in the Bid Forms (Part 1, Section III) and accepted by the Watermaster, and set forth in this Contract.

Lump Sum Bid \$292,000.00: Two Hundred Ninety Two Thousand Dollars and Zero Cents

If this is not a lump sum bid and the contract price is dependent upon the quantities constructed, the Watermaster will pay and said Contractor shall receive, in full compensation for the work the prices named in the Bid Forms (Part 1, Section III).

4. The Watermaster hereby employs the Contractor to perform the work according to the

November 2, 2005
PROHIBITION OF DISCRIMINATION

terms of this Contract for the above-mentioned price(s), and agrees to pay the same at the time, in the manner, and upon the conditions stipulated in the said specifications; and the said parties for themselves, their heirs, executors, administrators, successors, and assigns, do hereby agree to the full performance of the covenants herein contained.

5. The Notice Inviting Bids, Instructions to Bidders, Bid Forms, Information Required of Bidder, Performance Bond, Payment Bond, Warranty Form, Contractors License Declaration, Specifications, Drawings, and all addenda issued by the Watermaster with respect to the foregoing prior to the opening of bids, are hereby incorporated in and made part of this Contract, as if fully set forth.

6. The Contractor agrees to commence work under this Contract on or before the date to be specified in a written "Notice To Proceed" and to complete said work to the satisfaction of the Watermaster, Sixty (60) calendar days after award of the Contract. All work shall be completed before final payment is made.

7. Time is of the essence on this Contract.

8. Contractor agrees that in case the work is not completed before or upon the expiration of the contract time, damage will be sustained by the Watermaster, and that it is and will be impracticable to determine the actual damage which the Watermaster will sustain in the event and by reason of such delay, and it is therefore agreed that the Contractor shall pay to the Watermaster the amount of (\$1,200) dollars for each day of delay, which shall be the period between the expiration of the contract time and the date of final acceptance by the Watermaster, as liquidated damages and not as a penalty. It is further agreed that the amount stipulated for liquidated damages per day of delay is a reasonable estimate of the damages that would be sustained by the Watermaster, and the Contractor agrees to pay such liquidated damages as herein provided. In case the liquidated damages are not paid, the Contractor agrees that the Watermaster may deduct the amount thereof from any money due or that may become due to the Contractor by progress payments or otherwise under the Contract, or if said amount is not sufficient, recover the total amount.

In addition to the liquidated damages, which may be imposed if the Contractor fails to complete the work within the time agreed upon, the Watermaster may also deduct from any sums due or to become due the Contractor, liquidated damages in accordance with the General Requirements (Part 2, Section II), Paragraph 46, "Violations", for any violation of the Instructions to Bidders (Part 1, Section II), Paragraph 6, "Wage Rates"; Contract (Part 1, Section IV), Paragraphs 9 through 11; General Conditions (Part 2, Section I), Paragraph 3.2, "Labor, Materials and Equipment"; General Conditions (Part 2, Section I), Paragraph 3.11, "Safety and Protection" or General Conditions (Part 2, Section I), Paragraph 8.11, "Disturbance of the Peace".

9. That the Contractor will pay, and will require subcontractors to pay, employees on the work a salary or wage at least equal to the prevailing salary or wage established for such work as set forth in the wage determinations and wage standards applicable to this work, contained in or referenced in the contract documents.

November 2, 2005
PROHIBITION OF DISCRIMINATION

10. That, in accordance with Section 1775 of the California Labor Code, Contractor shall forfeit to the Watermaster, as a penalty, not more than Fifty (\$50.00) Dollars for each day, or portion thereof, for each worker paid, either by the Contractor or any subcontractor, less than the prevailing rates as determined by the Director of the California Department of Industrial Relations for the work.

11. That, except as provided in Section 1815 of the California Labor Code, in the performance of the work not more than eight (8) hours shall constitute a day's work, and not more than forty (40) hours shall constitute a week's work; that the Contractor shall not require more than eight (8) hours of labor in a day nor more than forty hours of labor in a week from any person employed by the Contractor or any subcontractor; that the Contractor shall conform to Division 2, Part 7, Chapter 1, Article 3 (Section 1810, et seq.) of the California Labor Code; and that the Contractor shall forfeit to the Watermaster, as a penalty, the sum of Twenty-Five (\$25.00) Dollars for each worker employed in the execution of the work by Contractor or any subcontractor for each day during which any worker is required or permitted to labor more than eight (8) hours in violation of said Article 3.

12. That the Contractor shall carry Workers' Compensation Insurance and require all subcontractors to carry Workers' Compensation Insurance as required by the California Labor Code.

13. That the Contractor shall have furnished, prior to execution of the Contract, two bonds approved by the Watermaster, one in the amount of one hundred (100) percent of the contract price, to guarantee the faithful performance of the work, and one in the amount of one hundred (100) percent of the contract price to guarantee payment of all claims for labor and materials furnished.

14. The Contractor hereby agrees to protect, defend, indemnify and hold the Watermaster and its employees, agents, officers, directors, servants and volunteers free and harmless from any and all liability, claims, judgments, costs and demands, including demands arising from injuries or death of persons (including employees of the Watermaster and the Contractor) and damage to property, arising directly or indirectly out of the obligation herein undertaken or out of the operations conducted by the Contractor, its employees agents, representatives or subcontractors under or in connection with this Contract, whether or not there is concurrent, passive or active negligence on the part of the Watermaster or its employees, agents, officers, directors, servants and volunteers.

The Contractor further agrees to investigate, handle, respond to, provide defense for and defend any such claims, demands or suit at the sole expense of the Contractor.

15. That this Contract, by reference, includes the contract documents defined in the General Conditions (Part 2, Section I).

November 2, 2005
PROHIBITION OF DISCRIMINATION

IN WITNESS WHEREOF, The Contractor and the Chairman of the Board of Directors, Chino Basin Watermaster, thereunto duly authorized, have caused the names of said parties to be affixed hereto, each in triplicate, the day and year first above written.

Chino Basin Watermaster,
San Bernardino County, California.

Contractor

By _____
Chief Executive Officer/General Manager

By _____
Title

November 2 ,2005
PROHIBITION OF DISCRIMINATION



CHINO BASIN WATERMASTER

II. BUSINESS ITEMS

B. MZ1 SUMMARY REPORT





CHINO BASIN WATERMASTER

9641 San Bernardino Road, Rancho Cucamonga, Ca 91730
Tel: 909.484.3888 Fax: 909.484.3890 www.cbwm.org

KENNETH R. MANNING
Chief Executive Officer

STAFF REPORT

DATE: March 9, 2006
March 21, 2006
March 23, 2006

TO: Committee Members
Watermaster Board Members

SUBJECT: MZ-1 Summary Report

SUMMARY

Issue – Pursuant to the Special Referee’s report dated June 16, 2005, Watermaster staff prepared a report titled *Management Zone 1 Interim Monitoring Program, MZ-1 Summary Report*. This report presents a summary of all the data collected as part of the MZ-1 monitoring program (through September 2005) and the conclusions reached from the analysis of the monitoring data. The report also includes MZ-1 Guidance Criteria, which are a recommended groundwater management criteria for the management of subsidence in the southern part of MZ-1 (Chino). These guidance criteria will be the basis of the long-term subsidence management plan.

Recommendation – Approve the February 2006 MZ-1 Summary Report.

Fiscal Impact – To be determined. The MZ-1 Summary Report recommends the continuation of the monitoring activities that have been implemented to date. The cost to Watermaster to provide this monitoring and reporting will be about \$175,000 per year in 2006 dollars.

BACKGROUND

The Implementation Plan of the Optimum Basin Management Program (OBMP) called for an aquifer-system investigation of suspected pumping-induced land subsidence and ground fissuring that has occurred in the southern region of Management Zone 1 (MZ-1). Watermaster has coordinated and conducted the investigation under the guidance of the MZ-1 Technical Committee, which is composed of representatives from all major MZ-1 producers and their technical consultants. The results of the investigation are being used in the development of a long-term plan to minimize or abate future land subsidence and ground fissuring.

To date, the main conclusions derived from the investigation are:

1. The current state of aquifer-system deformation in south MZ-1 (in the vicinity of Ayala Park) is essentially elastic. Little, if any, inelastic (permanent) compaction is now occurring in this area, which is in contrast to the past when about 2.2 feet of land subsidence occurred, accompanied by ground fissuring, from about 1987-1995.
2. Groundwater production from the deep, confined aquifer system in this area causes the greatest stress to the aquifer system. In other words, pumping of the deep aquifer system causes water level drawdowns that are much greater in magnitude and lateral extent than drawdowns caused by pumping of the shallow aquifer system.
3. Water level drawdowns due to pumping of the deep aquifer system can cause inelastic (permanent) compaction of the aquifer-system sediments, which results in permanent land subsidence. The initiation of inelastic compaction within the aquifer system was identified during this investigation when water levels fell below a depth of about 250 feet in the PA-7 piezometer at Ayala Park.
4. Through this study, a previously undetected barrier to groundwater flow was identified. The barrier is located within the deep aquifer system and is aligned with the historical zone of ground fissuring. Pumping from the deep aquifer system is limited to the area west of the barrier, and the resulting drawdowns do not propagate eastward across the barrier. Thus, compaction occurs within the deep system on the west side of the barrier, but not on the east side, which causes concentrated differential subsidence across the barrier and creates the potential for ground fissuring.
5. InSAR and ground level survey data indicate that permanent subsidence in the central region of MZ-1 (north of Ayala Park) has occurred in the past and continues to occur today. The InSAR data also indicate that the groundwater barrier extends northward into central MZ-1. These observations suggest that the conditions that very likely caused ground fissuring near Ayala Park in the 1990s are also present in central MZ-1, and should be studied in more detail.

A workshop was held May 25, 2005 to update the Special Referee on progress of the investigation and development of the long-term plan for MZ-1. After the workshop, the Special Referee issued a report to the Court that summarized the workshop and requested that Watermaster:

- produce a MZ-1 Summary Report that describes the investigation results and conclusions to date
- notify the Court of the schedule for the completion of the long-term plan
- provide "guidance criteria" to the MZ-1 producers in an effort to minimize the potential for future subsidence and fissuring, pending completion of the long-term plan

The MZ-1 Summary Report contains the guidance criteria, which consist mainly of setting a "guidance" water level – 245 feet below the reference point for the PA-7 piezometer at Ayala Park – and recommends that groundwater production from a selected list of wells in MZ-1 not cause water levels to fall below the guidance level.

The report also outlines the process and schedule for developing a long-term management plan by June 2006. The primary objective of the long-term plan is to prevent additional permanent land subsidence that could initiate additional ground fissuring. A developing secondary objective is to optimize the use of existing groundwater production infrastructure. A key element of the long-term plan will be its adaptive nature, as new data are collected and periodically analyzed to evaluate the effectiveness of the long-term plan.

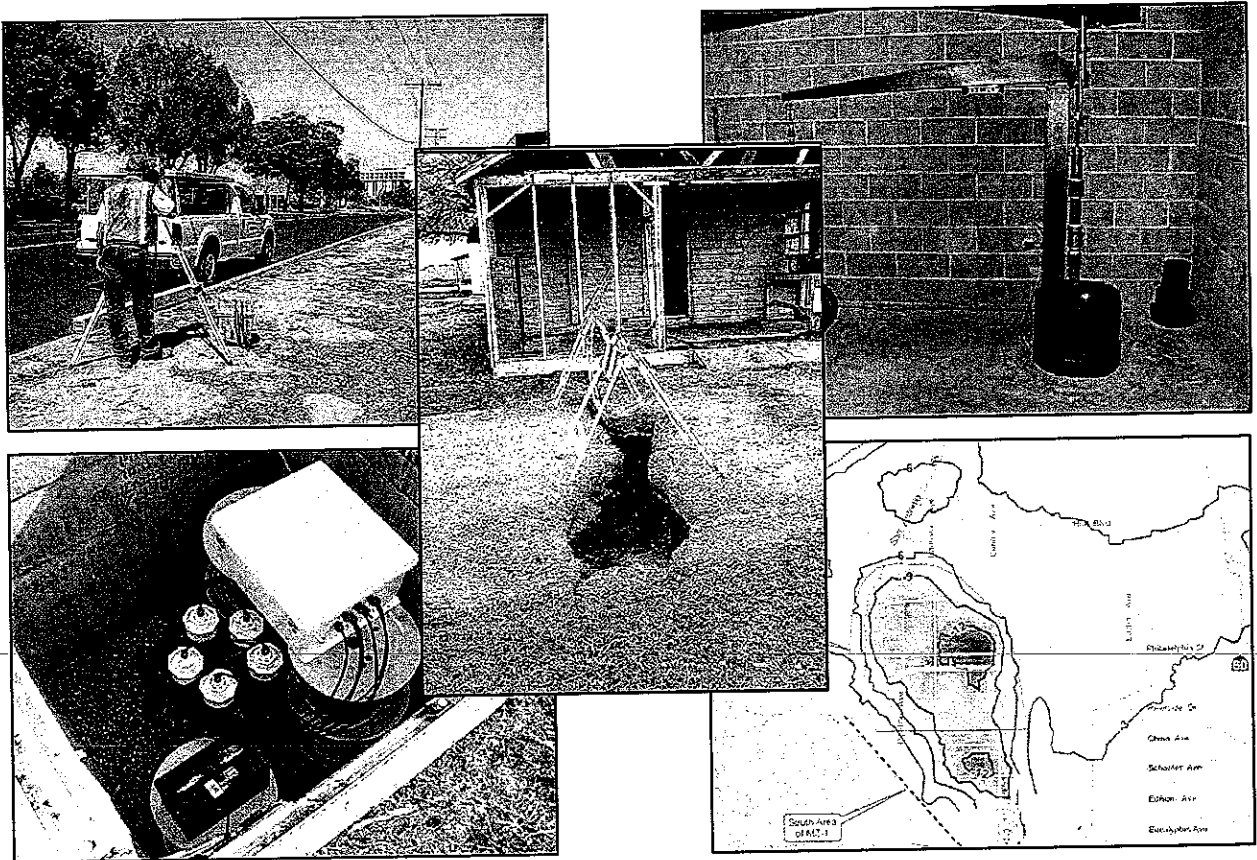
The guidance criteria and the long-term plan discussed above relate to the management of pumping-induced subsidence within the southern region of MZ-1, where associated ground fissuring damaged infrastructure in the early 1990s. However, this investigation has also revealed that the central region of MZ-1 has experienced in the past, and is currently experiencing, measurable land subsidence. This discovery has initiated an additional effort by Watermaster to characterize the subsidence mechanisms in this region through a slightly expanded monitoring effort. The adaptive nature of the long-term plan should accommodate the results that will emerge from the expanded monitoring effort in central MZ-1, so as to minimize the risk of future ground fissuring in this heavily urbanized region of Chino Basin.

The MZ1 Summary Report is best viewed in color which may be done by downloading this document from:
<ftp://citrix.wildermuthenvironmental.com/MZ1>

CHINO BASIN
OPTIMUM BASIN MANAGEMENT PROGRAM

Management Zone 1
Interim Monitoring Program

MZ-1 Summary Report



Prepared for
MZ-1 Technical Committee

Prepared by
Wildermuth Environmental, Inc.

February 2006

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CHINO BASIN
OPTIMUM BASIN MANAGEMENT PROGRAM

Management Zone 1
Interim Monitoring Program

MZ-1 Summary Report

Prepared for

MZ-1 Technical Committee

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ACRONYM AND ABBREVIATIONS LIST

AE	Associated Engineers
CA	California
CBWM	Chino Basin Watermaster
CIM	California Institution for Men
IMP	Interim Monitoring Program
MZ-1	Management Zone 1
OBMP	Optimum Basin Management Program
CH	Chino Hills
InSAR	Synthetic Aperture Radar Interferometry
MSL	mean sea level
PA	Piezometer A at Ayala Park Piezometer/Extensometer Facility
USGS	United States Geological Survey
WEI	Wildermuth Environmental Inc



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EXECUTIVE SUMMARY

The Implementation Plan of the Optimum Basin Management Program (OBMP) called for an aquifer-system investigation of suspected pumping-induced land subsidence and ground fissuring that has occurred in the southern region of Management Zone 1 (MZ-1). Watermaster has coordinated and conducted the investigation under the guidance of the MZ-1 Technical Committee, which is composed of representatives from all major MZ-1 producers and their technical consultants. The results of the investigation are being used to develop management tools (models) that will assist in the development of a long-term plan to minimize or abate future land subsidence and ground fissuring.

To date, the main conclusions derived from the investigation are:

1. The current state of aquifer-system deformation in south MZ-1 (in the vicinity of Ayala Park) is essentially elastic. Little, if any, inelastic (permanent) compaction is now occurring in this area, which is in contrast to the past when about 2.2 feet of land subsidence occurred, accompanied by ground fissuring, from about 1987-1995.
2. Groundwater production from the deep, confined aquifer system in this area causes the greatest stress to the aquifer system. In other words, pumping of the deep aquifer system causes water level drawdowns that are much greater in magnitude and lateral extent than drawdowns caused by pumping of the shallow aquifer system.
3. Water level drawdowns due to pumping of the deep aquifer system can cause inelastic (permanent) compaction of the aquifer-system sediments, which results in permanent land subsidence. The initiation of inelastic compaction within the aquifer system was identified during this investigation when water levels fell below a depth of about 250 feet in the PA-7 piezometer at Ayala Park.
4. Through this study, a previously undetected barrier to groundwater flow was identified. The barrier is located within the deep aquifer system and is aligned with the historical zone of ground fissuring. Pumping from the deep aquifer system is limited to the area west of the barrier, and the resulting drawdowns do not propagate eastward across the barrier. Thus, compaction occurs within the deep system on the west side of the barrier, but not on the east side, which causes concentrated differential subsidence across the barrier and creates the potential for ground fissuring.
5. InSAR and ground level survey data indicate that permanent subsidence in the central region of MZ-1 (north of Ayala Park) has occurred in the past and continues to occur today. The InSAR data also indicate that the groundwater barrier extends northward into central MZ-1. These observations suggest that the conditions that very likely caused ground fissuring near Ayala Park in the 1990s are also present in central MZ-1, and should be studied in more detail.

A workshop was held May 25, 2005 to update the Special Referee on progress of the investigation and development of the long-term plan for MZ-1. After the workshop, the Special Referee issued a report to the Court that summarized the workshop and requested that Watermaster:

- produce a MZ-1 Summary Report (this report) that describes the investigation results and conclusions to date
- notify the Court of the schedule for the completion of the long-term plan
- provide "guidance criteria" to the MZ-1 producers in an effort to minimize the potential for future subsidence and fissuring, pending completion of the long-term plan

This report contains the guidance criteria, which consist mainly of setting a "control" water level – 245 feet below the reference point for the PA-7 piezometer at Ayala Park – and recommend that groundwater production from a selected list of wells in MZ-1 not cause water levels to fall below the control level.



This report also outlines the process and schedule for developing a long-term management plan by June 2006. The primary objective of the long-term plan is to prevent additional permanent land subsidence that could initiate additional ground fissuring. A developing secondary objective is to optimize the use of existing groundwater production infrastructure. A key element of the long-term plan will be its *adaptive* nature, as new data are collected and periodically analyzed to evaluate the effectiveness of the long-term plan.

The guidance criteria and the long-term plan discussed above relate to the management of pumping-induced subsidence within the southern region of MZ-1, where associated ground fissuring damaged infrastructure in the early 1990s. However, this investigation has also revealed that the central region of MZ-1 has experienced in the past, and is currently experiencing, measurable land subsidence. This discovery has initiated an additional effort by Watermaster to characterize the subsidence mechanisms in this region through a slightly expanded monitoring effort. The adaptive nature of the long-term plan should accommodate the results that will emerge from the expanded monitoring effort in central MZ-1, so as to minimize the risk of future ground fissuring in this heavily urbanized region of Chino Basin.

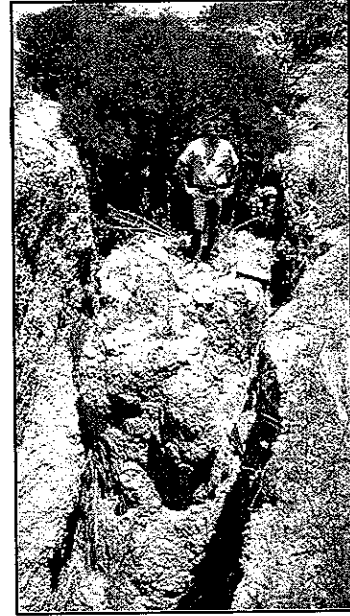
The monitoring and analyses associated with this investigation dovetail nicely with other Watermaster efforts associated with basin re-operation and hydraulic control.



1. BACKGROUND

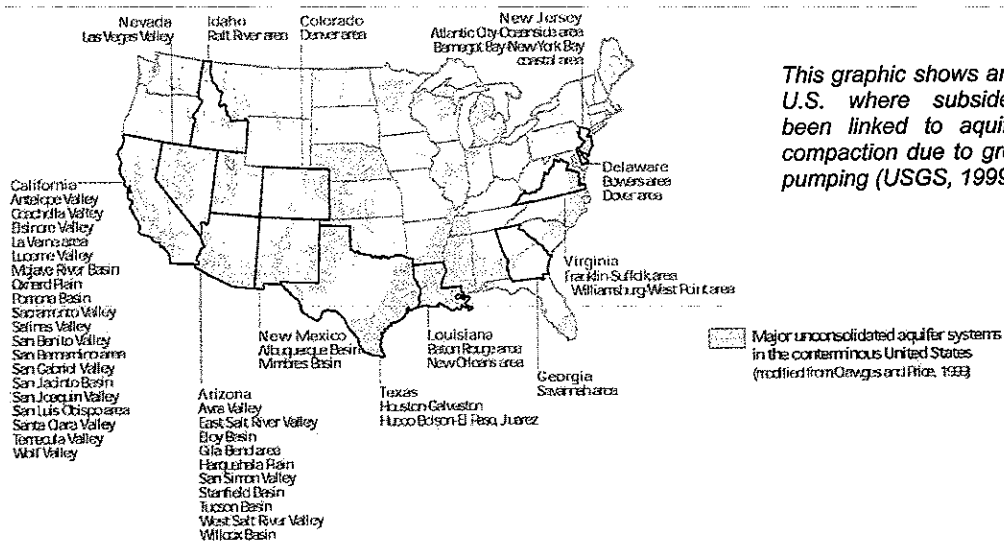
Groundwater Withdrawals and Land Subsidence

Land subsidence is the sinking of the Earth's surface due to the rearrangement of subsurface Earth materials. In the United States alone, over 17,000 square miles in 45 states have experienced land subsidence (USGS, 1999). In many instances, land subsidence is accompanied by adverse impacts at the land surface, such as sinkholes, earth fissures, encroachment of adjacent water bodies, modified drainage patterns, and others. In populated regions, these subsidence-related impacts can result in severe damage to man-made infrastructure and costly remediation measures.



This earth fissure near Mesa, Arizona formed as a result of differential compaction of the aquifer system (USGS, 1999).

Over 80% of all documented cases of land subsidence in the United States have been caused by groundwater extractions from the underlying aquifer system (USGS, 1999). Subsidence due to groundwater extraction is especially well-documented in the arid southwestern United States, where the aquifer systems are typically composed of unconsolidated sediments that are susceptible to permanent compaction when groundwater is extracted. Some infamous examples include the San Joaquin and Santa Clara Valleys in California, the Las Vegas Valley in Nevada, the Houston-Galveston area in Texas, and



This graphic shows areas in the U.S. where subsidence has been linked to aquifer-system compaction due to groundwater pumping (USGS, 1999).



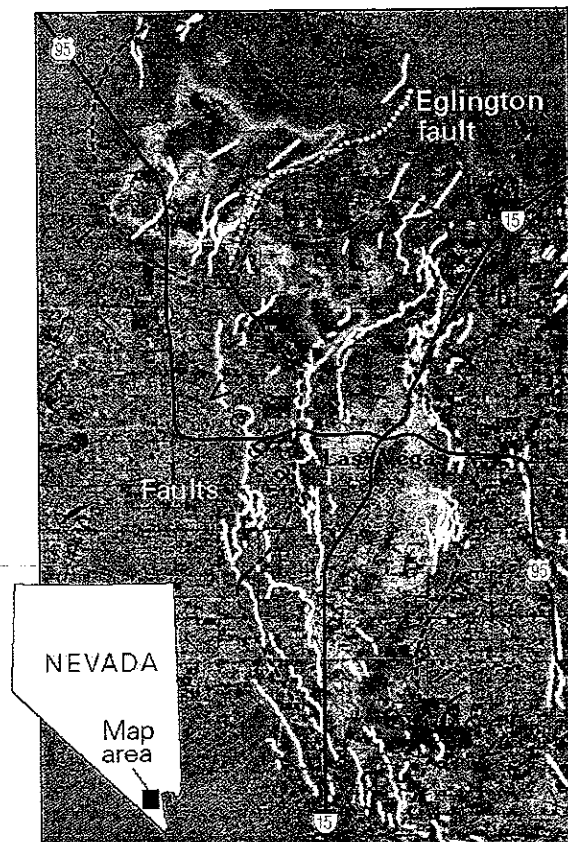
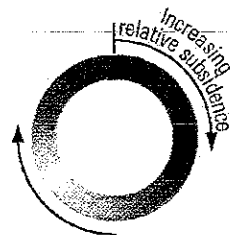
SECTION 1 – BACKGROUND
MZ-1 SUMMARY REPORT

several basins in Arizona. In many of these regions, earth fissuring occurred in areas of differential subsidence (*i.e.* where rates and accumulated magnitudes of subsidence vary over short horizontal distances).

Although drawdown of water levels is the driving force that causes land subsidence due to groundwater pumping, the geology of a groundwater basin also plays an important role in this process. Clay layers within the aquifer-system are relatively compressible materials. Therefore, aquifer-systems that contain thick and/or numerous clay layers are most susceptible to permanent compaction and land subsidence when groundwater is extracted. In addition, faults that act as groundwater barriers can focus and augment drawdown in the aquifer-system when pumping wells are located near these faults. When pumping and drawdown are concentrated on one side of a fault barrier, then differential land subsidence and ground fissuring are a common result (see Las Vegas, as an example).

This map graphic depicts land subsidence in the Las Vegas Valley that occurred from April 1992 to December 1997. The subsidence, attributed to aquifer-system compaction caused by groundwater production, was measured by remote sensing techniques (InSAR). Geologic faults (shown in white) appear to control the location of subsidence, and have been the focal point of earth fissure formation (USGS, 1999).

One color cycle represents about 4 inches of subsidence.



The scientific model that describes the phenomenon of pumping-induced land subsidence is termed the *aquitard-drainage model*. This model has been successfully applied to numerous cases of land subsidence world-wide. It has been incorporated into the industry-standard computer models of groundwater flow and is increasingly recognized as critical to the understanding of aquifer-system hydraulics (flow and storage) and mechanics (deformation). A brief summary of the aquitard-drainage model is below:

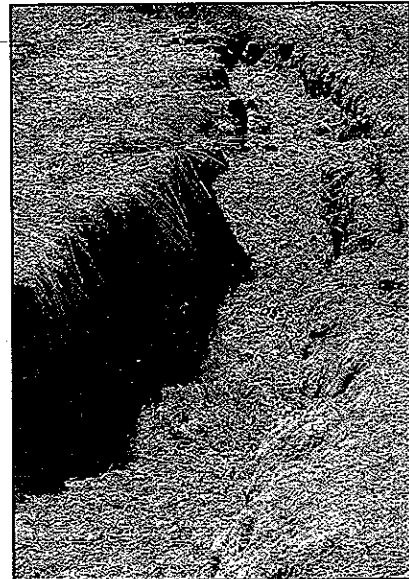


Aquitard-Drainage Model. Simply stated, an aquifer system consists of permeable sand and gravel layers (the aquifers) interbedded with less-permeable silt and clay layers (the aquitards). Pumping wells cause water-level drawdowns in the aquifers which, in turn, cause the aquitards to slowly drain into the aquifers. The draining allows aquitard pore pressures to decay toward equilibrium with the reduced heads in the adjacent aquifers. Since the pressure of the pore water provides some internal support for the sedimentary structure of the aquitards, this loss of internal support causes the aquitards to compress, resulting in a small amount of subsidence at the land surface. When the pumping wells turn off, and water levels recover in the aquifers, groundwater migrates back into the aquitards and they expand, resulting in a small amount of rebound at the land surface. Over a limited range of seasonal water level fluctuations this process can occur in a purely elastic fashion. That is, a recovery of water levels to their original values causes the land surface to rebound to its original elevation. However, when drawdown falls below a certain “threshold” level, elastic compression transitions to a non-recoverable inelastic compaction of the aquitards, resulting in permanent land subsidence. The “threshold” water level, referred to as the *preconsolidation stress*, is taken to be the maximum past stress to which the sedimentary structure had previously equilibrated under the gradually increasing load of accumulating sediments. [Note: The probable value of the virgin preconsolidation stress in the Chino Basin has not been documented, but studies in similar areas suggest that drawdowns in the range of 40 to 100 feet will typically exceed the initial threshold value.]

Drawdowns exceeding a previous threshold water level result in an increase in the value of maximum past stress, and thus the establishment of a deeper threshold, accompanied by an increment of inelastic aquitard compaction. Concomitantly, the compaction results in the one-time irreversible mining of groundwater from the aquitards. The benefits of this process include not only the obvious economic value of the water produced but also the often overlooked fact that, by establishing deeper thresholds, it increases the volume of confined groundwater storage available for cyclical drawdown and replenishment under strictly elastic conditions. The cost, of course, is the resulting deformation of the land surface and its impact on vulnerable infrastructure.

History of Ground Fissuring and Land Subsidence in Chino Basin

Ground Fissuring. One of the earliest indications that land subsidence was occurring in Chino Basin was the appearance of ground fissures in the City of Chino. These fissures appeared as early as 1973 (Fife et al., 1976), but an accelerated occurrence of ground fissuring ensued after 1991. Figure 1-1 shows the location of the fissures within the larger context of Management Zone 1 (MZ-1) and the Chino Basin. Figure 1-2 shows a detailed view of this area.



Surface expression of earth fissure that developed in a field north of CIM in February 1991.

Photo source: Geomatrix Consultants



Subsequent studies of the fissuring attributed the phenomenon to land subsidence (Fife et al., 1976; Kleinfelder, 1993, 1996; Geomatrix, 1994). The evidence to support this cause-and-effect relationship between the subsidence and fissuring is shown in Figure 1-2. In this figure, and as pointed out by Geomatrix (1994), the north-south trend of fissuring is located on the steep eastern limb of the main trough of subsidence that was mapped by ground level surveying (discussed below) – an area where east-west directed extensional stress should be associated with subsidence to the west. These observations and conclusions prompted efforts to quantify the magnitude of historical subsidence and to monitor the rates of on-going subsidence. These efforts included:

- Compilation and analysis of leveling survey data to estimate historical subsidence
- Compilation and analysis of remote sensing data to estimate historical subsidence
- Initiation of monitoring efforts to track on-going subsidence

Through these efforts, the history of land subsidence near the area of ground fissuring was characterized in good detail for the period after 1987, and in lesser detail for the period prior to 1987.

Recent Land Subsidence (Post-1987). Repeated leveling surveys were conducted within the City of Chino from 1987-1999 (Kleinfelder, 1993, 1996, 1999). Figure 1-1 shows the location and extent of the surveys within the larger context of MZ-1 and the Chino Basin. Figure 1-2 shows a close-up view of this area, and subsidence contours of the survey data. These contours delineate a subsidence trough generally aligned north-south with maximum subsidence during the 12-year period of 2.4 feet along Central Avenue between Eucalyptus and Schaefer Avenues (the trough axis). The subsidence trough extends approximately from Pipeline Avenue on the west to Benson Avenue on the east, and from Merrill Avenue on the south to the edge of the survey area on the north (Riverside Drive). The contours suggest that the subsidence trough extends further north of Riverside Drive, but the surveys did not include benchmarks north of Riverside Drive.

Remote sensing studies of subsidence were conducted (Peltzer, 1999a, 1999b) to further analyze subsidence in MZ-1. These studies employed Synthetic Aperture Radar Interferometry (InSAR), which utilizes radar imagery from an Earth-orbiting spacecraft to map ground surface deformation. Figures 1-1 and 1-2 show the results of these InSAR studies that independently confirmed the location and relative magnitude of subsidence in MZ-1 as defined by the leveling surveys, and indicated the occurrence of subsidence north of the area monitored by the leveling surveys (north of Riverside Drive).

The leveling surveys and the InSAR analyses both indicated that subsidence rates have slowed significantly since about 1995. In fact, the leveling surveys indicated that about 90% of the total subsidence measured along Central Avenue from 1987-1999 occurred prior to 1996.

Historical Land Subsidence (Pre-1987). Much less data is available to estimate regional subsidence prior to 1987. Geomatrix (1994) and Geoscience (2002) compared the leveling survey data (post-1987) to elevation data published on USGS 7.5-minute quadrangle maps (1933 and 1967). Geomatrix (1994) estimated as much as 3-4 feet of subsidence from 1967-1993 in some areas shown on Figure 1-2. Geoscience (2002) estimated a maximum of 3.7 feet of subsidence from 1933-1987 at the intersection of Pipeline Avenue and Riverside Drive. These subsidence estimates and their assumptions and limitations are currently being reviewed by Watermaster. If generally accurate, these estimates combined with the post-1987 survey data suggest that as much as 4-5 feet of subsidence has occurred during 1933-1999 in some areas of Chino south of State Highway 60.



Potential Causes of Land Subsidence

The main studies that were commissioned subsequent to the fissuring events in the early 1990s (Kleinfelder, 1993, 1996; Geomatrix, 1994) attributed the subsidence and fissuring phenomenon to the aquitard-drainage model. Watermaster arrived at the same conclusion (WEI, 1999) based on the presence of all requisite elements of the aquitard-drainage model in the southern portion of MZ-1 and other supporting evidence:

- **Presence of aquitards.** Geophysical and lithologic logs from numerous wells in the region indicate that the aquifer-system sediments that underlie the area of subsidence in MZ-1 contain many interbedded aquitard layers, which are susceptible to permanent compaction under reduced piezometric heads. In addition, during the early 1900s, much of the southern part of MZ-1 was an area of flowing-artesian wells (Mendenhall, 1908), indicating the existence of fine-grained confining layers (aquitards) at depth.
- **Reduced pore pressures within the aquifer-system.** The flowing-artesian groundwater conditions in southern MZ-1 also indicate that piezometric heads were at or above the land surface during the early 1900s. Water level histories at numerous relatively shallow wells in the region demonstrate that the piezometric heads (water levels) declined by about 140 feet from about 1940 to 1977, but then recovered by about 40 feet by 1999 (see Figure 1-3).

In addition, the accelerated occurrence of fissuring that commenced in 1991 was preceded by the completion and initial operation of a number of the deep production wells in 1989-1990. These wells are owned by the City of Chino Hills. Water level histories at these wells indicate that drawdowns within the deeper portions of the aquifer system caused by pumping these wells have exceeded 300 feet.

In both the shallow and deep zones of the overall aquifer system, the historical drawdowns were substantially greater than probable maximum value of the virgin threshold of inelastic compaction.

- **Other evidence.** The axis of maximum subsidence along Central Avenue, as delineated by ground level surveys (1987-1999), is aligned with the locations of several deep production wells owned by Chino Hills—suggesting a cause-and-effect relationship.
- **Similarity to other subsidence case studies.** There are numerous examples throughout the western United States where ground fissures have accompanied aquifer-system compaction and land subsidence within alluvial groundwater basins (Holzer, 1984). Geomatrix (1994) studied the ground fissures on CIM property and also reviewed case histories of fissuring throughout the southwestern United States. Their study noted similarities between the physical structure of the CIM fissures and the fissures described in the literature that were associated with areas of subsidence due to groundwater pumping and aquifer-system compaction.

There exist other potential causes of land subsidence that have been documented in other locations worldwide. Most of these causes can be immediately dismissed as explanations for the subsidence observed in Chino Basin, but others can not. Table 1-1 lists all potential causes of land subsidence, and a qualitative description of their applicability to subsidence and fissuring in Chino Basin.

Even though some of these potential subsidence mechanisms cannot be immediately dismissed as contributing to subsidence in Chino Basin, they are not likely. The aquitard-drainage model is based on physical laws of nature—namely, gravity and the compressibility of materials under load. And when the requisite elements of this model are all present (*i.e.* presence of aquitards, piezometric head declines, *etc.*), the question is not whether subsidence occurred, but rather, how much is the inevitable result of the aquitard-drainage mechanism?



By comparison, other potential causes of subsidence were reduced to unlikely and, at the most, minor contributory factors in Chino Basin, and as such, were never directly investigated by Watermaster.

Development of the MZ-1 Interim Monitoring Program

In the Optimum Basin Management Program (OBMP) Phase I Report (WEI, 1999), Watermaster identified the aquitard-drainage model as the most likely cause of the land subsidence and ground fissuring observed in MZ-1. Program Element 4 of the OBMP – *Develop and Implement a Comprehensive Groundwater Management Plan for Management Zone 1* called for the development and implementation of an interim management plan for MZ-1 that would:

- Minimize subsidence and fissuring in the short-term
- Collect information necessary to understand the extent, rate, and mechanisms of subsidence and fissuring
- Formulate a long-term management plan to reduce to tolerable levels or abate future subsidence and fissuring

The main part of the interim management plan was to develop and implement a monitoring and testing program in MZ-1 that would answer certain questions to enable the development of a long-term plan to minimize or abate subsidence and fissuring. These questions included:

1. How much subsidence is currently occurring in MZ-1?
2. How much of the current subsidence is an elastic, reversible process that will restore the land surface to its original elevation if water levels recover to their original values; or, in the alternative phraseology, how much, if any, is irreversible (permanent subsidence)?
3. How much subsidence did historical pumping cause in MZ-1?
4. How much of the historical subsidence was an elastic, reversible process, and how much, if any, was irreversible?
5. These questions give rise to the most critical questions: What was the historical threshold value of head decline at which the deformation of the sedimentary structure would have changed from an elastic compression to inelastic compaction? And additionally, what is that threshold value of head decline today?

In an attempt to minimize subsidence and fissuring in the short-term, the cities of Chino and Chino Hills agreed to jointly reduce groundwater production in MZ-1 by 3,000 acre-feet per year for the duration of the interim management plan. This agreement between the cities was termed the *Forbearance Agreement*.

Formation of the MZ-1 Technical Committee. The MZ-1 Technical Committee was formed to serve as a clearing house for technical information, as well as the source for full professional discussion, input and peer review by its members, for the benefit of Watermaster. The Technical Committee provides comment and assists Watermaster in the development of recommendations for consideration and potential action by Watermaster under the Interim Management Plan. In addition, the Technical Committee provides similar assistance to Watermaster in its effort to develop a long-term plan as provided in Program Element 4. The Technical Committee consists of representatives (and their technical consultants) from those parties to the Judgment that are presently producing groundwater within MZ-1. Each of the following producers is entitled to representation on the Committee: Chino, Chino Hills, Ontario, Upland, Pomona, Monte Vista



Water District, San Antonio Water Company, Southern California Water Company, CIM and the Agricultural Pool. Figure 1-1 shows the locations of wells owned by the producers listed above. The MZ-1 Technical Committee first convened on March 6, 2002, and has continued to meet once every 1-3 months.

Composition of the MZ-1 Interim Monitoring Program. The MZ-1 Technical Committee approved the scope and schedule for the MZ-1 Interim Monitoring Program (IMP) at the January 29, 2003 meeting. The IMP was developed and implemented by Watermaster to collect the information necessary to answer the five questions listed above. The data collected and analyzed as part of this effort are being utilized to develop effective management tools and, ultimately, a long-term management plan that will minimize or completely abate ground fissuring and subsidence in MZ-1.

The IMP is described in detail in the IMP Work Plan dated January 8, 2003 (WEI, 2003), but generally consists of three main elements: benchmark survey, InSAR, and aquifer-system monitoring. The benchmark surveys and the InSAR analyses monitor deformation of the land surface. Aquifer-system monitoring measures the hydraulic and mechanical changes within the aquifer-system that cause the land surface deformation. The methods involved in the implementation of each element are briefly described below:

Methods: Aquifer-System Monitoring. This work involves the measuring of stresses within the aquifer system (water-level changes) that cause land surface deformation as measured by benchmark surveys, InSAR, and the extensometers (described below). The objective is to establish the relationships between water-level changes in the aquifer system (stress) and aquifer-system deformation (strain).

Figure 1-4 shows location of the centerpiece of the aquifer-system monitoring program – the Ayala Park Extensometer – a highly sophisticated monitoring facility consisting of two multi-piezometers and a dual-extensometer. As the aquifer system undergoes various stresses due to groundwater production and recharge, the facility monitors the hydraulic response of the aquifer system at the piezometers and the mechanical response of the aquifer system at the extensometers. The facility is equipped with pressure transducers to measure water levels in the piezometers, linear potentiometers to measure the vertical aquifer-system deformation at the extensometers, and data loggers to record the data at frequent intervals (e.g. 15 minutes).

Piezometer construction and instrumentation was completed in mid-November 2002, at which time collection of piezometric data commenced. Dual-extensometer construction and instrumentation was completed in mid-July 2003, at which time collection of aquifer-system deformation data commenced.

Figure 1-4 also shows the nearby wells owned by CIM and the cities of Chino and Chino Hills that were equipped with pressure transducers and data loggers to record (1) water-level data and (2) the specific timing of pumping cycles at production wells.

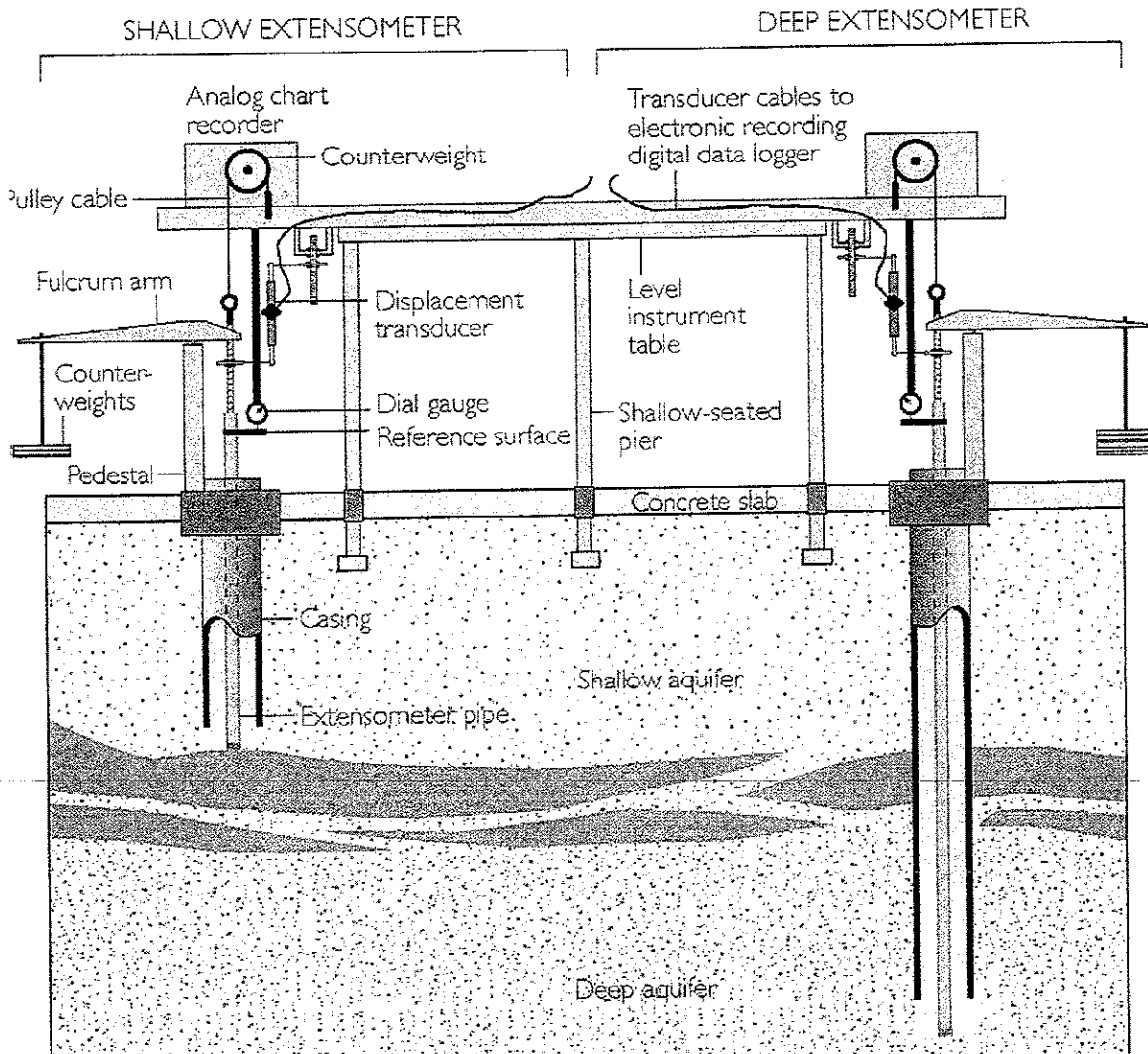
The IMP also called for Watermaster, with the assistance of the well owners, to conduct controlled aquifer stress tests (pumping tests) while monitoring water levels and groundwater production at nearby monitoring wells and production wells, as well as aquifer-system compaction and/or expansion at the dual-extensometer. These tests were performed in fall 2003, spring 2004, and fall 2004.

The data collected from this monitoring effort are being used to: (1) quantify and characterize the current state of aquifer-system deformation (i.e. elastic vs. inelastic), (2) determine the threshold value of head decline at which the deformation of the aquifer-system sediments changes from an elastic compression to



SECTION 1 – BACKGROUND
MZ-1 SUMMARY REPORT

inelastic compaction, (3) estimate aquifer-system parameters, such as the conductive and storage parameters of the aquifer and aquitard sediments, (4) reveal the existence of groundwater barrier(s) within the aquifer sediments, and (5) use all the above data as input to predictive computer models of compaction, subsidence, and groundwater flow to support the development of a long-term management plan.



A conceptual graphic of a dual extensometer, very similar to the facility at Ayala Park in Chino. Extensometers measure vertical deformation within an aquifer system. Typically, they are accompanied by piezometers that measure pore water pressure changes that cause deformation within the aquifer system.



Methods: Ground-Level Surveying. This work involves repeated benchmark surveying to measure vertical (and in some cases horizontal) ground surface deformation along selected profiles within Chino Basin – mainly in MZ-1. The benchmark surveys are being used to (1) establish a datum from which to measure land surface deformation during the IMP period, (2) allow determination of historical subsidence at any historical benchmarks that can be recovered, (3) “ground-truth” the InSAR data, and (4) assist in the development and evaluation of the long-term management plan.

A network of stable benchmark monuments was installed to supplement an existing network of benchmarks that was installed for the City of Chino in 1987. Associated Engineers (AE) completed monument installations (see Figure 1-5) and an initial survey of all monument elevations in April 2003. Repeat surveys are planned for April of each year during the IMP period.

The IMP work plan also called for the deep extensometer at Ayala Park (discussed below), which is anchored in sedimentary bedrock at about 1,400 ft bgs, to be used as the “starting benchmark” for all survey loops. To accomplish this, a Class-A benchmark was constructed outside the extensometer building to serve as the practical (i.e. actual) starting benchmark. To link this benchmark to the deep extensometer pipe, each survey event begins by referencing the benchmark to a marked spot on one of the piers that supports the extensometer instrument platform. These piers and the instrument platform represent a stable ground surface datum that is used to measure relative vertical displacement between the ground surface and the deep extensometer pipe (recorded every 15 minutes). The vertical displacement recorded at the deep extensometer between survey events, in addition to any vertical displacement measured between the starting benchmark and the pier, is then used to calculate the elevation at the starting benchmark outside the extensometer building. Then, relative vertical displacement between benchmarks is measured across the entire network to obtain current elevations.

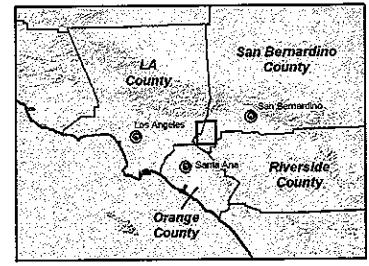
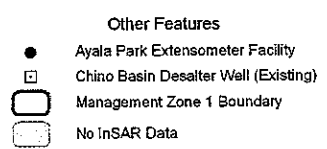
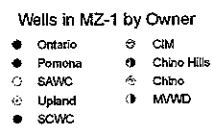
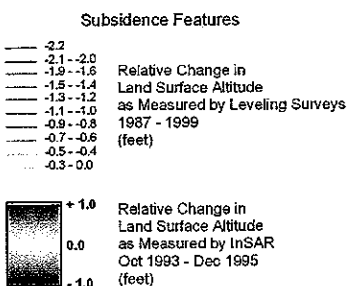
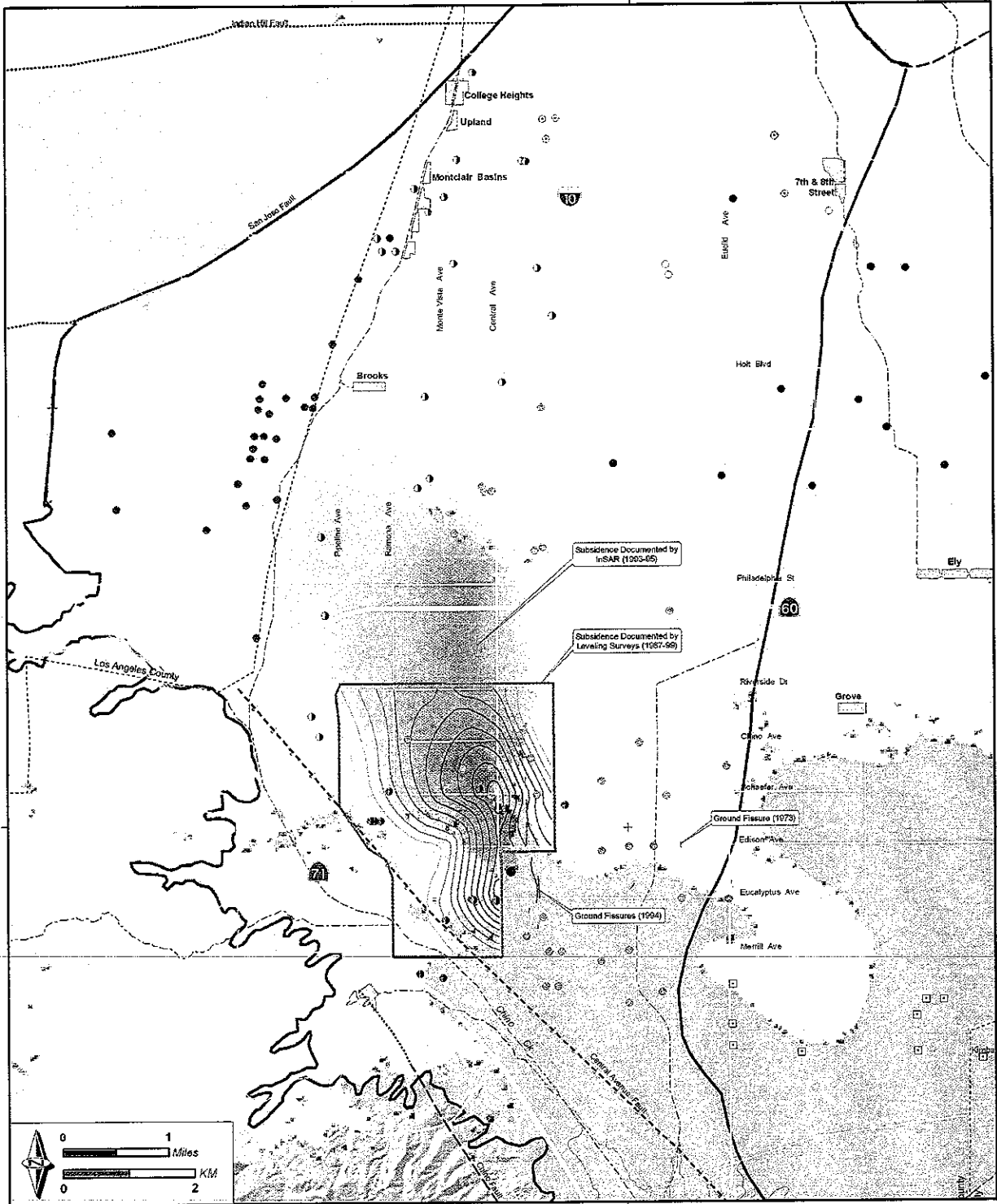
A key element of the MZ-1 benchmark network is the array of closely spaced benchmarks that have been established across the historic fissure zone in the immediate vicinity of the Ayala Park extensometers (Ayala Park Array). At this array, located along Edison and Eucalyptus Avenues, both vertical and horizontal displacements are measured. These horizontal and vertical displacements are defining two-dimensional profiles of land-surface deformation that can be related to the vertical distribution of aquifer-system compaction and expansion that is being recorded continuously at the extensometers. These surveys are being repeated semi-annually during the late spring and early fall periods of highest and lowest water levels in an attempt to monitor fissure movement, if any, that may be associated with elastic and/or inelastic aquifer-system deformation. (Note: the semi-annual survey frequency of the Ayala Park Array monuments is a modification to the IMP work plan, and was agreed upon by the MZ-1 Technical Committee at the September 24, 2003 meeting).

Methods: InSAR Analyses. InSAR is being used to characterize ground surface deformation in Chino Basin. This analysis will be performed for a historical period (1992-2000) and on an on-going basis thereafter. The advantage of InSAR is that it provides an aerially continuous representation of land surface deformation. These data are planned to be used to: (1) characterize the time history of land surface deformation in greater spatial and temporal detail than can be accomplished from the available historical ground-level survey data, (2) calibrate computer simulation models of subsidence and groundwater flow, and (3) assist in the evaluation of the effectiveness of the long-term management plan.



**Table 1-1
Applicability of Potential Causes of Subsidence in Chino Basin**

Potential Cause of Subsidence	Applicability to Chino Subsidence
Collapse of underground caverns	No caverns or soluble rocks are known to underlie the Chino Basin, and the geologic environment and history of the basin make their existence extremely unlikely.
Consolidation due to surface loading	No substantial surface loading has been applied, other than the construction of Prado Dam and the occasional short-lived accumulation of flood waters behind it. These are well south of the area of significant subsidence.
Consolidation of sediments over geologic time scales	This process is presumably occurring under the gradually increasing load of accumulating alluvial sediments, but at rates much too slow to be readily detectable over a period of decades. Under conditions of subaerial deposition the buildup of surficial sediments far exceeds their compaction at depth.
Desiccation and shrinkage of expansive soils	Swell/shrink properties of soils in the subsiding area have not been investigated. However, most of the area has been subject to agricultural and/or residential irrigation and is unlikely to have experienced serious desiccation, despite substantial lowering of the water table.
Settlement of soils due to ground shaking	Significant coseismic settlement of unconsolidated soils typically involves temporary liquefaction manifested in localized slumping and sand boils. These phenomena have not been reported during the seismic events of recent decades.
Drainage of organic soils	High organic soils do not occur in the subsiding area.
Hydrocompaction	Hydrocompaction occurs where thick accumulations of very dry soils are rewetted for the first time since deposition. The very shallow water tables and artesian conditions that historically characterized the area of recent subsidence rule out this phenomenon.
Solution of soluble subsurface deposits like salt	There is no evidence for the existence of soluble rocks underlying the Chino Basin.
Subsurface extraction of hydrocarbons	Not applicable. There are no known oil or gas extraction wells currently in operation in Chino Basin.
Tectonism	While the alluvial basins of California have obviously been subsiding over geologic time relative to their bounding mountain ranges, there is no evidence for a tectonic mechanism that would account for the localized and relatively rapid subsidence observed in the southwestern part of Chino Basin.
Thawing permafrost	Not applicable. Permafrost is soil or rock that remains below 0°C throughout the year, and forms when the ground cools sufficiently in winter to produce a frozen layer that persists throughout the following summer. These conditions do not occur in Chino Basin.
Aquifer-system compaction	Probable cause.



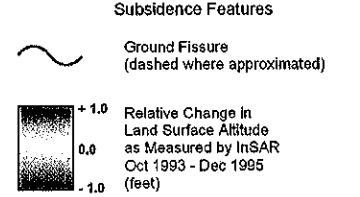
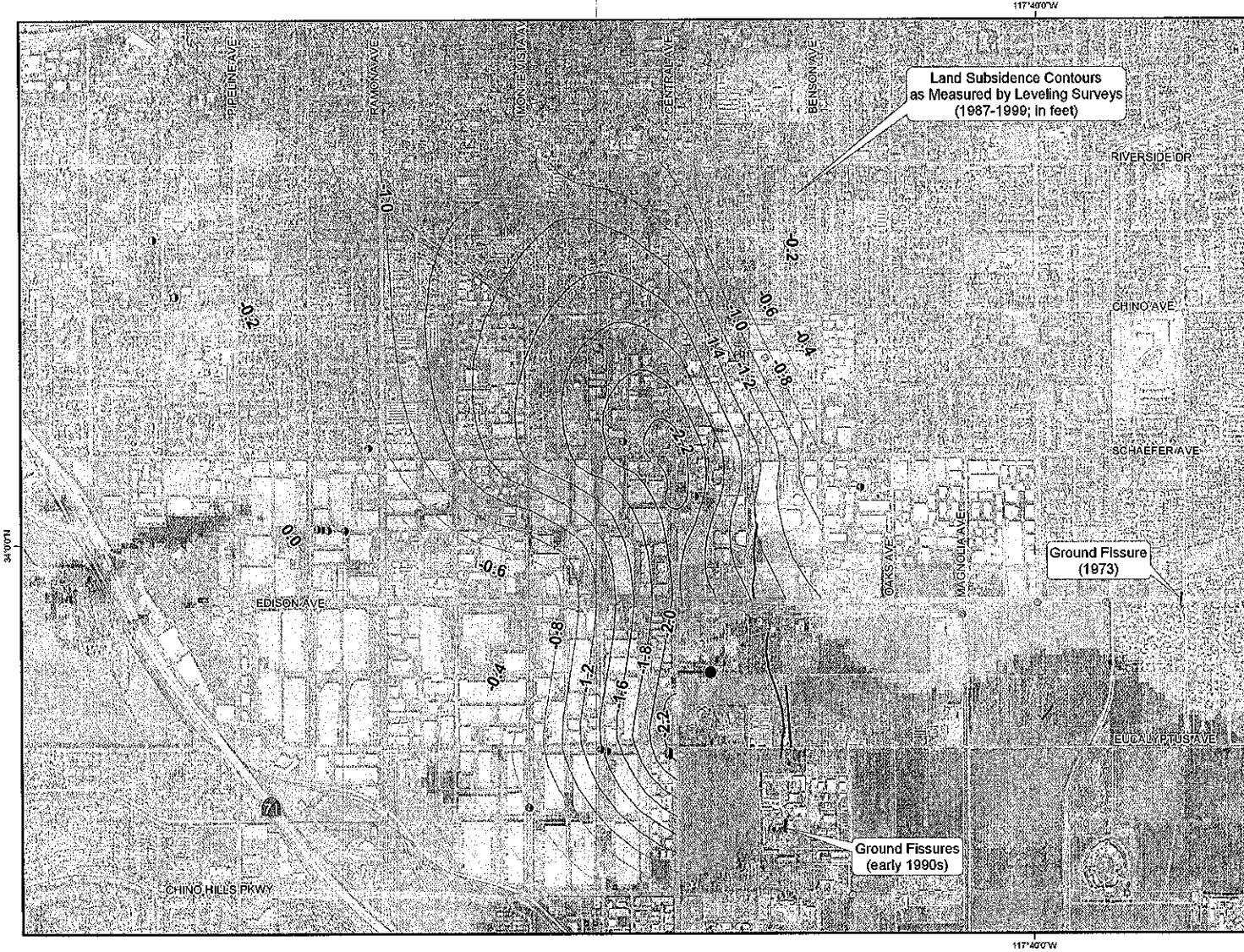
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Land Surface Deformation in Management Zone 1
 Leveling Surveys and InSAR

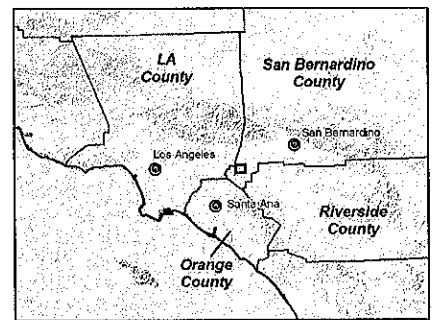
Figure 1-1



- Wells in MZ-1 by Owner**
- Ontario
 - Pomona
 - SAWC
 - Upland
 - SCWC
 - CIM
 - Chino Hills
 - Chino
 - MWD

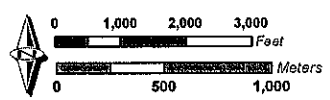
- Other Features**
- Ayala Park Extensometer Facility

Note: Air photo background flown in April 2004.



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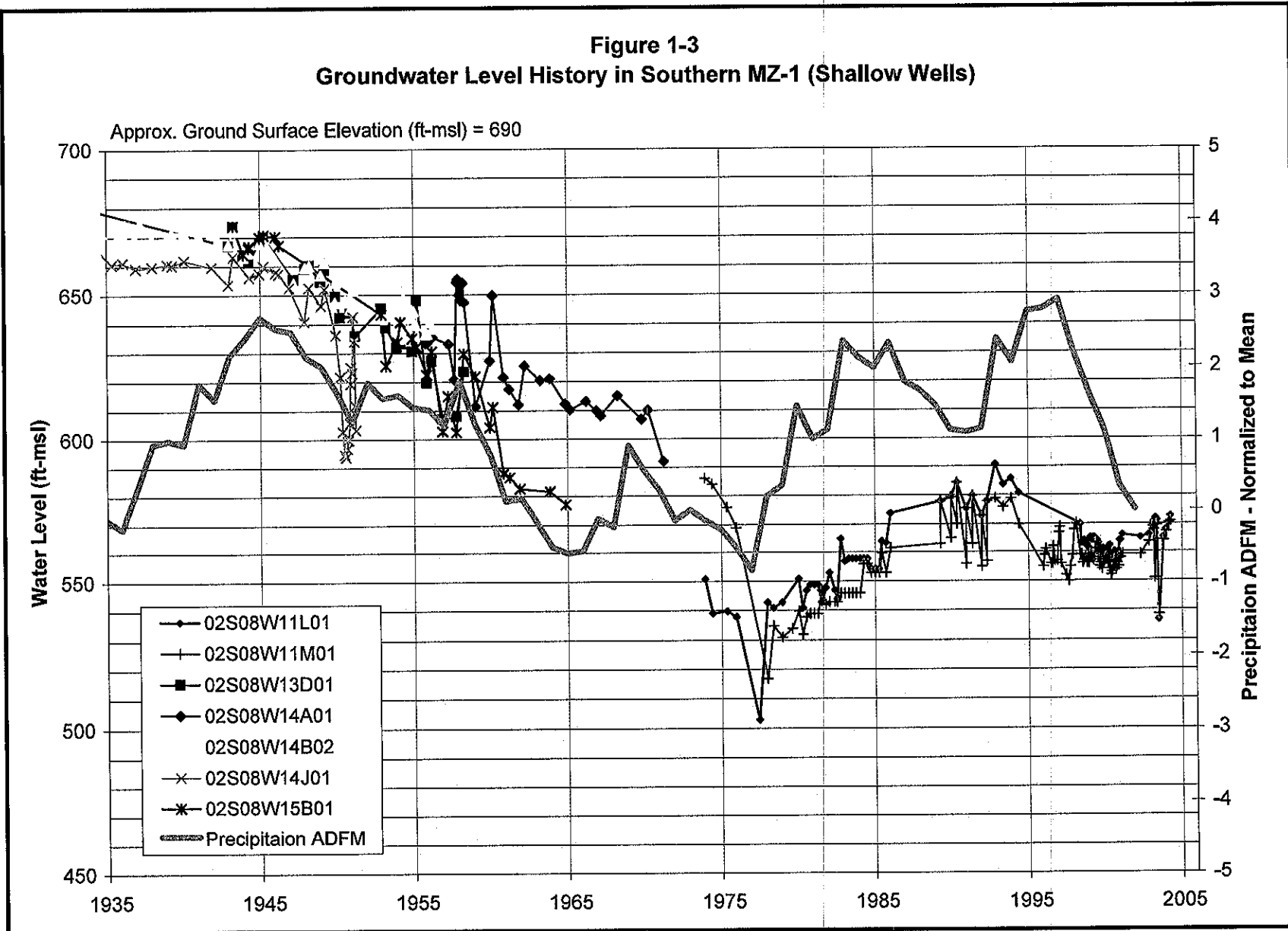


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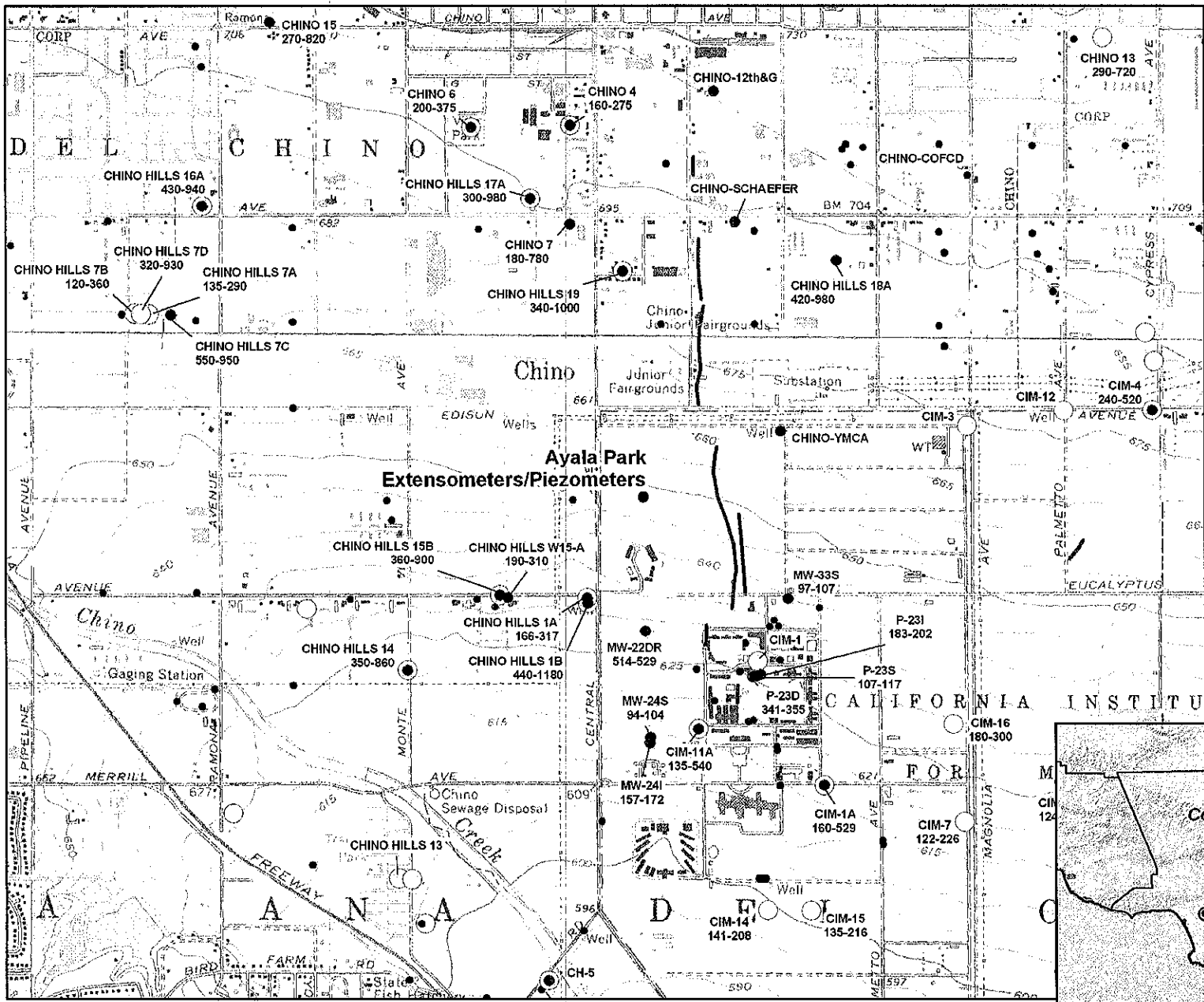
Land Surface Deformation in Chino, CA
 Leveling Surveys and InSAR

Figure 1-2

Figure 1-3
Groundwater Level History in Southern MZ-1 (Shallow Wells)



54



Main Map Features

- MZ-1 Observation Well
{Water level recording transducer installed at each well}

- Active Well
- Inactive or Destroyed Well

- ⤿ Ground Fissure (early 1990s)

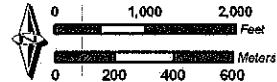
Other Features

Piezometric Monitoring Network
MZ-1 Interim Monitoring Program



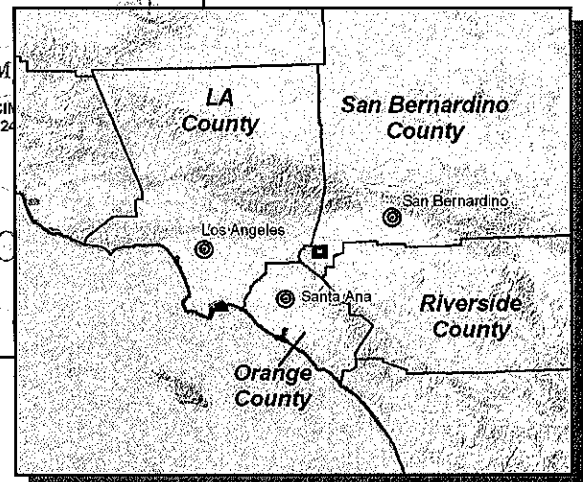
MZ-1 Summary Report
September 2005

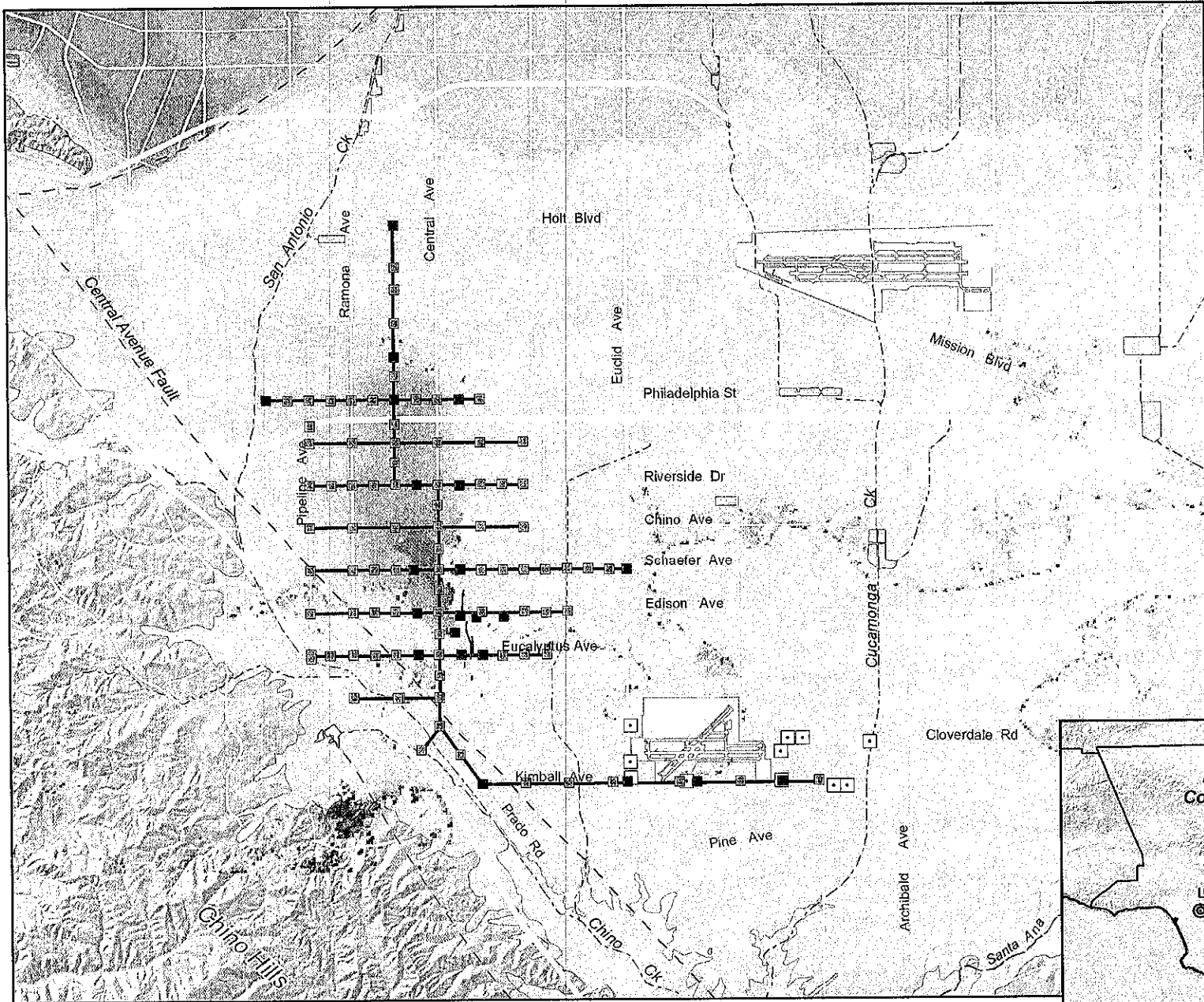
Figure 1-4



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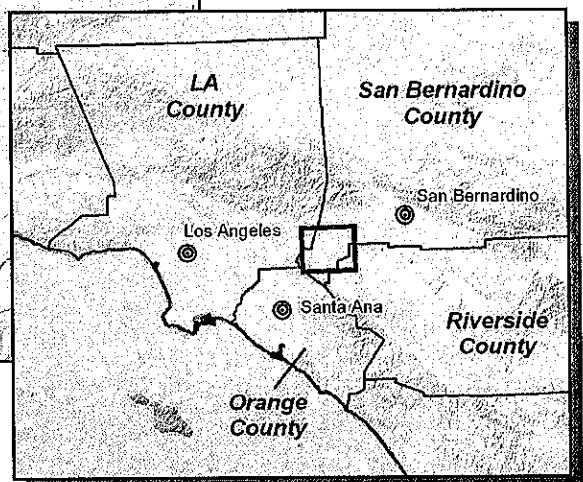
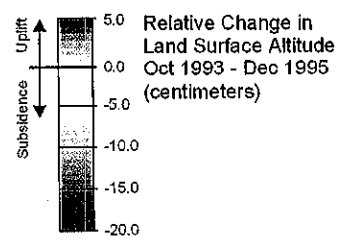


Main Features

- Survey Line
- Class-A Monument
- Class-B Monument

Other Features

- Chino-1 Desalter Well
- ~ Ground Fissure (1994)

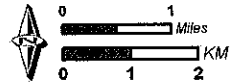


Benchmark Survey Monuments
MZ-1 Interim Monitoring Program



Figure 1-5

MZ-1 Summary Report
Ground Level Monitoring



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2. MZ-1 INTERIM MONITORING PROGRAM

This section describes the results, interpretations, and major conclusions derived from the Interim Monitoring Program (IMP) as of September 19, 2005.

Results and Interpretations

Aquifer-System Monitoring. The controlled testing and comprehensive monitoring of the aquifer-system (see Section 1) and subsequent data analyses has led to a number of key interpretations:

1. There appear to be two distinct aquifer systems in this area – a shallow, un-confined to semi-confined system from about 100-300 ft-bgs and a deep, confined system from about 400-1,200 ft-bgs.
2. Under current conditions of aquifer utilization in MZ-1, the aquifer-system deformation appears to be essentially elastic. At the Ayala Park Extensometer, about 0.14 feet of elastic land subsidence and rebound were observed during the pumping and recovery seasons of 2004-05. Minor amounts (~0.01 feet) of permanent compaction and associated land subsidence apparently occurred over this same period.
3. The relationships between aquifer-system stress (water level changes) and aquifer-system strain (vertical deformation of the sediment matrix) have been established by comparing piezometer data versus extensometer data. These relationships indicate the nature of the aquifer-system deformation (i.e. elastic vs. inelastic) and provide estimates of aquifer-system parameters for later use in aquifer-system models.
4. A deep aquifer-system pumping test in September 2004 appears to have transitioned the system from elastic to inelastic deformation. This provides a “threshold” water level at Ayala Park, below which further drawdown will result in inelastic compaction. The data derived from this test will assist in the creation of management tools for MZ-1 (e.g. groundwater flow and subsidence models).

A technical discussion related to the above interpretations follows:

Figure 2-1 shows the changes in thickness of the aquifer systems as recorded by the deep and shallow extensometers, completed at depths of 1,400 and 550 ft-bgs. It also shows the water-level fluctuations in two piezometers, PA-10 and PA-7, which are representative of the shallow aquifer system and the upper part of the deep aquifer system, respectively.

During periods of water-level decline in PA-7, both extensometers are recording compaction of the sediments. During periods of recovery in PA-7, both extensometers are generally recording elastic expansion. Note that for the data available, almost all of the compaction during the drawdown season is recovered as expansion during the recovery season.

During the late-spring (2004) pumping of the shallow aquifer system, while the deep system not pumped, the shallow extensometer recorded compression while the deep extensometer recorded an overall expansion. Subtracting the shallow record from the deep confirms that the deeper sediments continued a smooth expansion in response to continuing recovery of heads in the deeper parts of the aquifer system, as represented by the data from PA-7, which is screened from 438-448 ft-bgs. The shallow compression is seen to correlate closely with the drawdown recorded by PA-10, screened from 213-233 ft-bgs.

These observations clearly demonstrate the existence of the deep and shallow aquifer-systems in this region of MZ-1. Nearby pumping at wells that are screened in either the deep or shallow aquifer-systems result in distinct hydraulic and mechanical responses that are recorded at the Ayala Park piezometers and extensometers. These observations also demonstrate the importance, for analytical purposes, of



independently stressing the deep and shallow systems by pumping from only one at a time, so that the observed deformation can be more accurately attributed to production from a specific depth interval.

The relationships between water levels and aquifer-system deformation are further depicted in the stress-strain diagrams shown in Figure 2-2. In this diagram, increasing depth to water (drawdown due to pumping) is the measure of decreasing pore pressure and increasing effective intergranular stress. Increasing compression of the sediments is the resulting strain. When pumping diminishes or ceases, pore pressures recover, intergranular stress is reduced, and the aquifer system expands.

Figure 2-2 shows that the full thickness of sediments responds linearly to extended intervals of continuous drawdown or recovery, but with a large seasonal hysteresis attributable to the time lag involved in the delayed vertical propagation of pore pressure changes from the pumped aquifers into adjacent, poorly permeable aquitards. The parallel slopes of the compression and expansion trends represent the overall elasticity of the sedimentary section. Its inverse is the skeletal storativity, in hydrologic terminology.

Brief intervals of recovery during the drawdown season, and of drawdown during the recovery season, produce steeply sloping, more-or-less tight hysteresis loops. Their much steeper slope represents the (inverse) aggregate compressibility of the permeable pumped aquifers. The longer intervals of recovery and drawdown generate the more open hysteresis loops, as the delayed responses of immediately adjacent portions of the aquitards have time to influence the extensometers.

The parallelism of the seasonal drawdown and recovery stress-strain slopes in Figure 2-2 indicates that seasonal drawdown to 250 ft-bgs at this site is producing essentially elastic, recoverable deformation. However, the slope of the drawdown curve in 2004 begins to deviate from its elastic trend when the seasonal drawdown exceeds 250 ft-bgs indicating a transition to inelastic compaction within draining aquitard interbeds. A minor amount of non-recovered compaction is indicated by the offset of the recovery curve in 2005 to the right (direction of compression). On about September 19, 2005 water levels had recovered to the levels of pre-pumping conditions of 2004 (~105 ft-bgs at PA-7), and the offset of the stress-strain curve to the right (direction of compression) confirmed that about 0.01 ft of permanent compaction occurred during the pumping season of 2004.

The pumping and associated drawdown of water levels in 2004 was part of a controlled aquifer system stress test. The primary objective of this test was to transition the deformation of aquifer-system sediments from elastic compression to inelastic compaction. If successful, it would provide "threshold" piezometric heads at the extensometer location that should not be approached in the future if permanent (inelastic) compaction within the aquifer-system is to be avoided. This would also define a key parameter required for estimating the maximum elastic storage capacity of the confined aquifer-system.

For fear of exacerbating the ground fissuring, one limiting condition of the test that was agreed upon by the participating agencies was that pumping cease when inelastic compaction was identified. Although 0.01 feet of permanent compaction is relatively minor deformation, it is measurable and within the detection limits of the extensometer. The stress-strain diagram in Figure 2-2 indicates that at Ayala Park the aquifer-system transitioned from elastic compression to inelastic compaction when the water level in the PA-7 piezometer at Ayala Park fell below about 250 ft-bgs. The applicability of this limit at increasing distances from the piezometer/extensometer facility is dependent on an approximate replication of the tested pumping conditions (i.e. specific wells pumped, pumping rates, and pumping durations). A different areal distribution of pumping might cause localized inelastic compaction away from Ayala Park without drawing PA-7 below 250 feet or recording inelastic effects at the extensometer.



A different vertical distribution of extraction will stress the aquifer system in a different manner, and may result in a different threshold water level in PA-7.

Other objectives of the pumping test that were successfully accomplished were to (1) estimate key aquifer-system parameters that could be used in later modeling efforts, and (2) confirm and elucidate the existence of a groundwater barrier within the sediments below about 300 ft-bgs

Discovery of Groundwater Barrier. Multiple lines of evidence suggest that a previously unknown groundwater barrier exists within the deep aquifer-system in the same location as the fissure zone.

Controlled aquifer-system stress (pumping) tests in October 2003 and April 2004 provided piezometric response data that revealed a potential groundwater barrier within the sediments below about 300 ft-bgs and aligned north-south with the historic fissure zone. Figure 2-3 is a map that shows the locations of a pumping well perforated in the deep aquifer system (CH-19, 340-1,000 ft-bgs) and other surrounding wells that also are perforated exclusively in the deep system. Figure 2-4 shows the water level responses in these wells during various pumping cycles at CH-19. The groundwater barrier is evidenced by a lack of water level response in CH-18 (east of the fissure zone) due to pumping at CH-19 (west of the fissure zone). Image-well analysis of pumping-test responses also indicates that this barrier approximately coincides with the location of the historic zone of ground fissuring.

Ground level survey data (described in detail below) corroborate the water level data – also indicating the existence of the barrier and its coincident location with the fissure zone. Figure 2-6 shows that during the pumping season of 2003 (April to November) vertical displacement of the land surface (i.e. subsidence) was generally greater on the west side of the fissure zone where water-level drawdown was greatest. Figure 2-7 shows that during the recovery season of 2003-04 (November to April) vertical displacement of the land surface (i.e. rebound) was again greater on the west side of the fissure zone where water level recovery was greatest.

In other words, the groundwater barrier in the deep aquifer-system is aligned with the fissure zone and causes greater water level fluctuations on the west side of the barrier where the pumping is concentrated. These greater water level fluctuations on the west side of the barrier, in turn, cause greater deformation of the aquifer-system matrix which, in turn, causes greater vertical land surface deformation on the west side of the barrier. In addition, the pattern of horizontal displacement of benchmarks over the pumping and recovery seasons, as shown in Figures 2-6 and 2-7, likely reflects, in part, the differential compaction of the aquifer system across the fissure zone.

Similarly, the InSAR data in Figures 1-2 and 2-5 also corroborate the existence of the groundwater barrier by showing maximum subsidence west of the barrier and virtually no subsidence east of the barrier.

This spatial coincidence of the groundwater barrier and the historic fissure zone suggests a cause-and-effect relationship: the barrier causes differential water level declines, which cause differential aquifer-system compaction and a steep gradient of subsidence across the barrier, which can and likely has caused ground fissuring above the barrier.

Monitoring of Ground-Surface Deformation—Ground-Level Surveying. In late April 2004, AE performed the annual survey event across the entire network of benchmark monuments, including the measurements of horizontal displacements at the Ayala Park Array of monuments. The results of the ground level surveys were presented to the MZ-1 Technical Committee at its meeting. Also at this



meeting, the project manager from AE made a presentation to describe survey methodologies, accuracy, results, and challenges.

Figure 2-5 displays the vertical displacement at monuments that occurred from April 2003 to April 2004. Comparing monument elevations over the April-to-April period is meant to reveal the inelastic component of compaction, if any, which may be occurring in the region. The assumption here is that in April 2004 water levels in the region have recovered to the April 2003 levels; thus the measured vertical displacement does not include the elastic component of aquifer system deformation. Water levels measured as part of the IMP (in the vicinity of Ayala Park) support this assumption. Examination of Figure 2-5 shows that the monuments near Ayala Park experienced little to no subsidence over this time period. However, the monuments located in the northern portions of the surveyed area showed small but measurable subsidence of the land surface (on average about 0.04 feet). Maximum subsidence of about 0.08 feet was recorded at monuments located along Philadelphia Street between Pipeline and Ramona Avenues. Water level and groundwater production data have not been collected or analyzed as part of the IMP in these northern portions of the survey area; hence, it is not yet possible to classify the nature of the subsidence in this region (*i.e.* elastic vs. inelastic), since it is not known whether water levels in 2004 had recovered to their 2003 levels.

The color-coded background in Figure 2-5 represents the subsidence that occurred in the area over the October 1993 to December 1995 period as measured by InSAR. The subsidence shown by this InSAR data has been interpreted as primarily permanent subsidence caused by inelastic aquifer-system compaction. If so, the survey data in Figure 2-5 are indicating that the distribution of inelastic compaction in 2003-04 is significantly different than the distribution of inelastic compaction that occurred during the early 1990s. In particular, maximum permanent subsidence of about 1 foot in 1993-95 was measured in the vicinity of Ayala Park by InSAR, whereas in 2003-04 the survey data are indicating minimal permanent subsidence, if any, in this same area.

Figures 2-6 and 2-7 display the vertical and horizontal displacement at monuments of the Ayala Park Array that occurred from April 2003 to November 2003 and November 2003 to April 2004, respectively. The determination of horizontal displacement of monuments was accomplished through the processing of distance and angle measurements between adjacent monuments, and is based on the assumption that the southeastern monument was stable over the period of measurement. The methods used to measure the horizontal displacement of monuments at the Ayala Park Array are currently being refined by AE. These figures show:

- significant horizontal displacement of the ground surface over the course of the pumping and recovery seasons in the vicinity of the historic fissure zone
- the elastic nature of the land surface displacement over the course of the pumping and recovery seasons
- the apparent presence of a groundwater barrier within the deep aquifer system (see Section 5.3.4 below).

Groundwater production and water-level data show that pumping of wells perforated within the deep aquifer system (>300 ft-bgs) causes water-level drawdowns in the deep aquifer system on the order of 150 feet. However, these large drawdowns do not propagate east of the fissure zone. During the pumping season of 2003 (April to November) vertical displacement of the land surface (*i.e.* subsidence) was generally greater on the west side of the fissure zone where water-level drawdown was greatest. During



the recovery season of 2003-04 (November to April) vertical displacement of the land surface (i.e. rebound) was again greater on the west side of the fissure zone where water-level recovery was greatest.

In other words, the groundwater barrier in the deep aquifer system aligned with the fissure zone causes greater water-level fluctuations on the west side of the barrier where the pumping is concentrated. These greater water-level fluctuations west of the barrier cause greater deformation of the aquifer-system matrix which, in turn, causes greater vertical land surface deformation on the west side of the barrier. The InSAR data corroborate the existence of the groundwater barrier by showing maximum subsidence west of the barrier (0.2ft) and virtually no subsidence east of the barrier during the course of one pumping season (April-1993 to September 1993). In addition, the pattern of horizontal displacement of benchmarks over the pumping and recovery seasons likely reflects, in part, the differential compaction of the aquifer system across the fissure zone.

In June 2005, the entire network of monuments was surveyed for vertical displacement and, at the Ayala Park array of monuments, for horizontal displacement. The results of this survey are currently being processed.

Monitoring of Ground Surface Deformation—InSAR. Vexcel Corporation of Boulder, Colorado – a company that specializes in remote sensing and radar technologies – conducted a “proof of concept” study of historical synthetic aperture radar data that was acquired over the MZ-1 area. The objective of this study was to generate cumulative displacement maps over relatively short time steps (April to November 1993). The MZ-1 Technical Group deemed the study successful, and approved follow-up study by Vexcel to perform a comprehensive analysis of all historical synthetic aperture radar data (1992-2003) to characterize in detail the history of subsidence in MZ-1.

The comprehensive analysis was completed during the first quarter of calendar 2005. However, the usable data in this analysis only spanned the 1992-2000 period. Dr. David Cohen of Vexcel presented the InSAR results by to the MZ-1 Technical Committee in March 2005. Figures 2-8 and 2-9 display the summary results of the InSAR analysis of land subsidence for the periods of 1992-1995 and 1996-2000.

The InSAR results were generally consistent with the ground-level-survey data collected over a similar period with respect to the areal extent and magnitude of historical subsidence. The InSAR data show that:

- the rate of subsidence in the south area of MZ-1 has declined over time, particularly since about 1995.
- currently, the aquifer system is experiencing mainly elastic compression and expansion in the south area of MZ-1.
- the central area of MZ-1 is displaying greater rates of subsidence than the south area (near Ayala Park). This subsidence is probably due to aquifer system compaction, but pumping and water level data that would define this relationship have not yet been collected and analyzed in the central area of MZ-1.
- a steep gradient of subsidence exists across the fissure zone. The steep gradient extends north of the fissure zone to about Francis Street. In addition, the spatially continuous InSAR data show that the gradient of subsidence is steeper across the fissure zone than is shown by surveys of discrete benchmarks, which further supports the potential link between the subsidence and the fissuring. The existence of this steep gradient across the fissure zone also supports/reveals the existence and extent of the groundwater barrier.

Conclusions



There are five major conclusions that have been derived from the IMP to date:

1. The current state of aquifer-system deformation in south MZ-1 (in the vicinity of Ayala Park) is essentially elastic. Little, if any, inelastic (permanent) compaction is now occurring in this area, which is in contrast to the past when about 2.2 feet of land subsidence occurred, accompanied by ground fissuring, from about 1987-1995.
2. Groundwater production from the deep, confined aquifer system in this area causes the greatest stress to the aquifer system. In other words, pumping of the deep aquifer system causes water-level drawdowns that are much greater in magnitude and lateral extent than drawdowns caused by pumping of the shallow aquifer system.
3. Water-level drawdowns due to pumping of the deep aquifer system can cause inelastic (permanent) compaction of the aquifer-system sediments, which results in permanent land subsidence. The initiation of inelastic compaction within the aquifer system was identified during this investigation when water levels fell below a depth of about 250 feet in the PA-7 piezometer at Ayala Park.
4. Through this study, a previously undetected barrier to groundwater flow was identified. The barrier is located within the deep aquifer system and is aligned with the zone of historical ground fissuring. Pumping from the deep aquifer system is limited to the area west of the barrier, and the resulting drawdowns do not propagate eastward across the barrier. Thus, compaction occurs within the deep system on the west side of the barrier, but not on the east side, which causes concentrated differential subsidence across the barrier and creates the potential for ground fissuring.
5. InSAR and ground-level survey data indicate that permanent subsidence in the central parts of MZ-1 (north of Ayala Park) has occurred in the past and continues to occur today. The InSAR data also indicate that the groundwater barrier extends northward into central MZ-1. These observations suggest that the conditions that very likely caused ground fissuring near Ayala Park in the 1990s are also present in central MZ-1, and should be studied in more detail.



Figure 2-1 - Piezometric and Extensometer Data
Ayala Park Piezometer/Extensometer Facility

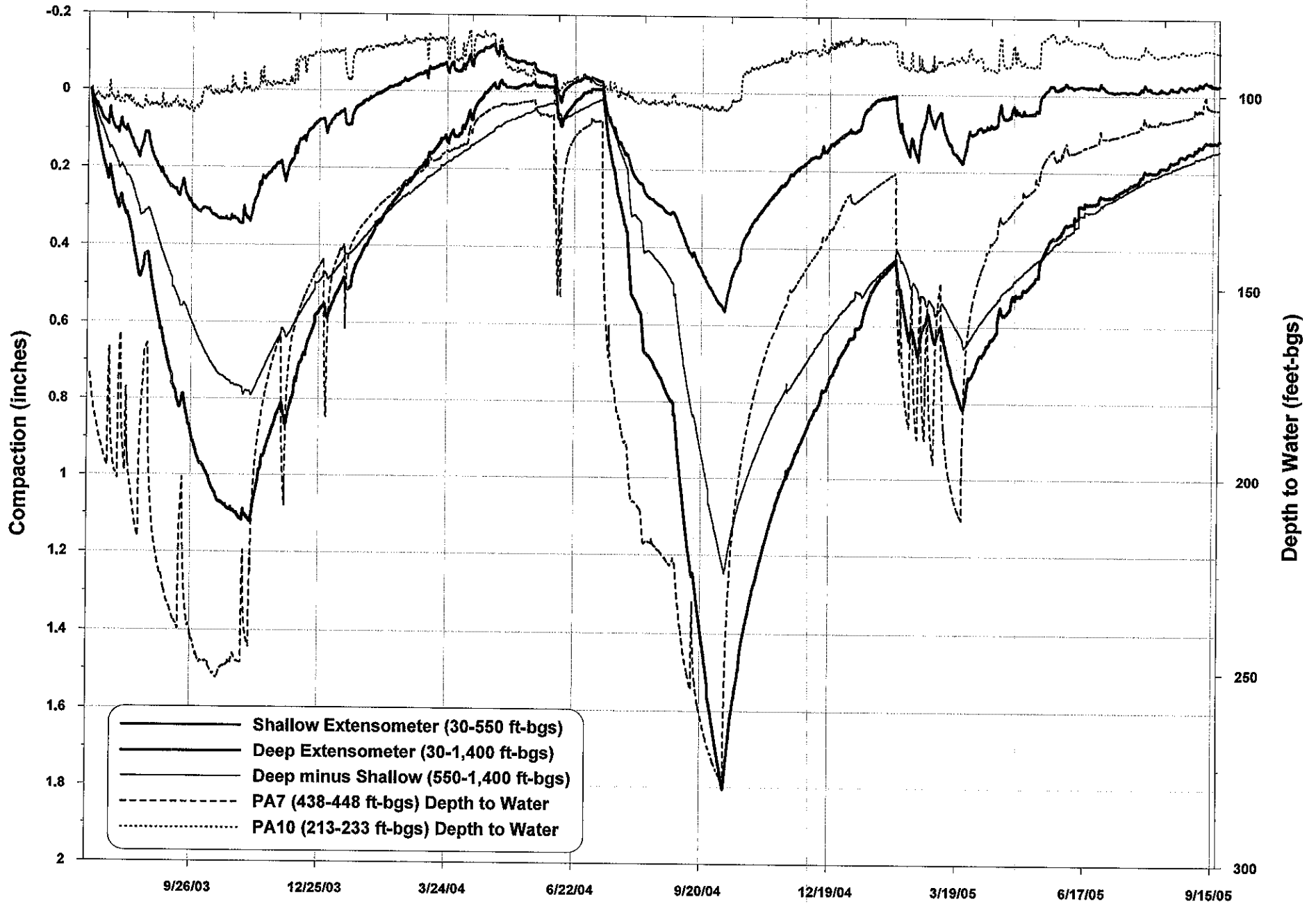
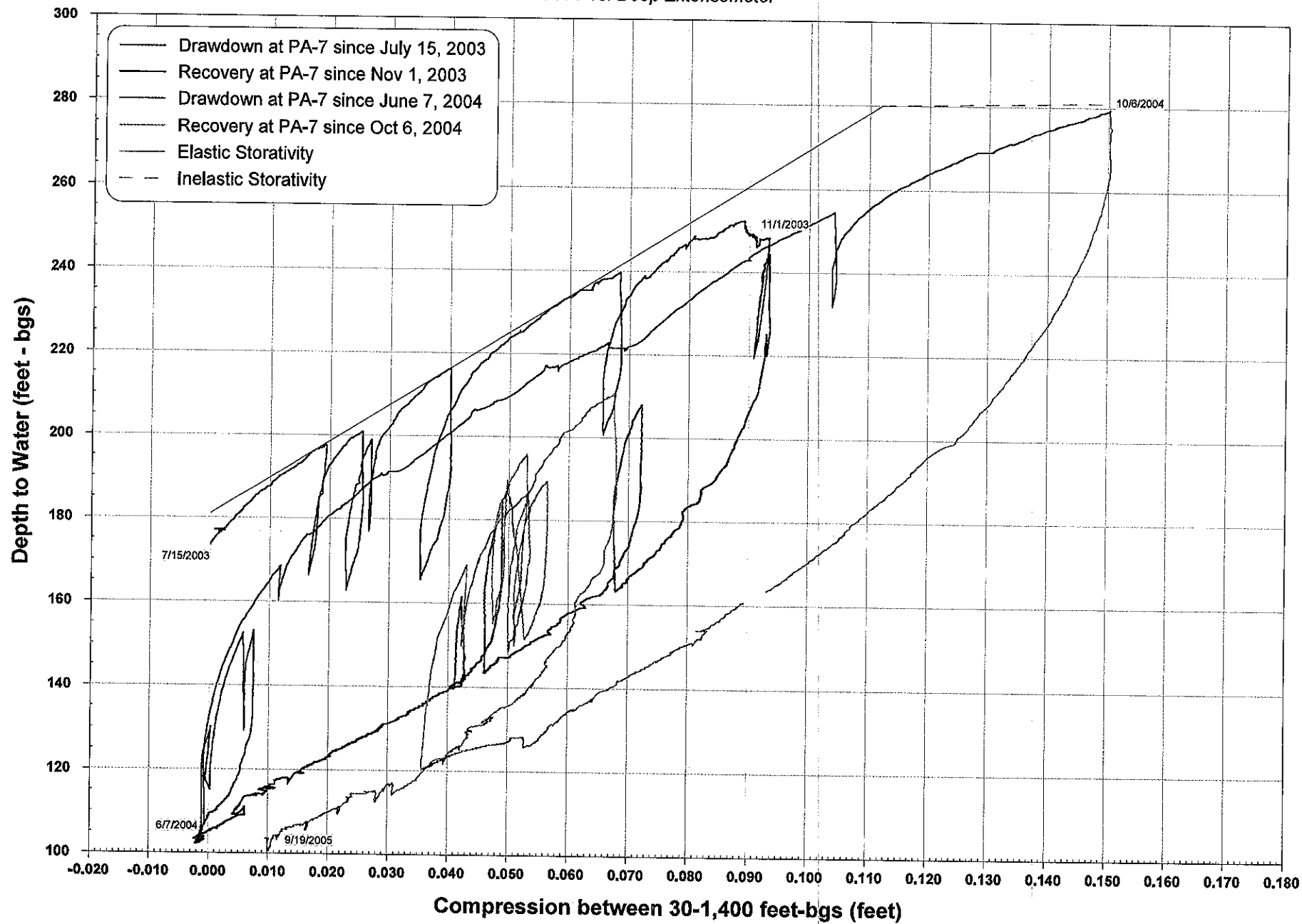
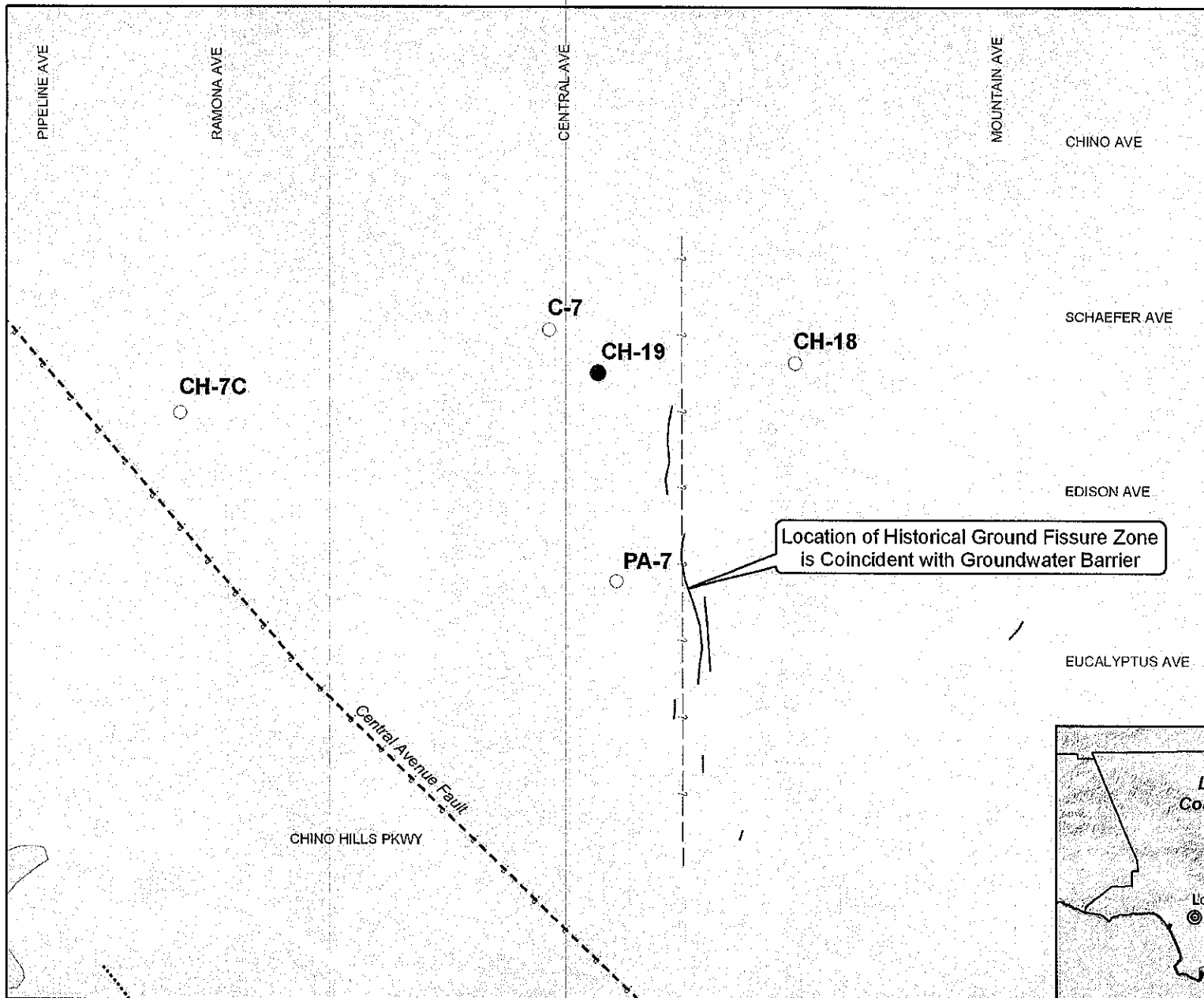


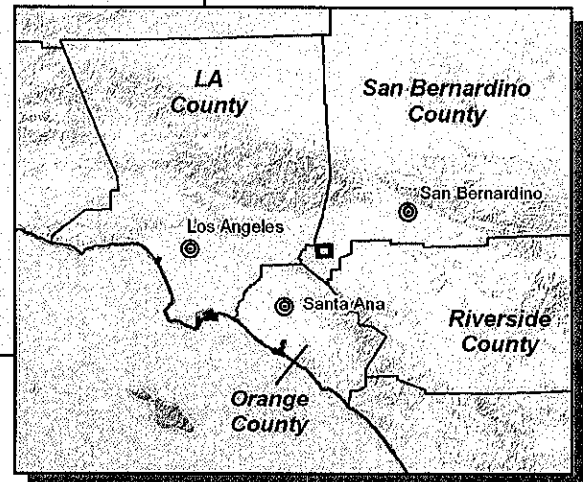
Figure 2-2 -- Stress-Strain Diagram
PA-7 vs. Deep Extensometer





- Main Features**
- Pumping Well
 - Observation Well
- Note: See water level responses at these wells in Figure 5-13.*
- ~ Ground Fissure (1994)
 - - - Approximate Location of Groundwater Barrier

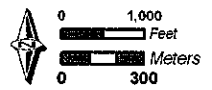
Location of Historical Ground Fissure Zone is Coincident with Groundwater Barrier



MZ-1 Groundwater Barrier
Evidence from Pumping Test

Figure 2-3

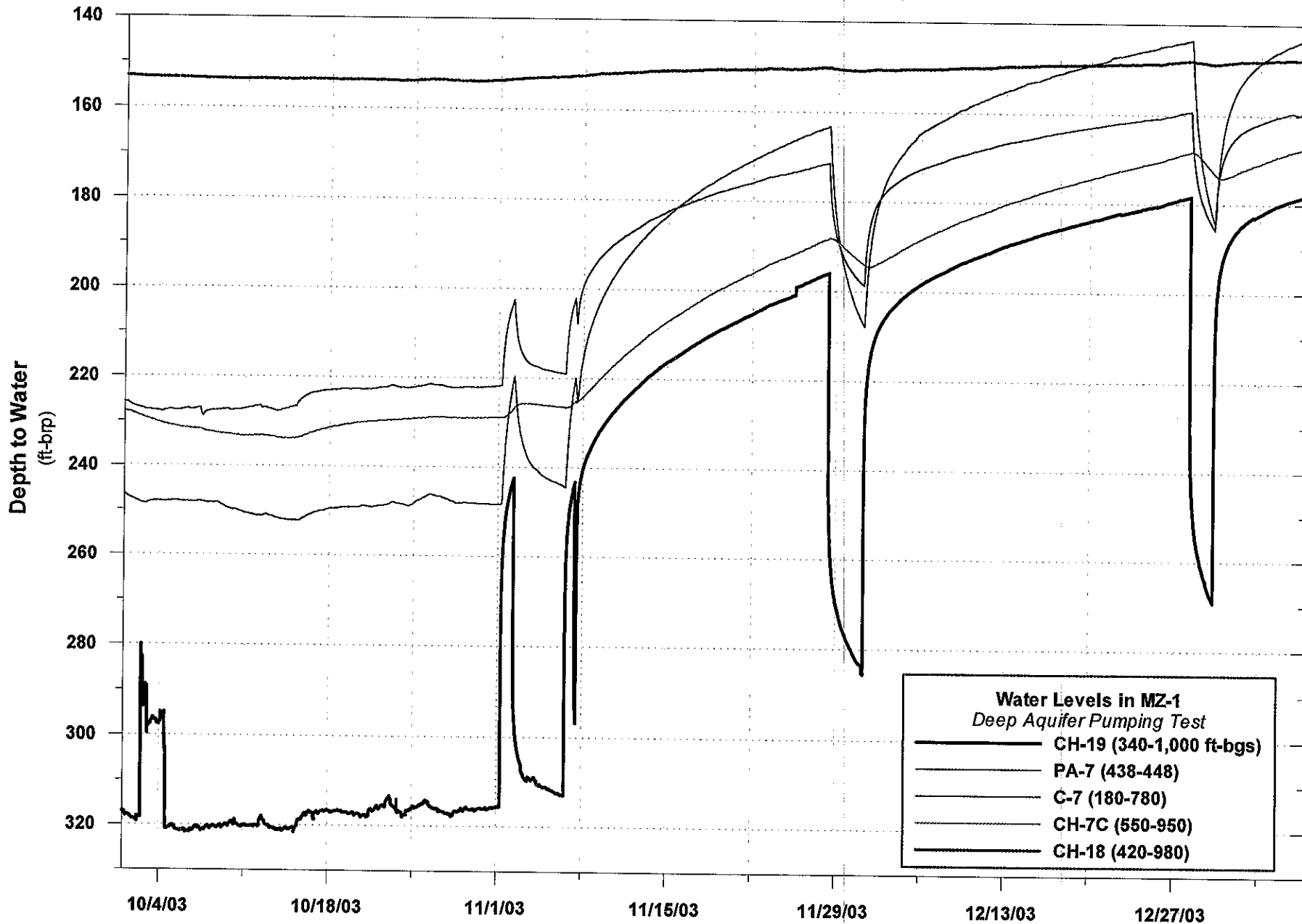

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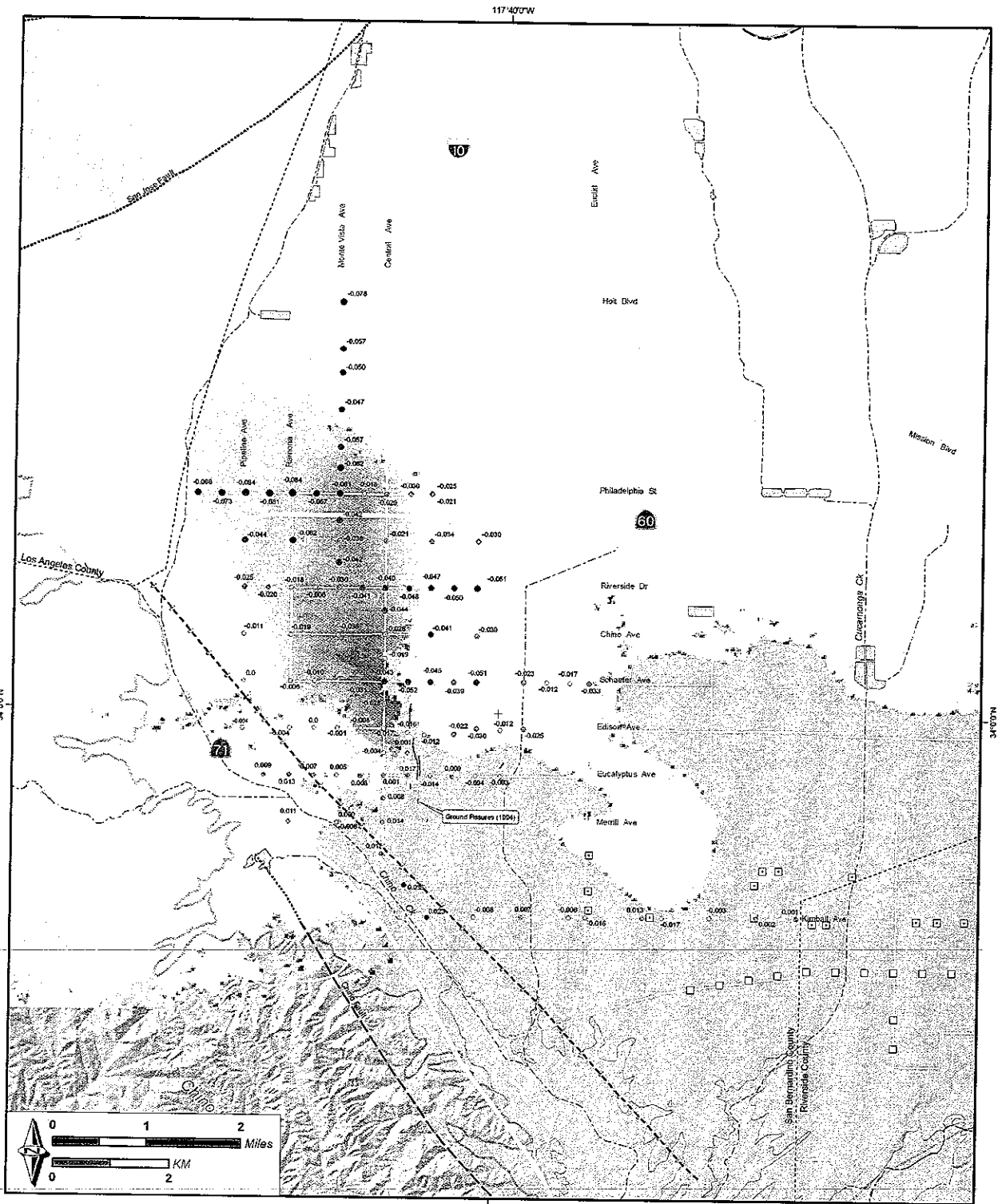


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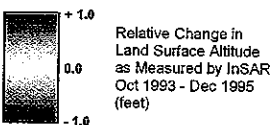
Figure 2-4
Water Level Responses at Nearby Wells to Pumping at CH-19





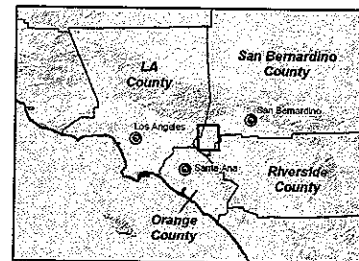
Main Features

- -0.010 to -0.030
 - -0.075 to -0.050
 - -0.050 to -0.040
 - -0.030 to -0.020
 - -0.010 to -0.001
 - 0.0
 - 0.001 to 0.020
- Relative Change in Land Surface Altitude as Measured by Leveling Surveys April 2003 - April 2004 (feet)



Other Features

- ⊕ Ayala Park Extensometer Facility
 - Chino Basin Desalter Well (Existing)
 - Chino Basin Desalter Well (Planned)
 - Chino Basin Hydrologic Boundary
- Faults & Groundwater Divides**
- Location Certain
 - - - Location Uncertain
 - · - Location Approximate
 - + Groundwater Divide
 - Location Concealed



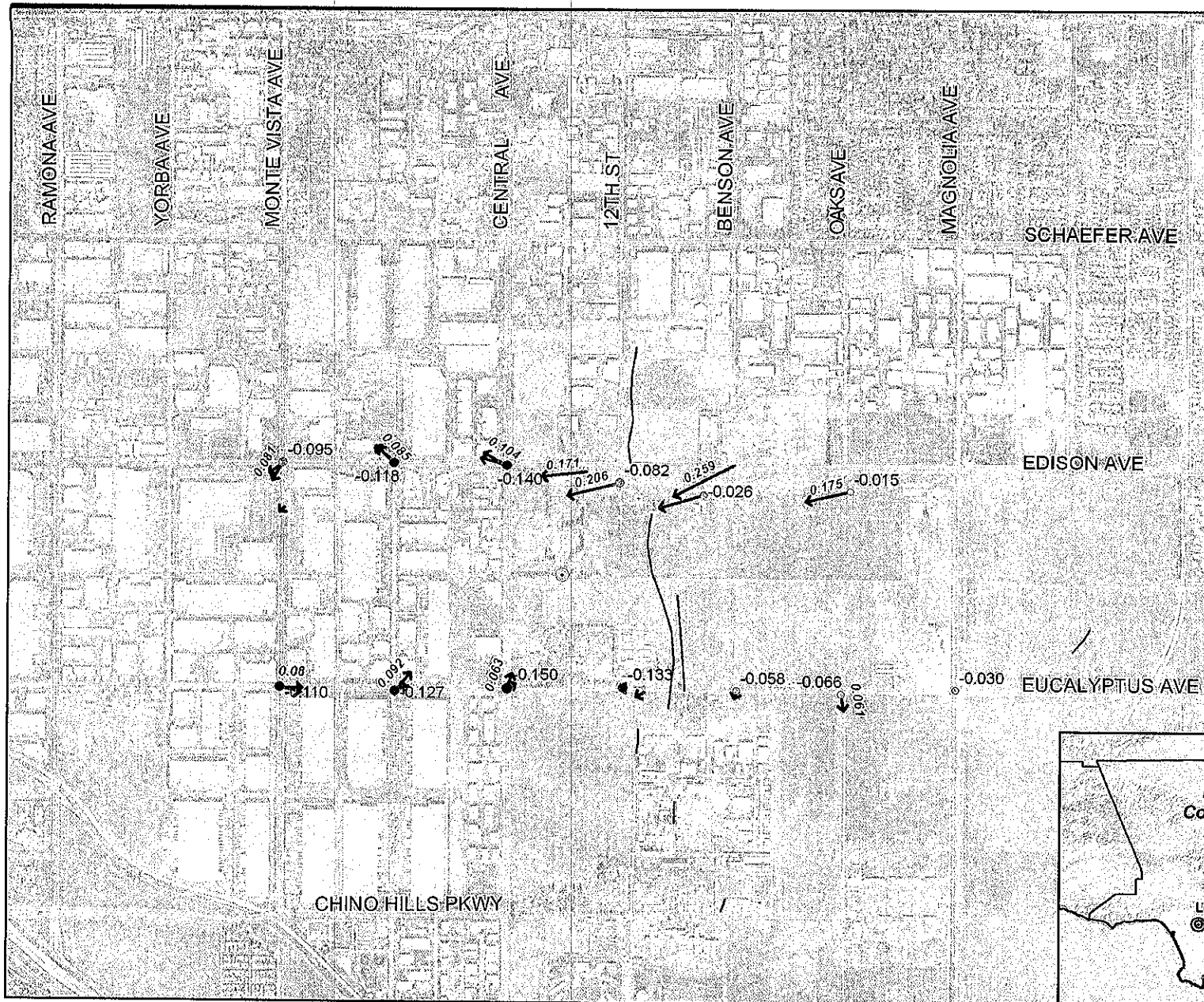
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Ground Level Survey Results
 April 2003 to April 2004

Figure 2-5



- Results of Ground Level Surveys**
- 0.12 ● Vertical Displacement at Monument (ft)
 - 0.10 ← Horizontal Displacement at Monument (ft) Relative to SE Monument
- Other Features**
- ⊙ Ayala Park Extensometer
 - ~ Ground Fissure (early 1990s)

Horizontal Displacement at Ayala Park Array of Monuments
 April 2003 to November 2003

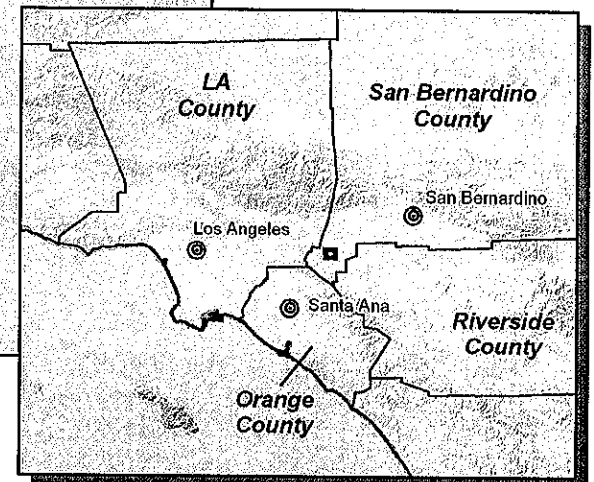


MZ-1 Summary Report
 September 2005



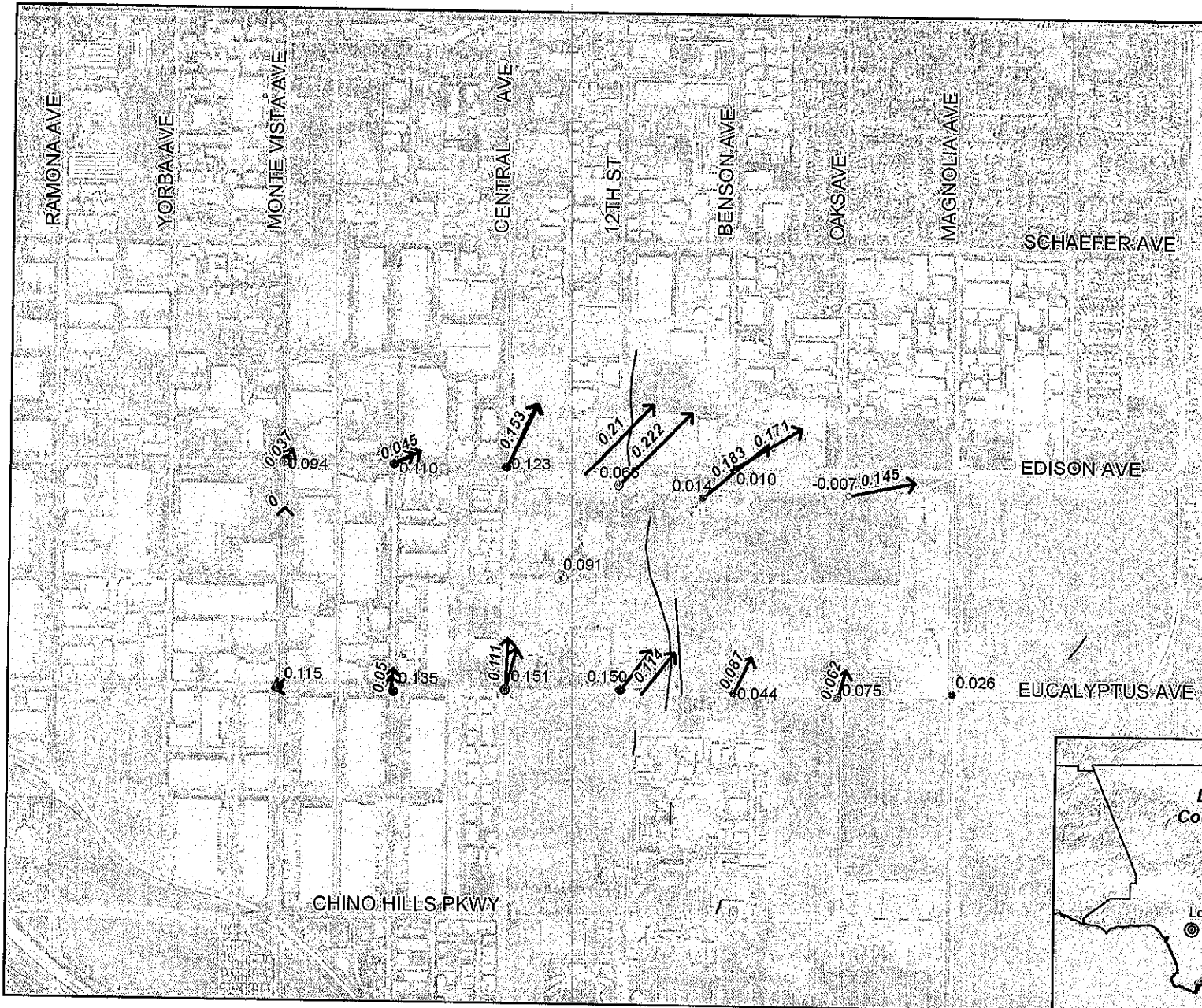
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Figure 2-6



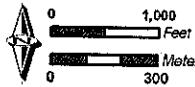
- Results of Ground Level Surveys**
- 0.15 ● Vertical Displacement at Monument (ft)
 - 0.10 → Horizontal Displacement at Monument (ft) Relative to SE Monument
- Other Features**
- Ayala Park Extensometer
 - ~ Ground Fissure (1994)

Horizontal Displacement at Ayala Park Array of Monuments
November 2003 to April 2004



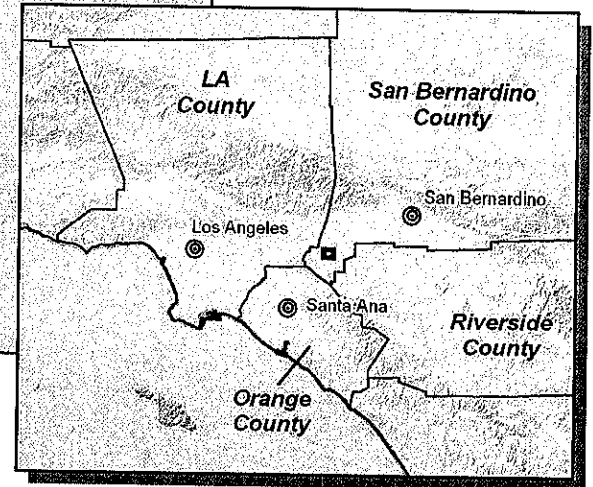
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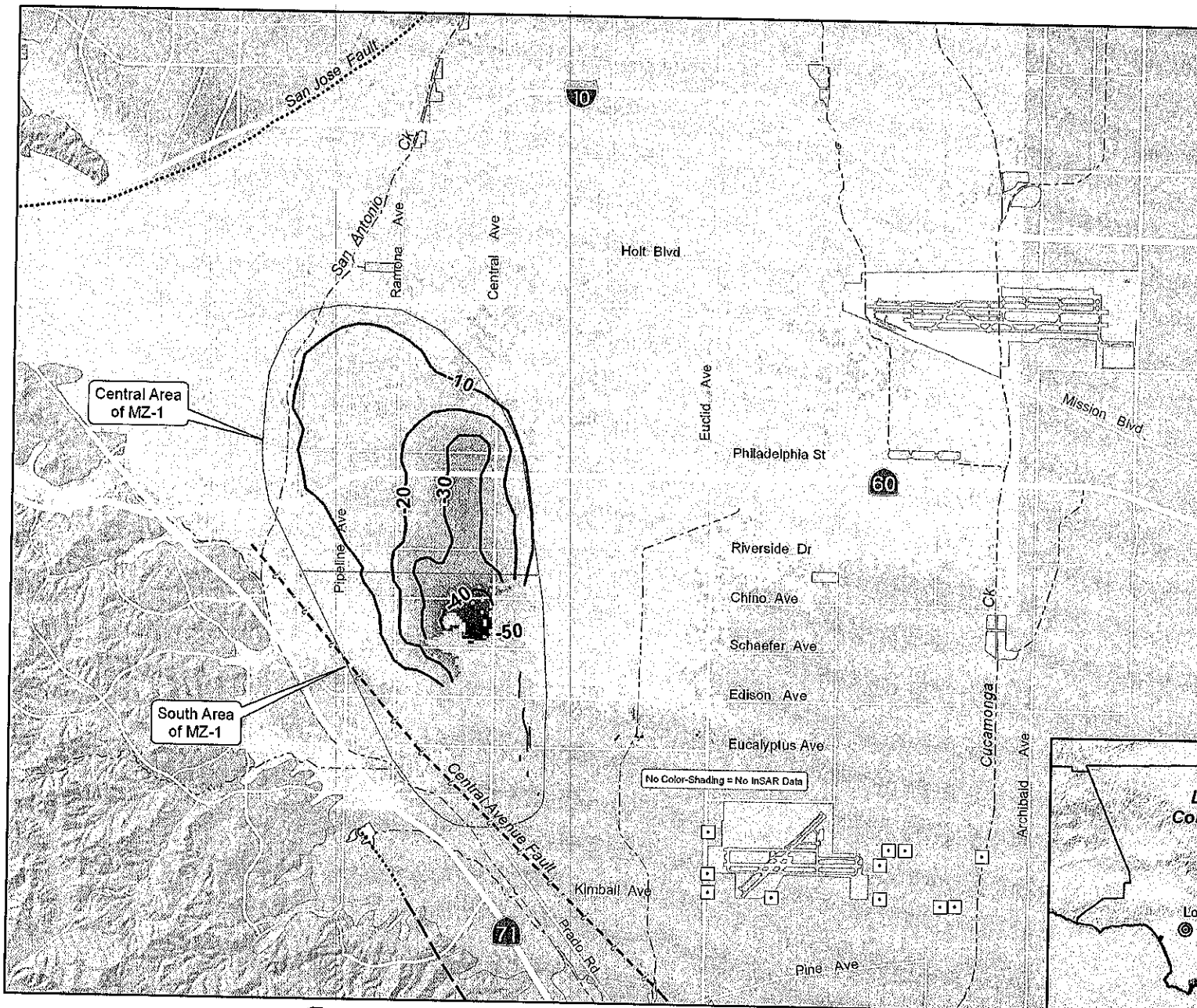
Figure 2-7



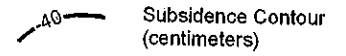
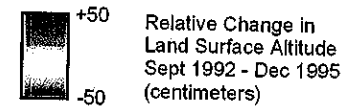
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Results of InSAR Analysis



Other Features

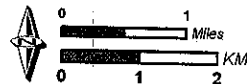
- Chino-I Desalter Well
- Ground Fissure (early 1990s)
- Unconsolidated Sediments
- Sedimentary Bedrock

InSAR Analysis of Subsidence
1992 to 1995



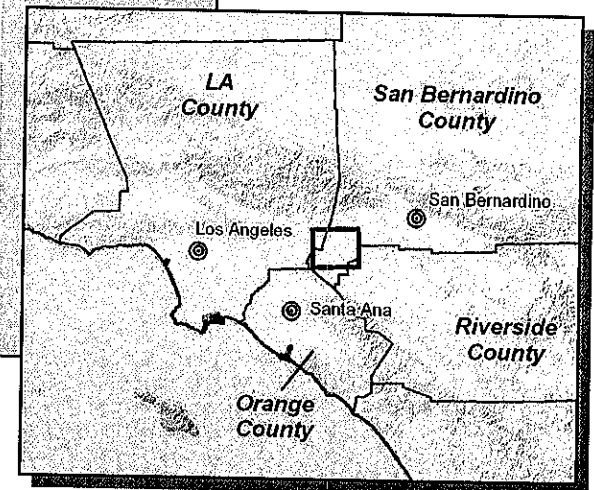
Figure 2-8

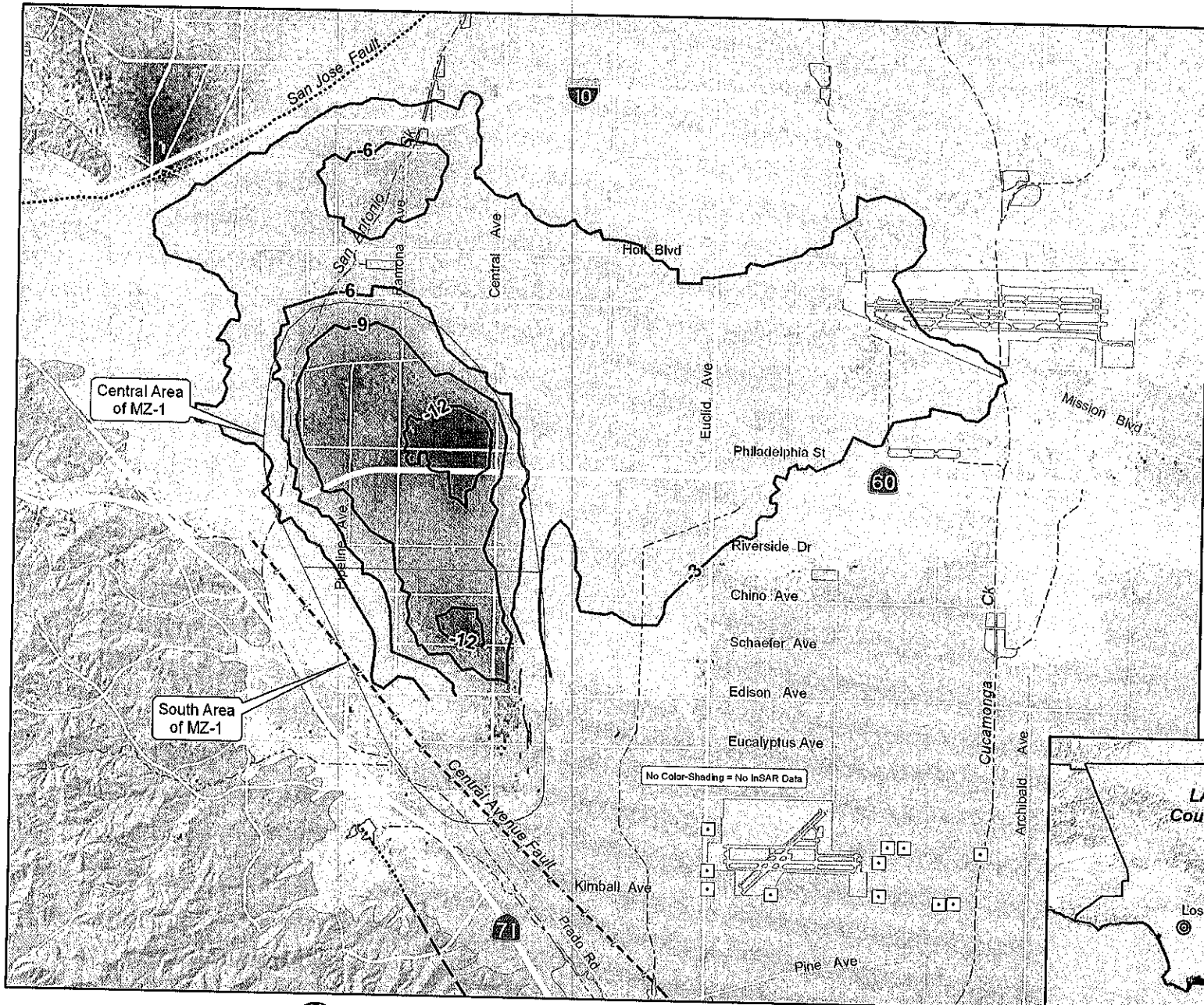
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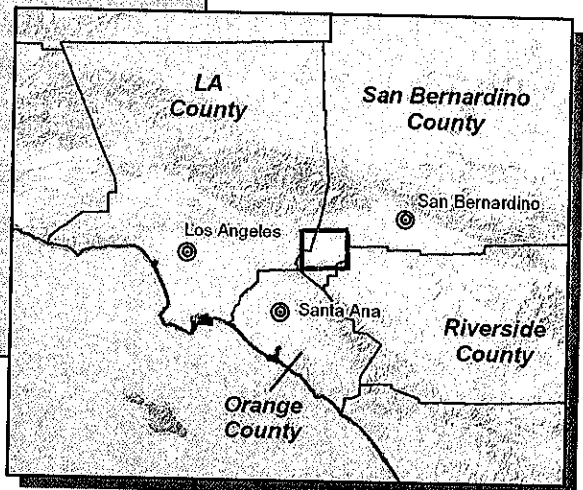
Results of InSAR Analysis

+15
-15
Relative Change in Land Surface Altitude
Jan 1996 - Apr 2000
(centimeters)

-12
Subsidence Contour
(centimeters)

Other Features

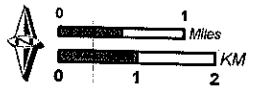
- Chino-I Desalter Well
- ~ Ground Fissure (early 1990s)
- Unconsolidated Sediments
- Sedimentary Bedrock



InSAR Analysis of Subsidence
1996 to 2000

Figure 2-9


MZ-1 Summary Report
September 2005



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3. ONGOING AND RECOMMENDED WORK

This section describes:

- the ongoing work of the IMP, which includes the continued monitoring of the aquifer system and land surface deformation and the development of analytical and numerical models of groundwater flow and aquifer-system deformation.
- the work that is currently being implemented that was not initially part of the IMP, but has been recommended by MZ-1 Technical Committee and/or Watermaster based on data obtained during the IMP period. This work includes the expanded aquifer-system monitoring in the central area of MZ-1, and the monitoring of horizontal ground surface deformation along Schaefer Avenue.

Continued Monitoring

Aquifer-System Monitoring. Aquifer-system monitoring efforts will continue for the duration of the IMP. The MZ-1 Technical Committee will likely recommend that the aquifer-system monitoring efforts continue, albeit at a reduced scope, as part of the long-term management plan. Electronic data from the Ayala Park Extensometer facility and from water level recording transducers in surrounding wells will be collected and entered into the MZ-1 database once every two months. The purpose of this continued monitoring effort is to (1) continually evaluate the effectiveness of the long-term plan, and (2) verify the accuracy of the groundwater flow and subsidence models that are being used as management tools.

InSAR. The MZ-1 Technical Committee is recommending that on-going InSAR monitoring of land surface deformation be conducted on a semi-annual interval (spring and fall data acquisition and interferometric analysis) for the next two years. This analysis will (1) reveal seasonal and annual ground surface displacement across the entire MZ-1 area, and (2) be compared to ground-level survey data collected at the same interval (see Section 5.4.2 below) to help determine a long-term strategy to monitor ground surface deformation.

Ground Level Surveying. The MZ-1 Technical Committee is recommending that the entire network be surveyed twice per year for the next two years (during the spring and fall of each year). The ground level survey data will be compared against the InSAR data (see above) to help determine a long-term strategy to monitor ground surface deformation.

Development of Analytical and Numerical Models

The objectives of aquifer-system modeling in MZ-1 are:

- To evaluate fluid withdrawal as the mechanism of historical land subsidence and fissuring
- To predict the effects of potential basin management practices on groundwater levels and land subsidence and fissuring (forecasting tool)

In other words, if a model can be constructed that simulates past drawdown and associated land subsidence, then the model represents an additional line of evidence that fluid withdrawal was the mechanism of historical land subsidence. In addition, the model can be used to predict future drawdown and associated land subsidence that would result from potential basin management practices.

Three distinct modeling efforts will take place in sequence:

1. *Inverse analytical modeling.* This type of modeling will use groundwater level and production data collected as part of the aquifer-system stress testing (pumping tests) that were conducted in 2003 and



2004. The objectives are to determine the hydraulic and mechanical parameters of the aquifer-system and reveal XY-anisotropy. The results will be used in subsequent numerical modeling efforts.

2. *One-dimensional compaction modeling.* This type of modeling will use groundwater level and aquifer-system deformation data collected at the Ayala Park Piezometer/Extensometer Facility, as well as historical water level and subsidence data collected near Ayala Park. One objective is to determine the aquitard properties in the vicinity of Ayala Park. Areal extrapolation of aquitard properties will be based on geology and InSAR data, and the results will be used in the three-dimensional numerical modeling efforts (see Section 3). Another objective is to predict aquifer-system deformation due to predicted water level changes that may occur at Ayala Park in the future due to nearby pumping.
3. *Three-dimensional groundwater flow and subsidence modeling.* This type of modeling will use groundwater level and production data at all wells in the area and historical land subsidence data from ground level surveys and InSAR. Again, this model will attempt to match historical water level and subsidence data and, if successful, will serve as a forecasting tool for MZ-1 managers.

It is desirable that the calibration period for future groundwater flow and subsidence modeling begins before significant drawdown in MZ-1 (~1940). The comprehensive set of subsidence data in this region begins in 1987. If subsidence data exists prior to 1987, then it needs to be collected, evaluated, and linked to the post-1987 survey data if it is to be used in model calibration. Associated Engineers is currently investigating the quantity and quality of pre-1987 subsidence data in MZ-1, and will deliver a report containing these data in October 2005.

Expanded Monitoring

One of the key discoveries of the IMP has been the groundwater barrier located beneath the historic fissure zone. However, the northern and southern extent of this barrier is unknown. The MZ-1 Technical Committee is contemplating the expansion of the aquifer-system monitoring network to the north and south of its current extent to better characterize the location and effectiveness of the barrier. Further aquifer-system testing (i.e. pumping test) may be necessary as part of this effort.

The horizontal surveys will also be extended to the north over this two year period to include the benchmarks along Schaefer Avenue. The next survey of the entire monument network is planned for October 2005.



4. DEVELOPMENT OF THE LONG-TERM MANAGEMENT PLAN FOR MZ-1

Recall that the objective of the long-term management plan is to minimize or abate permanent land subsidence and ground fissuring in MZ-1. The modeling efforts described above will be critical to the development of the long-term plan, and the continual evaluation of plan in the future.

A workshop was held May 25, 2005 to update the Special Referee on IMP progress and development of the long-term management plan for MZ-1. The OBMP implementation plan called for the development of the long-term plan by June 2005. Because the modeling efforts were just begun in the summer of 2005, the Special Referee was notified before and during the workshop of the impending delay in the development of the long-term plan.

Subsequent to the workshop, the Special Referee issued a report to the Court (Appendix A). In the report, the Special Referee:

- indicated that the IMP progress and current activities are sufficient to warrant a delay in the development of a long-term plan
- indicated that it was incumbent upon Watermaster to request that the Court extend the period for completion of the long-term plan, and that Watermaster file with the Court a motion for an order to set a new schedule for the completion of the long-term plan
- requested that Watermaster produce a MZ-1 Summary Report (this report) that describes the IMP results and conclusions to date, and addresses outstanding issues such as other potential subsidence mechanisms and historical subsidence that pre-dates the 1990s
- requested that Watermaster provide "guidance criteria" to the MZ-1 producers in an effort to minimize the potential for future subsidence and fissuring until the completion of the long-term plan

Guidance Criteria to Minimize Subsidence and Fissuring

In response, Watermaster produced this summary report, and drafted a set of guidance criteria for MZ-1 producers. Again, the purpose of the guidance criteria is to minimize the risk of permanent subsidence and ground fissuring while the long-term plan is being developed. The guidance criteria are listed in Table 4-1 and below:

1. Table 4-2 lists the existing wells (hereafter the Managed Wells) and their owners (hereafter the Parties) that are the subject of these Guidance Criteria.
2. Figure 4-1 shows the area addressed by these Guidance Criteria (hereafter the Area of Subsidence Management). Within the boundaries of this area, both existing and newly-constructed wells are subject to being classified as Managed Wells. This is based upon the observed and/or predicted effects of pumping on groundwater levels and aquifer-system deformation. Initial Managed Well designations for wells that pumped during the IMP were based on effects measured at the Ayala Park Piezometer/Extensometer Facility. Additional Managed Well designations were made based on analysis of well construction and geology.
3. The Guidance Level is a specified depth to water measured in Watermaster's PA-7 piezometer at Ayala Park. It is defined as the threshold water level at the onset of inelastic compaction of the aquifer system as recorded by the extensometer, minus 5 feet. The 5-foot reduction is meant to be a safety factor to ensure that inelastic compaction does not occur. The Guidance Level is established by Watermaster based on the periodic review of monitoring data collected by Watermaster. The initial Guidance Level is 245 feet below the top of the PA-7 well casing.



4. If the water level in PA-7 falls below the Guidance Level, Watermaster recommends that the Parties curtail their production from designated Managed Wells as required to maintain the water level in PA-7 above the Guidance Level.
5. Watermaster will provide the Parties with real-time water level data from PA-7.
6. The Parties are requested to maintain and provide to Watermaster accurate records of the operation of the Managed Wells, including production rates and on-off dates and times. The Parties are requested to promptly notify Watermaster of all operational changes made to maintain the water level in PA-7 above the Guidance Level.
7. Watermaster recommends that the Parties allow Watermaster to continue monitoring piezometric levels at their wells.
8. Watermaster will evaluate the data collected as part of the MZ-1 Monitoring Program at the conclusion of each fiscal year (June 30) and determine if modifications, additions, and/or deletions to the Guidance Criteria are necessary. These changes to the Guidance Criteria could include (1) additions or deletions to the list of Managed Wells, (2) re-delineation of the Area of Subsidence Management, (3) raising or lowering of the Guidance Level, or (4) additions and/or deletions to the Guidance Criteria (including the need to have periods of water level recovery).
9. Watermaster cautions that some subsidence and fissuring may occur in the future even if these Guidance Criteria are followed. Watermaster makes no warranties that faithful adherence to these Guidance Criteria will eliminate subsidence or fissuring.

Development and Schedule of the Long-Term Plan

In a sense, the guidance criteria listed above are a *first draft* of the long-term plan. Over the next nine months (October 2005 to June 2006), Watermaster will conduct its modeling exercises and coordinate a series of meetings with MZ-1 producers that will likely lead to revisions of the guidance criteria.

Of particular interest to the affected Parties is the sixth criterion (6) listed above, which limits the timing of production from the Managed Wells to July through September of each year. It may be that the Managed Wells can be pumped at reduced rates over periods longer than three months, and still not cause drawdown below 245 feet at the PA-7 piezometer or inelastic compaction within the aquifer system. Watermaster's groundwater flow and subsidence models will help to address these unknowns prior to pumping by predicting:

- the water level response at PA-7 due to various proposed pumping scenarios, and
- the aquifer-system compaction response due to the water level responses.

In June 2006, after the MZ-1 meetings and modeling exercises, Watermaster will release an expanded *second draft* of the guidance criteria, which will be defined as the official long-term plan for MZ-1. A key element of the long-term plan will be the verification of the model predictions and the protective nature of the guidance criteria as related to permanent land subsidence and ongoing fissuring. This verification will be accomplished through continued monitoring and reporting by Watermaster and revision of the guidance criteria when appropriate (see Criterion 11 above). In this sense, the long-term plan will be adaptive.

The guidance criteria and the long-term plan discussed above relate to the management of pumping-induced subsidence within south MZ-1 (the Area of Subsidence Management in the terminology of the



guidance criteria). Recall that central MZ-1 is currently experiencing measurable land subsidence, and is the focus of an expanded effort to monitor piezometric levels and land surface deformation. An adaptive long-term plan will accommodate the results and modified recommendations that will emerge from the expanded monitoring of central MZ-1.



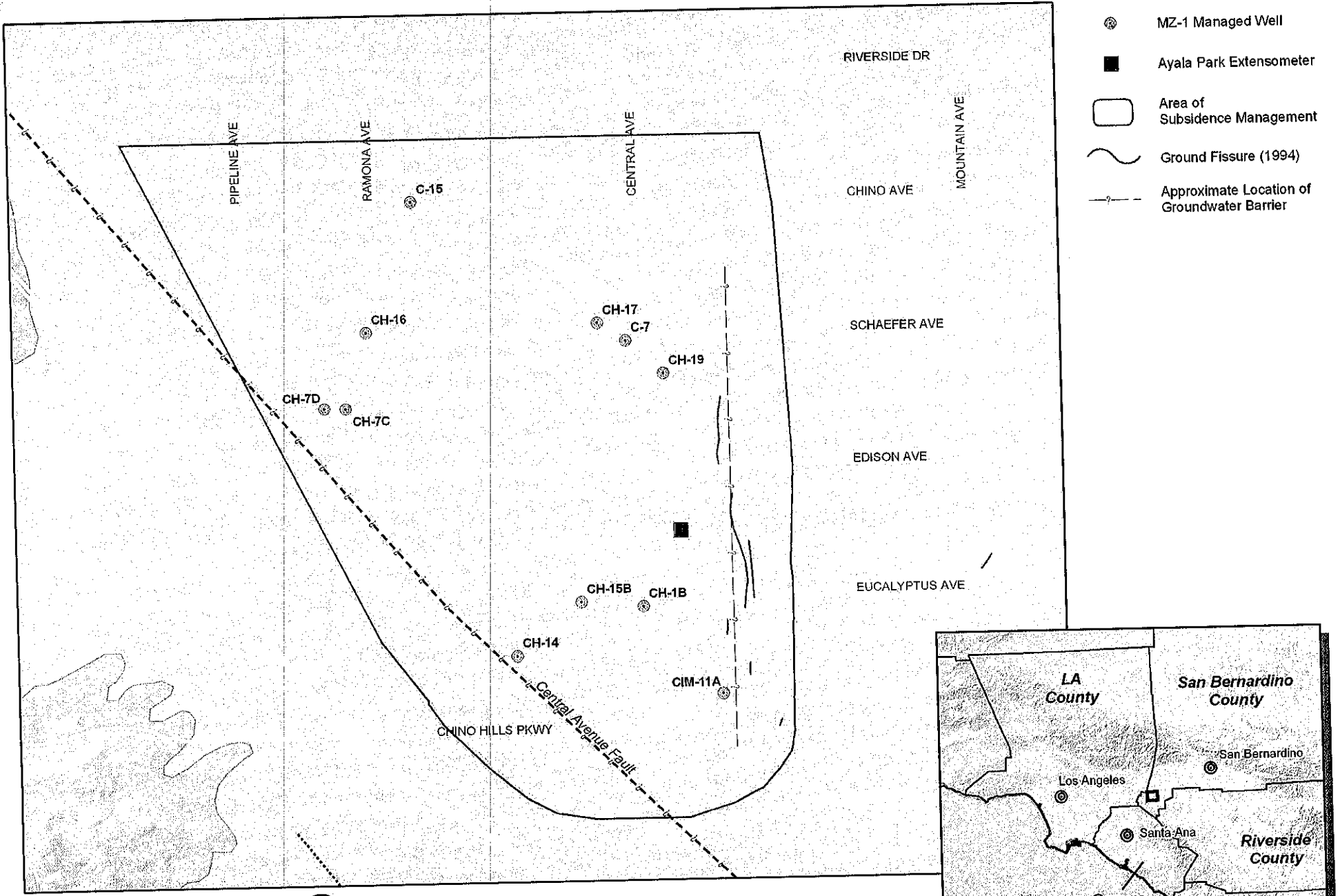
Table 4-1
Guidance Criteria for MZ-1 Producers

1. Table 4-2 lists the existing wells (hereafter the Managed Wells) and their owners (hereafter the Parties) that are the subject of these Guidance Criteria.
2. Figure 4-1 shows the area addressed by these Guidance Criteria (hereafter the Area of Subsidence Management). Within the boundaries of this area, both existing and newly-constructed wells are subject to being classified as Managed Wells. This is based upon the observed and/or predicted effects of pumping on groundwater levels and aquifer-system deformation. Initial Managed Well designations for wells that pumped during the IMP were based on effects measured at the Ayala Park Piezometer/Extensometer Facility. Additional Managed Well designations were made based on analysis of well construction and geology.
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9. Watermaster cautions that some subsidence and fissuring may occur in the future even if these Guidance Criteria are followed. Watermaster makes no warranties that faithful adherence to these Guidance Criteria will eliminate subsidence or fissuring.

**Table 4-2
MZ-1 Managed Wells**

CBWM_ID	Owner	Well Name	Status	Screened Interval ft-bgs	Capacity gpm
600487	Chino Hills	1B	Inactive	440-470, 490-610, 720-900, 940-1180	up to 1200
600687	Chino Hills	7C	Inactive	550-950	--
600498	Chino Hills	7D	Inactive	320-400, 410-450, 490-810, 850-930	400
600495	Chino Hills	14	Inactive	350-860	300-400
600488	Chino Hills	15B	Active	360-440, 480-900	1500
600489	Chino Hills	16	Inactive	430-940	800
600499	Chino Hills	17	Active	300-460, 500-980	700
600500	Chino Hills	19	Active	340-420, 460-760, 800-1000	1100-1500
3600461	Chino	7	Inactive	180-780	
600670	Chino	15	Inactive	270-400, 626-820	
3602461	CIM	11A	Active	135-148, 174-187, 240-283, 405-465, 484-512, 518-540	500-600

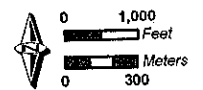
78



MZ-1 Managed Wells
MZ-1 Long-Term Monitoring Program

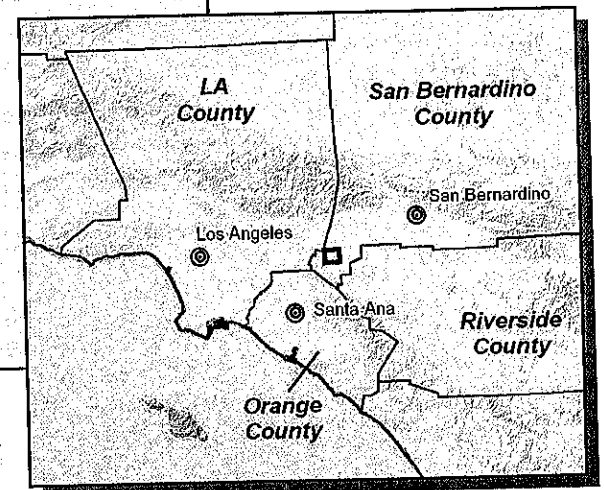
Figure 4-1

 MZ-1 Monitoring Program
Ground Level Monitoring



Author: AEM
Date: 20060226
File: Figure_4-1.mxd

Produced by:
 WILDERMUTH ENVIRONMENTAL INC.



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**APPENDIX A – SPECIAL REFEREE’S REPORT ON PROGRESS MADE ON IMPLEMENTATION OF
THE WATERMASTER INTERIM PLAN FOR MANAGEMENT OF SUBSIDENCE**

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4 SPECIAL REFEREE

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SUPERIOR COURT OF THE STATE OF CALIFORNIA
COUNTY OF SAN BERNARDINO, RANCHO CUCAMONGA DIVISION

CHINO BASIN MUNICIPAL WATER)
DISTRICT,)
Plaintiff,)
v.)
THE CITY OF CHINO,)
Defendants.)

CASE NO. RCV 51010
Judge: Honorable J. Michael Gunn
Date: TBD
Time:
Dept:

SPECIAL REFEREE'S REPORT ON PROGRESS MADE ON
IMPLEMENTATION OF THE WATERMASTER INTERIM PLAN
FOR MANAGEMENT OF SUBSIDENCE

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7
8 SUPERIOR COURT OF THE STATE OF CALIFORNIA
9 COUNTY OF SAN BERNARDINO, RANCHO CUCAMONGA DIVISION

10
11 CHINO BASIN MUNICIPAL WATER)
12 DISTRICT,)
13)
14 v.)
15 THE CITY OF CHINO,)
16)
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19)
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21)
22)
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25)
26)
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28)

Plaintiff,
Defendants.

CASE NO. RCV 51010
Judge: Honorable J. Michael Gunn
SPECIAL REFEREE'S REPORT ON
PROGRESS MADE ON IMPLEMEN-
TATION OF THE WATERMASTER
INTERIM PLAN FOR MANAGE-
MENT OF SUBSIDENCE
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Time:
Dept:

I. INTRODUCTION

A workshop was held May 25, 2005, as a follow-up to the workshop held August 29, 2002. The second workshop was originally scheduled to be held in 2003, pursuant to Court Order Concerning Watermaster's Interim Plan for Management of Subsidence, dated October 17, 2002 ("2002 Order"). The second workshop was postponed until substantial data collection and analysis had been completed.

The scope of the workshop was limited to presentation of technical data and analysis completed to date related to the Watermaster Interim Plan for Management of Subsidence ("Interim Plan"). The presentation was made by Mr. Malone of Wildermuth Environmental, Inc., Watermaster Engineering Consultant. Mr. Malone, Mr. Wildermuth, and Mr. Riley addressed questions posed

1 by the Special Referee, technical expert Joe Scalmanini, and several others. Consistent with use of
2 a workshop format, cross-examination was not allowed. A transcript of the workshop has been
3 prepared and will be filed with the Court by Watermaster.

4 II. 2002 COURT ORDER

5 In the 2002 Order, Judge Gunn directed Watermaster to:

- 6 (1) Implement the Interim Plan Monitoring Program for subsidence, including all work
7 related to piezometers, extensometers, ground-level monitoring, aquifer testing, and
8 other actions to study, analyze, and interpret subsidence and fissuring in MZ1 and to
9 determine causes in sufficient detail that they can be managed through a long-term
10 plan;
- 11 (2) Continue the MZ1 Technical Committee work and have the Technical Committee
12 serve in an advisory capacity to assist Watermaster in developing a long-term
13 subsidence management plan for MZ1;
- 14 (3) Develop a long-term management plan by fiscal year 2004/2005;
- 15 (4) Submit quarterly reports to the court on all interim and long-term efforts to address
16 MZ1 subsidence and fissuring problems, including documentation of participation,
17 forbearance, impacts, and other "noteworthy details that pertain to the goal of
18 forbearance to minimize subsidence and fissuring";
- 19 (5) Schedule a follow-up workshop for July 17, 2003; and
- 20 (6) File reports at least quarterly to apprise the court of any actions pending that could
21 cause the "jurisdiction issue" to resurface.

22 III. COMPLIANCE WITH 2002 COURT ORDER

23 A. Regular Reports by Watermaster

24 Watermaster has regularly reported to the court, through its status reports, on the progress
25 of all work related to Management Zone 1 ("MZ1") subsidence issues. Watermaster has also
26 reported that it is not aware of any pending legal actions which have raised issues concerning the
27 court's jurisdiction related to subsidence. The City of Chino ("Chino") has annually asked for
28 continuances of its Paragraph 15 Motion. The process has been that Chino requests continuance
after both Chino and the City of Chino Hills ("Chino Hills") have committed to forbear some
pumping. (Our files reflect that Chino requested a continuance to September 1, 2005, but we do not
have a copy of a court order approving that continuance.) Watermaster has reported that the MZ1
Technical Advisory Committee has been actively meeting.

////

1 **B. Pumping Forbearance Agreements**

2 Annual forbearance agreements have been entered into for the past three years by Chino and
3 Chino Hills. On April 28, 2005, Watermaster approved continuation of the forbearance agreements
4 for a fourth year. The fourth year of forbearance will be fiscal year 2005/2006.

5 **C. Court Order and Deadlines**

6 Two of the deadlines set forth in the 2002 Order have not been met. First, a long-term
7 management plan for MZ1 was to have been completed this fiscal year (by July 1, 2005). Second,
8 a follow-up Special Referee workshop was not held in July 2003, but, instead, was postponed in
9 order that a substantial body of work could be completed to study and assess the MZ1 issues.

10 **IV. INTERIM PLAN WORK**

11 **A. Technical Work Completed to Date**

12 The purpose of the second workshop was to hear a description of the work and study that has
13 been done since the MZ1 Interim Plan was begun, to ascertain whether any conclusions have been
14 reached, and to obtain a description of the activities that are being undertaken now and that remain
15 to be done. Mr. Malone's presentation on the technical work and analysis to date formed the bulk
16 of the workshop. He provided a very detailed description of the monitoring and other technical work
17 that has been undertaken. Ongoing efforts have included installation of piezometers and an
18 extensometer, installation of transducers to monitor water levels in a network of wells, and ground-
19 level and InSAR monitoring for subsidence. Mr. Malone reported several discoveries which he
20 characterized as significant, including discovery of a groundwater barrier at depth in a location
21 approximately coincident with the fissuring that has occurred, and that there are two very distinct
22 aquifer systems. (Reporter's Transcription ("RT") at pp. 44-47)

23 Mr. Malone also indicated that all of the potential causes of the subsidence and fissuring
24 which had been previously suggested had been reviewed, but that the Interim Plan work has focused
25 on the hypothesis that the subsidence and fissuring have been caused by subsurface fluid withdrawal:

26 We reviewed all these [other potential causes of subsidence], but what we zeroed in
27 on was the subsurface withdrawal as our hypothesis. That's what we identified as the
28 most likely cause of the subsidence that we had observed in the City of Chino . . . so
our hypothesis was that the groundwater production caused land subsidence and
fissuring in Chino Basin. . . We also noted that it was likely, or that we were

1 hypothesizing that the production from the confined aquifer system was the main
2 cause of this recent episode of subsidence and fissuring that was measured in the
3 early 1990's. So this is what we designed our monitoring program to test, whether
4 or not this hypothesis was correct.

5 (RT at pp. 32-33) There was no further discussion on the record regarding the nature of the review
6 that was done as to other potential causes of the subsidence and fissuring.

7 A primary focus of the technical work has been to determine at what point subsidence creates
8 inelastic compaction versus subsidence which is elastic and can recover. Mr. Malone described the
9 process to identify:

10 . . . the threshold where the deformation process transitions from elastic to inelastic.
11 By doing that, we'd be defining the usable volume of the storage reservoir, under
12 what range of water levels can we operate where we're not causing inelastic
13 compaction. And that would be a very key finding to any long-term management
14 plan that might develop out of this study.

15 (RT at pp. 43-44) The presentation included detailed descriptions of "stress-strain diagrams" which
16 reflect data on the elastic versus inelastic response of the system to pumping. Mr. Malone drew
17 attention to a "key point" that there appears to have been about two one-hundredths of a foot (0.02
18 ft.) of permanent compaction over the 2004 pumping season. (RT at pp. 58-59) He indicated that
19 the ". . . inelastic threshold was crossed at about 250 feet below ground surface during the latter part
20 of the pumping season." (RT at p. 60) Mr. Malone made it very clear that it is necessary to wait for
21 "fully recovered water levels" before drawing any final conclusions that the system transitions from
22 elastic to inelastic compaction when water levels are somewhere below 250 feet below ground
23 surface. (RT at p. 95)

24 In response to questions as to whether there are sufficient data available now to develop a
25 long-term plan, Mr. Malone responded that:

26 . . . When we operate in the forbearance agreement where we pump during the
27 pumping season, but we allow the system to recover during the wintertime months,
28 . . . we've demonstrated that we're operating generally in an elastic range. . . And so
29 to how far we can step out of that same pumping pattern and still operate within the
30 elastic range, we have not determined that yet. But the models hold the promise of
31 determining that.

32 (RT at p. 93)

33 Mr. Malone explained that the next step in the investigation is to create groundwater models

1 to "... simulate the groundwater production's effects on groundwater levels." (RT at p. 91) The
2 model will: "... help us provide that linkage between groundwater production and groundwater
3 levels that would provide a tool to evaluate any management plan that might come out of this." (RT
4 at p. 107)

5 In response to a question, Mr. Malone indicated that there are not plans to do further testing
6 in the southern part of MZ1:

7 We feel like if the stress-strain diagram goes to where it seems to be going, that
8 we've identified this threshold of preconsolidation stress that is the transition
9 between inelastic and elastic compaction. . . I don't think we have any further
10 questions that we're trying to answer in this southern part of Management Zone 1.
11 We're going to be developing the models that will help us provide that linkage
12 between groundwater production and groundwater levels. . .

11 (RT at p. 107)

12 B. Recommended Additional Technical Work

13 Mr. Malone recommended that technical work be continued in the southern part of MZ1 and
14 that certain technical work be started in the central MZ1 area to the north. For the southern MZ1
15 area, the recommendation is that monitoring continue (RT at pp. 97-99) and that some of the
16 dedicated piezometers be replaced (RT at pp. 103-104). In addition, numerical models would be
17 developed (a one-dimensional compaction model and a three-dimensional groundwater flow and
18 subsidence model). The three-dimensional model would link:

19 ... the areal and vertical distribution of pumpage to water level fluctuations and then
20 the ultimate deformation that occurs in the aquifer system. . . We've been working
21 mostly on this link between water level fluctuation and deformation. The model will,
22 then, now take us from that to include pumpage, how it affects water level
23 fluctuations, and then how the water level fluctuations affect deformation.

22 (RT at pp. 99-100)

23 Mr. Malone also discussed expanding the investigation of subsidence, initially via
24 monitoring, to the central region of MZ1, including the installation of water level transducers in
25 existing wells. (RT p. 107) Mr. Malone characterized as speculative the potential need to construct
26 a new monitoring facility or facilities in the central region, including a multi-piezometer and/or
27 extensometer. (RT at p. 102) He clarified that ground-level survey data, InSAR data, and water-
28 level data should be collected in the central MZ1 area before any conclusion would be reached on

1 the need for piezometers or an extensometer. (*Id.*) Expansion of the subsidence investigation into
2 the central region of MZ1 is prompted by the observation of some historical subsidence in the area,
3 confounded to some degree by the lack of any known local pumping in the immediate subsidence
4 area. (RT at pp. 76, 80, 83-84, 87)

5 C. Long-Term Plan Schedule

6 There was not extensive discussion at the workshop on either a long-term plan or a schedule
7 for completion of a plan. Mr. Malone indicated that InSAR surveys and ground surveys will be
8 conducted in both fall 2005 and spring 2006. (RT at p. 104) The modeling would be completed in
9 the spring of 2006, with a modeling report to follow that summer. (*Id.*) Mr. Wildermuth responded
10 to a question regarding scheduling by indicating that several more years of studies and model
11 development and analysis would be required, followed by 12 months to reach an agreement on a
12 long-term plan. (RT at p. 109) This timing is consistent with the discussion in the 2002 workshop.
13 At that workshop, in response to the question of how long it would take to start developing a long-
14 term plan given optimal agreement by all parties, Mr. Wildermuth stated that he thought it would
15 take three to five years (2002 Workshop Transcript at page 101.) Mr. Slater also clarified at the 2002
16 workshop that Mr. Wildermuth's three to five years were for the "data development side" and that
17 "the business deal probably follows soon thereon, and one would expect maybe twelve months to
18 wrap that piece up." (2002 Workshop Transcript at p. 103.)

19 V. RECOMMENDATION OF SPECIAL REFEREE

20 A. Preparation of a Summary Report on MZ1 Technical Work

21 A substantial body of technical work has been completed in the southern MZ1 area.
22 However, conclusions are still preliminary:

23 . . . With our stress-strain diagram . . . we're seeing that these head declines can
24 induce permanent compaction. But again this is a preliminary conclusion because
25 it is still pending fully recovered water levels. We're waiting for those water levels
to be fully recovered to see if any inelastic compaction did occur over the last
pumping season.

26 (RT at p. 95) When sufficient time has elapsed for water levels to have fully recovered, it is our
27 view that a summary report on all of the work presented at the workshop would be extremely helpful.
28 Even though no modeling has been completed, there appear to be sufficient data to conclude that

1 | there is a threshold depth to water that, if crossed, will likely lead to new inelastic compaction and
2 | subsidence and ground fissuring. That information should be made available to the parties in a
3 | summary report as soon as possible. Based on Mr. Malone's presentation, it should be feasible to
4 | prepare such a report by the middle of August. When the three-dimensional model is prepared, a
5 | modeling report will be written. In the meantime, there are important data and preliminary findings
6 | that can be made available very soon that will be of immediate use to the pumpers within MZ1.

7 | A further recommendation related to a summary report is that the summary report should also
8 | address the other potential causes of subsidence and fissuring that have been suggested in the past.
9 | If any of those items cannot be readily addressed, then the summary report should recommend how
10 | they will be addressed. While the detailed monitoring and testing has been substantial, they have
11 | not apparently addressed whether subsidence and fissuring might have been partially the result of
12 | mechanisms other than deep groundwater pumping. The continuing possibility that other
13 | mechanisms may also be responsible for subsidence is a potential impediment to development of the
14 | long-term plan.

15 | As part of this discussion, the summary report should discuss any information related to
16 | whether any significant subsidence predated the notable subsidence and fissuring since the early
17 | 1990's, and should describe the historical surveying investigation commissioned by Watermaster to
18 | address that issue. An important outstanding question is whether any pre-1990's subsidence that
19 | may have occurred correlates with, or can be attributed to, the large historical changes in
20 | groundwater levels that predated the Judgment.

21 | **B. Watermaster Issuance of Guidance Criteria.**

22 | Near the close of the workshop, there was some discussion of what would be included in a
23 | long-term plan, including possibly expanding the study area to include the central MZ1 region. (RT
24 | at pp. 123 *et seq.*) The concept of a long-term MZ1 management plan has been part of the
25 | Watermaster program since it was first articulated in 1999 in the Optimum Basin Management
26 | Program Phase 1 Report. A long-term management plan was to be formulated during the interim
27 | plan period, and would be based on investigations, monitoring programs and data assessment. It
28 | would be adaptive in nature. The workshop discussion noted that the technical work that has been

1 done and that will be done will form the basis for a long-term plan. Mr. Wildermuth indicated that:

2 . . . we haven't felt until very recently, last maybe six or eight months, that we were
3 at a point where we are getting close to coming up with conclusions from which we
4 could build a plan on, pull the parties together and talk about their deal making to
5 implement a plan.

6 (RT at p. 125) As discussed, above, however, development of a long-term plan itself does not appear
7 to be imminent.

8 In response to questions regarding the possibility of phasing the long-term plan, Mr.
9 Wildermuth discussed the option of bifurcating the ". . . southern and central portion, try to get the
10 southern portion going, and then based on the interests of the stakeholders, do something in the
11 central area." (RT at p. 125) Mr. Wildermuth also suggested that Watermaster's long-term plan
12 could range from being "guidance information" to something more aggressive. (RT at p. 108)

13 The concept of providing guidance criteria is a compelling one. It appears, based on the
14 presentation at the workshop, that Watermaster can very soon alert pumpers in the southern MZ1
15 area that there is a substantial risk that lowering water levels to below approximately 250 to 260 feet
16 below ground surface will result in new inelastic compaction and subsidence. This type of
17 information should formally be made available to the parties as soon as possible, presumably as soon
18 as a summary report on the MZ1 technical work is completed. The guidance criteria would be issued
19 by Watermaster in a timely fashion, to be followed by the long-term plan development which
20 necessarily will require a longer period to complete.

20 C. Long-Term Plan and Schedule

21 It is incumbent upon Watermaster now to request that the court extend the period for
22 completion of a long-term plan for MZ1. The overall testimony indicated that several more years
23 of technical and modeling work will be required, followed by approximately a year of negotiations
24 among the parties. The Watermaster should propose a schedule to the court which takes into account
25 the continuation of data collection and modeling work in the main MZ1 area as well as technical
26 work in the central MZ1 area. A date should be established for completion of a long-term plan.

27 Whether the long-term plan is ultimately characterized as a management plan is an issue for
28 the parties to address. Based on presentation and discussion at the workshop, it is clear that, at the

1 | very least, an ongoing monitoring program by Watermaster will be required so that the parties have
2 | full and sufficient information available to them to inform their decisions.

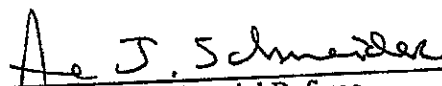
3 | **D. Expanded Monitoring in MZ1**

4 | The presentation at the workshop, while focused on monitoring and studies in the southern
5 | MZ1 area, indicated that some monitoring work can and should be done in the central MZ1 area,
6 | including installation of transducers in wells, and ground and InSar ground-level monitoring. More
7 | costly and complex efforts involving piezometers and an extensometer would logically be held in
8 | abeyance pending assessment of data collected. A phased long-term plan could include provision
9 | for central MZ1 monitoring work and studies, with future efforts considered and scheduled on an
10 | as-needed basis, while more definitive conclusions are drawn in the southern MZ1 area based on the
11 | extensive work already focused in that area. As noted above, the central MZ1 area appears to
12 | warrant additional investigation in light of detectable subsidence in spite of no significant pumping
13 | stress in the immediate subsidence area. Such additional investigation would also appear important
14 | in light of the overall concept of basin reoperation and hydraulic control, which could result in
15 | locally lower groundwater levels in parts of the basin.

16 | **VI. CONCLUSION**

17 | The workshop was very productive. Mr. Malone's presentation was excellent. The
18 | Watermaster does not require court approval to direct the preparation of a summary report on the
19 | MZ1 technical work or to issue guidance criteria. The Watermaster, however, should file with the
20 | court a motion for an order to set a schedule for the completion of a long-term plan.

21 | Dated: June 16, 2005

22 | 
23 | Anne J. Schneider, Special Referee

CHINO BASIN WATERMASTER
Case No. RCV 51010
Chino Basin Municipal Water District v. The City of Chino

PROOF OF SERVICE

I declare that:

I am employed in the County of San Bernardino, California. I am over the age of 18 years and not a party to the within action. My business address is Chino Basin Watermaster, 9641 San Bernardino Road, Rancho Cucamonga, California 91730; telephone (909) 484-3888.

On June 21, 2005 I served the following:

Special Referee's Report on Progress Mad on Implementation of the Watermaster Interim Plan for Management of Subsidence

BY MAIL: in said cause, by placing a true copy thereof enclosed with postage thereon fully prepaid, for delivery by United States Postal Service mail at Rancho Cucamonga, California, addresses as follows:

See attached service list:
Mailing List 1

BY PERSONAL SERVICE: I caused such envelope to be delivered by hand to the addressee.

BY FACSIMILE: I transmitted said document by fax transmission from (909) 484-3890 to the fax number(s) indicated. The transmission was reported as complete on the transmission report, which was properly issued by the transmitting fax machine.

BY ELECTRONIC MAIL: I transmitted notice of availability of electronic documents by electronic transmission to the email address indicated. The transmission was reported as complete on the transmission report, which was properly issued by the transmitting electronic mail device.

I declare under penalty of perjury under the laws of the State of California that the above is true and correct.

Executed on June 21, 2005 in Rancho Cucamonga, California.


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CHINO BASIN WATERMASTER

II. BUSINESS ITEMS

C. IEUA GRANT FUNDING AGREEMENT





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KENNETH R. MANNING
Chief Executive Officer

STAFF REPORT

DATE: March 9, 2006
March 21, 2006
March 23, 2006

TO: Committee Members
Watermaster Board Members

SUBJECT: DWR Grant Funding Cost Sharing Agreement with IEUA

SUMMARY

Issue – In January 2005, IEUA received a \$15,500,000 grant from DWR for use in funding IEUA's Chino Basin Conjunctive Use Expansion Program. IEUA has proposed using \$5,250,000 of this money to fund a second phase of improvements to the recharge basins in Chino Basin. It is proposed that Watermaster will pay one-half of the local cost share required by the DWR grant. Assuming total project cost of \$10,500,000, Watermaster's share will be \$2,625,000.

Recommendation – Staff recommends approval of the Cost Sharing Agreement

BACKGROUND

In January 2005, Inland Empire Utilities Agency ("IEUA") received a grant of \$15,500,000 from the Department of Water Resources ("DWR") through the Proposition 13 Groundwater Recharge and Storage Programs. (Contract E90020.) The purpose of this grant was to fund IEUA's Chino Basin Conjunctive Use Expansion Program. The total project cost for this program was estimated to be \$39,026,300, with the local share being funded through IEUA's Water and Sewer Rate revenue and a combination of various State and Federal funds.

In 2002, a separate grant of Proposition 13 money was given to IEUA that was used to fund implementation of Watermaster's Recharge Master Plan. That project involved a total cost of approximately \$40 million. One half of this project cost was paid through grant funds, and the one-half local share was split evenly between IEUA and Watermaster.

Through the initial implementation of the Recharge Master Plan, most, but not all, of the identified recharge basin improvements were constructed. The available funding fell short of being able to fund all of the identified

improvements. In addition, additional improvement work was identified as necessary over the course of initial project construction and over the past year of use of the facilities.

Because of this, IEUA has proposed using a portion of the most recent grant funding to perform further improvement work on the recharge basins. IEUA has proposed using \$5,250,000 of grant money for this purpose, using the same cost sharing arrangement that was used for the grant money that was used for initial implementation of the Recharge Master Plan.

Summary of Agreement

Staff from IEUA and Watermaster met on January 16, 2006 and developed a list of additional projects that would be beneficial to implement. This list was distributed as a handout at the February 2006 Pool meetings, and at the February Advisory Committee and Board meetings. A final version of this list will be attached to the cost sharing agreement as Exhibit "A".

The Agreement calls for a simple split of the local share costs of construction of the projects listed in Exhibit A. Since the amount of the grant funding is fixed at \$5,250,000, any variation in costs from the amount estimated in Exhibit A, will change the amount of the local share of funding. Under the Agreement, Watermaster must approve any changes to either the projects to be constructed, or any changes that change the estimated cost of construction of the projects. So long as the changes do not amount to an increase of 10% of the cost of the project to Watermaster, the Watermaster CEO may approve the change. After the 10% point is reached, any further changes must be approved through the Watermaster process.

The Agreement spreads Watermaster's portion of the costs over a three year period. Watermaster will pay IEUA \$1,000,000 at the end of the first year, \$1,000,000 at the end of the second year, and whatever remains of its portion of the local share of costs at the end of the third year. If the total cost of the project does not vary from the amount estimated, then Watermaster's share in the third year will be \$625,000.

Since this financial relationship is not a loan, there is no interest or financing cost to Watermaster.

**AGREEMENT REGARDING RECHARGE FACILITIES IMPROVEMENTS
MATCHING FUNDS COST SHARING AGREEMENT**

**between
INLAND EMPIRE UTILITIES AGENCY
and
CHINO BASIN WATERMASTER**

March, 2006

WHEREAS, the Program Element 2 of the Optimum Basin Management Program calls for the implementation of the Recharge Master Plan to enhance the physical recharge capacity in the Chino Basin.

WHEREAS, grant funding in combination with funding from Inland Empire Utilities Agency ("IEUA") and the Chino Basin Watermaster ("Watermaster") financed the first phase of implementation of the Recharge Master Plan.

WHEREAS, the local share of the funding for the first phase of implementation of the Recharge Master Plan was shared equally between IEUA and Watermaster.

WHEREAS, additional funding has been obtained by IEUA from the Department of Water Resources ("DWR") that can be used to implement further portions of the Recharge Master Plan.

WHEREAS, IEUA is willing to make this grant funding available to Watermaster under the same cost sharing arrangement that was utilized for the local share of implementation of the first phase of the Recharge Master Plan.

~~NOW THEREFORE IT IS AGREED THAT:~~

1. IEUA will make \$5,250,000 of DWR grant money ("Grant Money") available for project construction costs.
2. The Grant Money shall be used to construct projects as described in Exhibit "A" to this agreement.
3. The total cost of all projects proposed for construction under Exhibit "A" is anticipated to be approximately \$10,500,000. Any changes to the proposed list of projects or to the anticipated total cost of all projects shall require agreement by both IEUA and Watermaster.
4. Watermaster's share of the total cost of the projects proposed for construction on Exhibit "A" shall be one half of the total cost that is not paid with the Grant Money. For example, if the total cost is \$10,500,000, then \$5,250,000 of that total will be paid with the Grant Money, and Watermaster's share of the remaining cost will be \$2,625,000.

5. Watermaster shall reimburse IEUA for Watermaster's share of the total cost over a period of three years according to the following schedule:

- A. End of FY 2005-2006: \$ 1,000,000
- B. End of FY 2006-2007 \$ 1,000,000
- C. End of FY 2007-2008 Remainder of Watermaster share.

Reimbursements by Watermaster under this schedule shall be paid by the 31st of January following the end of the fiscal year.

6. So long as changes to the proposed list of projects or to the cost of such projects do not cause Watermaster's share of the total costs to increase by a cumulative total of 10%, then approval of such changes may be made in writing by the Watermaster CEO. If Watermaster's share of the total costs increases by more than 10%, then any further changes shall require approval by the Watermaster Board after consideration by the Pools and the Advisory Committee.

7. This agreement shall be specifically enforceable in the Court maintaining continuing jurisdiction over the case *Chino Basin Municipal Water District v. City of Chino*, San Bernardino Superior Court Case No. RCV 51010. In any dispute under this agreement, each party shall bear its own legal costs and expenses.

Signed:

For Chino Basin Watermaster

For Inland Empire Utilities Agency

Exhibit "A"

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**RECHARGE FACILITIES IMPROVEMENTS - PROPOSED GRANT FUNDED PROJECTS
 BASED ON IEUA/CBWM EQUAL SPLIT OF MATCHING FUNDS TO DWR \$5,280,000 GRANT
 For discussion purposes, developed from direction at Jan 16, 2006 meeting between IEUA and CBWM**

DWR GRANT PHASE 2A PROJECTS				
Monitoring Wells, Lysimeters, and Recycled Water Connections				
Total Grant Participation	(Grantee/Grantor/Total)		\$ 24,456	\$ 1,530,544
				\$ 1,555,000
Facility	Description	Status	Completion Schedule	Estimated Cost
Banana	Lysimeter Cluster	Completed		\$ 50,000
Hickory	Lysimeter Cluster, two sets	Completed		\$ 100,000
Banana-Hickory	Monitoring Well	Completed		\$ 180,000
Turner 1	Monitoring Well	Completed		\$ 180,000
Turner 1	Lysimeter Cluster	Completed		\$ 50,000
Turner 4	Monitoring Well	Completed		\$ 180,000
Turner 4	Lysimeter Cluster	Completed		\$ 50,000
RP3	Monitoring Well	Pending	Summer 2006	\$ 180,000
RP3	Lysimeter Cluster	Pending	Spring 2007	\$ 50,000
Declez	Monitoring Well	Pending	Summer 2006	\$ 180,000
Declez	Lysimeter Cluster	Pending	Spring 2007	\$ 50,000
Ely	Lysimeter Cluster (Replacement)	Pending	Spring 2007	\$ 50,000
Eighth	Lysimeter Cluster	Pending	Spring 2007	\$ 50,000
Eighth	Monitoring Well	Pending	Summer 2006	\$ 180,000
All Sites	Completion - Data Report - Asbuilts	Pending	Fall 2007/2007	\$ 25,000
			Subtotal	\$ 1,555,000

DWR GRANT - PHASE 2B					
SCADA Improvements (Prioritized List Developed by AC, BK, GT)					
Total Grant Participation	(Grantee/Grantor/Total)		\$ 487,353	\$ 382,647	\$ 870,000
Rank	Facility	Description	Status	Completion Schedule	Estimated Cost
1a	San Sevaine 5	Add level transmitter, mechanical actuator, and SCADA control to outlet gate	Pending	Fall 2007	\$ 125,000
1b	San Sevaine 1 & 2	Add level transmitter, mechanical actuator, and SCADA control to interbasin gate	Pending	Fall 2007	\$ 125,000
2a	Montclair 1	Add level transmitter to wet well and report flow rate per flume curve	Pending	Fall 2006	\$ 20,000
2b	Montclair 1	Add mechanical actuator and SCADA control inlet gate	Pending	Fall 2006	\$ 30,000
3	Various	DCS programming, security package, and bandwidth expansion	Pending	Fall 2007	\$ 150,000
4	Lower Day 3	Add mechanical actuator and SCADA control to outlet gate	Pending	Fall 2006	\$ 50,000
5	Upland	Add a level transmitter to basin	Pending	Fall 2006	\$ 20,000
6	Brooks	Add mechanical actuator and SCADA control to inlet gate on West State Street Storm Drain	Pending	Fall 2007	\$ 70,000
7	Turner 1 & 2	Add level transmitter to Turner 2 and mechanical actuator and SCADA control to interbasin gate	Pending	Fall 2007	\$ 70,000
8	RP3	Add level transmitters, mechanical actuator, and SCADA control to two diversion channel gates	Pending	Fall 2007	\$ 70,000
9	Montclair 1 & 2	Add mechanical actuator and SCADA control to interbasin gate	Pending	Fall 2007	\$ 70,000
10	8th Street N & S	Add mechanical actuator and SCADA control to interbasin gate	Pending	Fall 2007	\$ 70,000
				Subtotal	\$ 870,000

DWR GRANT - PHASE 2C				
NEW MWD TURNOUT/8TH STREET BASIN PIPELINE				
Total Grant Participation	(Grantee/Grantor/Total)		\$ 800,412	\$ 699,588
				\$ 1,500,000
Facility	Description	Status	Completion Schedule	Estimated Cost
New MWD Turnout	Add a new turnout to Rialto Feeder for 8th Str Basin (and Ely Basins), add short pipeline to route water to storm drain feeding West Cucamonga Channel, add GWR SCADA Controlled Valve and metering.	Discussing with MWD and RFP preparation	Fall 2007	\$ 1,500,000

DWR GRANT - PHASE 2D ALTERNATE PROJECTS					
Total Grant Participation		(Grantee/Grantor/Total) \$ 3,967,779 \$ 2,160,618 \$ 6,128,397			
MWD TURNOUT/VICTORIA BASIN PIPELINE					
Facility	Description	Status	Completion Schedule	Estimated Cost	
New MWD Turnout	Add a new turnout to Etiwanda Intertie for Victoria Basin (and possible other new basin), add pipeline to route water to basin(s), add GWR SCADA Controlled Valve and metering.	Discussing with MWD and RFP preparation	Fall 2007	\$ 2,000,000	
BERM HEIGHTENING AND HARDENING					
Rank	Facility	Description	Feasibility Study Completed, preparing scope for RPF	Fall 2006 to Fall 2007	\$
1	Hickory	Conservation berm harden	Design hardened wide spill over point for all basins and	Fall 2006	\$ 600,000
2	Ely	Outlet berms to Basins 1 and 2 harden and heighten	heightening of rest of berm. Build those berm improvements for allowable budget	Fall 2006	\$ 300,000
3	Eighth	Internal Berm Harden		Fall 2006	\$ 300,000
4	Declez	Internal Berm Harden		Fall 2007	\$ 600,000
5	Jurupa	Conservation Berm Harden (soft berm not yet constructed)		Fall 2007	\$ 600,000
6	San Sevaine	Conservation Berm Harden		Not a part	\$ 600,000
7	Victoria	Internal Berm Harden		Not a part	\$ 600,000
8	Lower Day	Internal Berm Harden		Not a part	\$ 600,000
9	Etiwanda SC	Outlet Berms Harden (basin not yet constructed)		Not a part	\$ 600,000
MONTCLAIR 2 AND 3 INLET					
Facility	Description	Preparing scope for RPF	Fall 2007	\$	
San Antonio Ch	In San Antonio Channel, build a new inlet (drop or rubber dam)			750,000	
Montclair 2	Build inlet pipe and vault with gates and flowmeter, inlet to basin, add inlet controls, gates and flow meter to GWR SCADA				
Montclair 3	Build a transfer pipe under City street and inlet to basin				
BASIN CLEANING VEHICLE DEVELOPMENT					
Various Develop Hood Device and Clarifier		Development	Fall 2007	\$ 750,000	
Other Misc. DWR Grant funding for Phase 2					
2A-2C Construction Contingency		\$ -	\$ 502,203	\$ 502,203	
2A-2C Land Costs		\$ -	\$ 4,400	\$ 4,400	
Total of All Projects		\$ 5,280,000	\$ 5,280,000	\$ 10,560,000	



CHINO BASIN WATERMASTER

II. BUSINESS ITEMS

D. ALLOCATION OF VOLUME VOTE





CHINO BASIN WATERMASTER

9641 San Bernardino Road, Rancho Cucamonga, Ca 91730
Tel: 909.484.3888 Fax: 909.484.3890 www.cbwm.org

KENNETH R. MANNING
Chief Executive Officer

STAFF REPORT

DATE: March 9, 2006

TO: Appropriative Pool Committee Members

SUBJECT: Allocation of Volume Vote

RECOMMENDATION: None

BACKGROUND

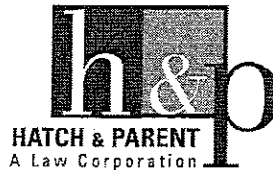
Following the Appropriative Pool meeting on February 9, 2006, staff was asked to compare various approaches to calculating the Appropriative Pool's allocation of volume votes.

The following documents include a summary page of the various approaches compared, with attached pages detailing the calculations for each approach.

The first column of the summary page allocates volume vote based on total dollars paid to Watermaster. The second column of the summary page allocates volume vote based on total dollars paid to Watermaster, less the total cost of replacement water charged by Watermaster. The third column allocates volume vote based on the amount of production by each appropriator along with their share of operating safe yield.

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21 East Carrillo Street
Santa Barbara, CA 93101
Telephone: (805) 963-7000
Fax: (805) 965-4333



Michael T. Fife
(805) 882-1453
MFife@HatchParent.com

MEMORANDUM

PRIVILEGED AND CONFIDENTIAL
Attorney-Client Privilege
(Evid. Code, § 950 et seq.)

TO: Ken Manning
FROM: Michael T. Fife
DATE: February 8, 2006
SUBJECT: Volume Voting

Volume vote allocations for Appropriative Pool members are calculated based on a formula that accounts for initial share of Operating Safe Yield, and the amount of assessments that are paid to Watermaster in a given year. This is a feature of the Appropriative Pool Pooling Plan which is Exhibit "H" to the Judgment. According to the Pooling Plan:

*"The total voting power on the Pool Committee shall be 1,000 votes. Of these, 500 votes shall be allocated in proportion to decreed percentage shares in Operating Safe Yield. The remaining 500 votes shall be allocated proportionally on the basis of assessments paid to Watermaster during the preceding year."
(Judgment, Exhibit "H", paragraph 3.)*

Currently, Watermaster includes payments made to Watermaster for replenishment water to account for over-production as a component of "assessments paid to Watermaster" when calculating voting power..

Issue:

Does the current manner of calculating volume votes inappropriately penalize parties who reduce their replenishment assessments through the purchase of water from other parties, or who use water from their storage accounts?

After this issue was raised at the November Pool meetings, Watermaster informally solicited feedback from the parties regarding potential approaches to the issue. These suggestions are listed below and are presented here for the purpose of facilitating discussion of the issue by the Pool. Watermaster does not endorse any of these approaches.

Sample Approaches:

1. Continue current practice.

The question of the allocation of the voting power of the Pool to the members of the Pool is ultimately a question for the members of the Pool to decide. The issue of a potential inequity in allocation was raised to Watermaster in November and so the issue has been agendized for discussion by the members of the Pool, but Watermaster has no position on the issue. It is possible that discussion of the issue will reveal that there is no issue.

2. Eliminate replenishment assessment costs from the current formula and instead use only Watermaster administrative and OBMP assessment values.

This approach would function as an interpretation of Exhibit "H" such that when it describes "assessments paid to Watermaster" such assessments are not intended to include costs associated with overproduction. Potentially, any policies associated with the allocation formula that relate to equities for producers who have high production by small allocations of water rights under the Judgment, would still be satisfied.

3. Calculate a "replenishment assessment cost" for all over-producers regardless of actual replenishment sources.

This method would act as a surrogate for the actual amount spent by an overproducer on replenishment water. This approach would preserve the structure of the existing method of allocation of voting power, and would narrowly address only the potential inequity caused by overproducers who satisfy their replenishment obligation in ways other than payment of replenishment assessments to Watermaster.

3. Revise the formula to include only initial share of Operating Safe Yield and actual production for the given fiscal year (rather than OSY and assessments paid).

This method appears very similar to number 2., above, to the extent that Watermaster Administrative Assessments and OBMP Assessments are tied to actual production.



APPROPRIATIVE POOL

ALLOCATION OF VOLUME VOTE

COMPARISON OF APPROACHES

Fiscal Year 2004-2005 (Based on 2003-2004 Production)

	As Approved Allocated Vote	Excluding Replenishment Water Allocated Vote	Production & OSY Allocated Vote
Arrowhead Mtn. Spring Water Co.*	0.51	0.09	0.19
Chino, City of	50.51	65.00	48.60
Chino Hills, City of	28.58	34.97	42.50
Cucamonga Valley Water District	49.59	61.79	70.77
Desalter Authority	0.00	0.00	35.96
Fontana Union Water Company	68.85	82.08	58.28
Fontana Water Company	159.84	61.02	87.60
Inland Empire Utilities Agency*	0.02	0.00	0.01
Jurupa Community Services District	68.73	72.67	74.94
Los Serranos Country Club	0.00	0.00	0.00
Marygold Mutual Water Company*	7.21	8.77	6.59
Metropolitan Water Dist of So Calif	0.00	0.00	0.00
Monte Vista Irrigation Co.*	8.44	11.27	6.17
Monte Vista Water District	113.88	102.02	101.24
Niagara Bottling Company, LLC*	4.86	0.85	1.77
Nicholson Trust*	0.04	0.04	0.03
Norco, City of*	3.17	3.53	3.19
Ontario, City of	220.98	230.65	223.20
Pomona, City of	129.23	162.95	156.91
Santa Ana River Water Company*	13.62	15.36	14.95
San Antonio Water Company*	17.50	21.50	13.78
San Bernardino County (Shooting Park)*	0.11	0.03	1.92
Southern California Water Company*	3.75	3.75	4.33
Upland, City of	33.42	41.21	32.55
West End Consolidated Water Company*	10.21	12.17	8.64
West Valley Water District*	6.95	8.28	5.88
	1,000.00	1,000.00	1,000.00

* Indicates Minor Rep

APPROPRIATIVE POOL

ALLOCATION OF VOLUME VOTE

AS APPROVED, INCLUDING REPLENISHMENT WATER

Fiscal Year 2004-2005 (Based on 2003-2004 Production)

	2004-2005 Assmts. Billed & Paid (1)	Assmt. Vote	O.S.Y. Vote	Allocated Vote
Arrowhead Mtn. Spring Water Co.*	\$14,897	0.51	0.00	0.51
Chino, City of	\$399,622	13.72	36.79	50.51
Chino Hills, City of	\$271,483	9.32	19.26	28.58
Cucamonga Valley Water District	\$483,358	16.59	33.00	49.59
Desalter Authority	\$5	0.00	0.00	0.00
Fontana Union Water Company	\$308,027	10.57	58.28	68.85
Fontana Water Company	\$4,655,832	159.83	0.01	159.84
Inland Empire Utilities Agency*	\$537	0.02	0.00	0.02
Jurupa Community Services District	\$1,454,731	49.94	18.79	68.73
Los Serranos Country Club	\$5	0.00	0.00	0.00
Marygold Mutual Water Company*	\$36,222	1.24	5.97	7.21
Metropolitan Water Dist of So Calif	\$25	0.00	0.00	0.00
Monte Vista Irrigation Co.*	\$66,042	2.27	6.17	8.44
Monte Vista Water District	\$2,035,933	69.89	43.99	113.88
Niagara Bottling Company, LLC*	\$141,438	4.86	0.00	4.86
Nicholson Trust*	\$190	0.01	0.03	0.04
Norco, City of*	\$38,696	1.33	1.84	3.17
Ontario, City of	\$3,416,024	117.27	103.71	220.98
Pomona, City of	\$785,429	26.96	102.27	129.23
Santa Ana River Water Company*	\$50,856	1.75	11.87	13.62
San Antonio Water Company*	\$109,479	3.76	13.74	17.50
San Bernardino County (Shooting Park)*	\$3,213	0.11	0.00	0.11
Southern California Water Company*	\$0	0.00	3.75	3.75
Upland, City of	\$215,937	7.41	26.01	33.42
West End Consolidated Water Company*	\$45,666	1.57	8.64	10.21
West Valley Water District*	\$31,054	1.07	5.88	6.95
* Indicates Minor Rep	\$14,564,701	500.00	500.00 500.00	1,000.00 1,000.00

(1) Assmts. Billed & Paid reflect actual assessment billed & paid.

Motion: _____ by _____, 2nd by _____, _____ vote _____

Date: _____

Quorum: 50% of voting power or 7 members to give affirmative action.

APPROPRIATIVE POOL

ALLOCATION OF VOLUME VOTE

NOT INCLUDING REPLENISHMENT WATER

Fiscal Year 2004-2005 (Based on 2003-2004 Production)

	2004-2005 Assmts. Billed & Paid (1)	Assmt. Vote	O.S.Y. Vote	Allocated Vote
Arrowhead Mtn. Spring Water Co.*	\$1,147	0.09	0.00	0.09
Chino, City of	\$364,973	28.20	36.79	65.00
Chino Hills, City of	\$203,361	15.71	19.26	34.97
Cucamonga Valley Water District	\$372,618	28.79	33.00	61.79
Desalter Authority	\$5	0.00	0.00	0.00
Fontana Union Water Company	\$308,027	23.80	58.28	82.08
Fontana Water Company	\$789,655	61.01	0.01	61.02
Inland Empire Utilities Agency*	\$59	0.00	0.00	0.00
Jurupa Community Services District	\$697,396	53.88	18.79	72.67
Los Serranos Country Club	\$5	0.00	0.00	0.00
Marygold Mutual Water Company*	\$36,222	2.80	5.97	8.77
Metropolitan Water Dist of So Calif	\$25	0.00	0.00	0.00
Monte Vista Irrigation Co.*	\$66,042	5.10	6.17	11.27
Monte Vista Water District	\$751,061	58.03	43.99	102.02
Niagara Bottling Company, LLC*	\$11,052	0.85	0.00	0.85
Nicholson Trust*	\$190	0.01	0.03	0.04
Norco, City of*	\$21,851	1.69	1.84	3.53
Ontario, City of	\$1,643,112	126.94	103.71	230.65
Pomona, City of	\$785,429	60.68	102.27	162.95
Santa Ana River Water Company*	\$45,218	3.49	11.87	15.36
San Antonio Water Company*	\$100,450	7.76	13.74	21.50
San Bernardino County (Shooting Park)*	\$372	0.03	0.00	0.03
Southern California Water Company*	\$0	0.00	3.75	3.75
Upland, City of	\$196,758	15.20	26.01	41.21
West End Consolidated Water Company*	\$45,666	3.53	8.64	12.17
West Valley Water District*	\$31,054	2.40	5.88	8.28
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*. Indicates Minor Rep	\$6,471,748	500.00	500.00	1,000.00
			499.99	1,000.00

(1) Assmts. Billed & Paid reflect actual assessment billed & paid.

Motion: _____ by _____, 2nd by _____, _____ vote

APPROPRIATIVE POOL

ALLOCATION OF VOLUME VOTE

OSY & PRODUCTION

Fiscal Year 2004-2005 (Based on 2003-2004 Production)

	2003-2004 Production	Assmt. Vote	O.S.Y. Vote	Allocated Vote
Arrowhead Mtn. Spring Water Co.*	55	0.19	0.00	0.19
Chino, City of	3,485	11.82	36.79	48.60
Chino Hills, City of	6,852	23.24	19.26	42.50
Cucamonga Valley Water District	11,139	37.77	33.00	70.77
Desalter Authority	10,605	35.96	0.00	35.96
Fontana Union Water Company	0	0.00	58.28	58.28
Fontana Water Company	25,828	87.59	0.01	87.60
Inland Empire Utilities Agency*	2	0.01	0.00	0.01
Jurupa Community Services District	16,556	56.15	18.79	74.94
Los Serranos Country Club	0	0.00	0.00	0.00
Marygold Mutual Water Company*	183	0.62	5.97	6.59
Metropolitan Water Dist of So Calif	1	0.00	0.00	0.00
Monte Vista Irrigation Co.*	0	0.00	6.17	6.17
Monte Vista Water District	16,881	57.25	43.99	101.24
Niagara Bottling Company, LLC*	522	1.77	0.00	1.77
Nicholson Trust*	0	0.00	0.03	0.03
Norco, City of*	397	1.35	1.84	3.19
Ontario, City of	35,234	119.49	103.71	223.20
Pomona, City of	16,111	54.64	102.27	156.91
Santa Ana River Water Company*	908	3.08	11.87	14.95
San Antonio Water Company*	13	0.04	13.74	13.78
San Bernardino County (Shooting Park)*	567	1.92	0.00	1.92
Southern California Water Company*	171	0.58	3.75	4.33
Upland, City of	1,929	6.54	26.01	32.55
West End Consolidated Water Company*	0	0.00	8.64	8.64
West Valley Water District*	0	0.00	5.88	5.88
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* Indicates Minor-Rep	147,439	500.00	500.00 500.01	1,000.00 1,000.00

(1) Assmts. Billed & Paid reflect actual assessment billed & paid.

Motion: _____ by _____, 2nd by _____, _____ vote



CHINO BASIN WATERMASTER

III. REPORTS AND UPDATES

- C. **CEO/STAFF REPORT**
 - 3. SAW DMS Data Coordination





Santa Ana Watershed Project Authority

COMMISSION FOR THE PROJECT AUTHORITY
EASTERN MUNICIPAL WATER DISTRICT
INLAND EMPIRE UTILITIES AGENCY
ORANGE COUNTY WATER DISTRICT
SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT
WESTERN MUNICIPAL WATER DISTRICT

GENERAL MANAGER
DANIEL B. COZAD

February 15, 2006

Danielle Maurizio
Chino Basin Water Master
9641 San Bernardino Road
Rancho Cucamonga, CA 91730

Subject: Data Collection & Coordination: Santa Ana Watershed Data Management System

Dear Santa Ana Watershed Stakeholder:

The Santa Ana Watershed Project Authority (SAWPA) received funding from the State Water Resources Control Board to develop Phase II of the Santa Ana Watershed Data Management System (SAW DMS). This system is currently under development to hold watershed-wide data needed for a variety of purposes. Phase II of the project will focus on supporting the following essential watershed activities:

- The triennial recalculation of Ambient Water Quality Standards for nitrogen and total dissolved solids, as required by the Santa Ana Watershed Water Quality Control Plan (or Basin Plan) as amended in 2004
- Preparation of the Annual Report of Santa Ana River Water Quality, Reaches 2, 4, & 5 as required by the Basin Plan,
- Water quality monitoring for Total Maximum Daily Load (TMDL) standards in the Middle Santa Ana River area (pathogens) and Lake Elsinore/Canyon Lake (nutrients) as required by the Basin Plan.

One of the goals of SAW DMS is to make data collection and management for these projects easier and less expensive in the future by developing standardized data collection methods and formats. It is our understanding, based on previous efforts for these projects, that your agency is a source of essential data for one or more of these projects.

We and our consultants will be contacting you shortly to request a meeting with you and/or the appropriate staff at your agency. At this meeting, we would like to:

- Interview you regarding what data you have and how you manage it
- Discuss collection of specific data associated with one or more of the three projects listed above
- Discuss means/methods/benefits of standardized data formats



- Discuss mechanisms to allow for and to streamline future data collection efforts supporting these long-term projects
- Listen to you so that we may better understand your perspective on potential benefits and potential issues
- Discuss the project's Technical Advisory Committee.

We appreciate your time and cooperation discussing these matters with us and highly value your inputs.

Sincerely



Greg Duecker
Information Systems & Technology Manager

Cc: RWQCB Support Letter



California Regional Water Quality Control Board

Santa Ana Region



Alan C. Lloyd, Ph.D.
Agency Secretary

3737 Main Street, Suite 500, Riverside, California 92501-3348
Phone (951) 782-4130 • FAX (951) 781-6288 • TDD (951) 782-3221
www.waterboards.ca.gov/santaana

Arnold Schwarzenegger
Governor

February 9, 2006

Dear Santa Ana Watershed Stakeholder:

The Santa Ana Regional Water Quality Control Board (RWQCB) staff requests your support of efforts being performed by the Santa Ana Watershed Project Authority (SAWPA) in developing the Santa Ana Watershed Data Management System (SAW DMS). This pilot program is key to making the collection and management of this data easier and less expensive in the future. This effort, funded by Proposition 13 funds by the State Water Resources Control Board, is focusing on developing new methods to collect and standardize water-related data for several very important projects throughout the Santa Ana Watershed. The SAW DMS will be used to support the following essential watershed activities:

- The triennial recalculation of nitrogen and total dissolved solids ambient groundwater quality, as required by the Santa Ana River Basin Water Quality Control Plan (or Basin Plan) as amended in 2004,
- Preparation of the Annual Report of Santa Ana River Water Quality, Reaches 2, 4, & 5 as required by the Basin Plan,
- Water quality monitoring for Total Maximum Daily Loads (TMDLs) in the Middle Santa Ana River area (pathogens) and Lake Elsinore/Canyon Lake (nutrients) as required by the Basin Plan.

Each of these projects is a high priority for the RWQCB and we appreciate SAWPA's efforts in the development of SAW DMS. This work is critical for accomplishing water quality improvements and preserving beneficial uses of water in the Santa Ana Watershed.

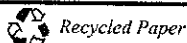
Your agency has been identified as a source of essential data valuable to one or more of these projects. SAWPA and their consultants will be contacting your agency in relation to the SAW DMS.

We encourage your agency's cooperation with SAWPA in providing data, in working to develop standard data exchange formats, and in coordinating future data collection activities. We believe communication and cooperation in the early stages of the project will ensure smoother, easier data exchange in the future and will create more reliable data and reduced costs.

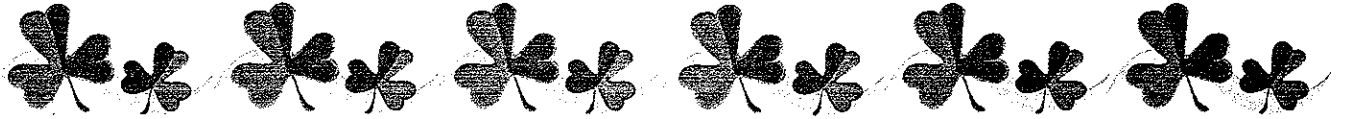
Sincerely,

for Gerard J. Thibeault
Executive Officer
Santa Ana Regional Water Quality Control Board

California Environmental Protection Agency



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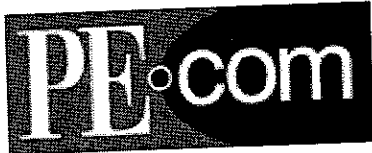


CHINO BASIN WATERMASTER

V. INFORMATION

I. Newspaper Articles





Water agency is no model of accord

OPPOSED: The governor visits today to tout a regional authority that disagrees with his plans.

08:39 AM PST on Friday, February 17, 2006

By **JIM MILLER / Sacramento Bureau**

The Inland agency held as the model for the regional approach envisioned in Gov. Schwarzenegger's \$29 billion waterworks plan has come out against a key part of the legislation.

Schwarzenegger is scheduled to visit Prado Dam near Corona today to praise the Santa Ana Watershed Project Authority and encourage other water agencies to take similar approach.

The authority, formed in the early 1970s, includes five agencies providing water and wastewater services to parts of Riverside, San Bernardino and Orange counties. Administration officials consider the authority a statewide template for tackling waterworks problems on a regional basis instead of each agency acting independently.

Earlier this week, however, the authority voiced its opposition to a major piece of Schwarzenegger's water plan -- a proposed monthly charge on every water user in the state that would raise an estimated \$5 billion for water projects over 10 years.

Inland officials complain that the charge would take an estimated \$50 million in local money and send it to Sacramento.

"Right now you want the money without any assurances we're going to get a reliable statewide water supply," said Geoffrey T. Vanden Heuvel, a Chino dairyman and member of the Chino Basin Water Conservation District, which also opposes the monthly user charge.

The water proposal is part of the governor's \$222.6 billion plan for new roads, levees and other infrastructure improvements, which includes \$68 billion in borrowing.

Schwarzenegger has said he wants the first installment of bonds -- totaling \$25.2 billion -- to go on the June ballot. To do that, the Legislature would have to approve a bond package by March 10. The governor has said he also is open to a November bond measure.

Democratic and Republican lawmakers object to the size of the governor's proposed bond package, calling it too large.

In addition, Republicans have called for changes to environmental and union-labor rules, while

Democrats want nonprofit hospitals, parks and affordable housing to be part of any borrowing proposal.

The conference committee crafting the bond legislation met for the first time Thursday. It heard testimony from administration officials and the Legislature's nonpartisan fiscal analyst but made no decisions.

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Water agencies say they'll go with flow

PACT: Districts agree to settle how Seven Oaks Dam water will be split -- if the state says it's OK.

08:12 AM PST on Wednesday, January 25, 2006

By JENNIFER BOWLES / The Press-Enterprise

Inland water agencies involved in a long-standing dispute have agreed how they would like to divvy up what could be billions of gallons of water that stockpiles behind the towering Seven Oaks Dam near Highland.

But officials at the State Water Resources Control Board said Tuesday that they'll have to give that agreement their stamp of approval as they weigh who will get the rights and how much additional water actually exists in the Santa Ana River.

"We won't put something in a permit that we can't enforce ourselves," said Jim Kassel, assistant chief of the board's water-rights division.

The construction of the 550-foot dam, dedicated six years ago, created a new opportunity to collect river water that otherwise would wash toward the Pacific Ocean.

Agencies say an extreme rainy season could result in 65 billion gallons of rain and snowmelt collected behind the barricade, enough to serve 400,000 homes for a year.

The extra water, which could be served as far away as western Riverside County, is seen as crucial for the growing Inland region and is far cheaper and typically of better quality than imported water.

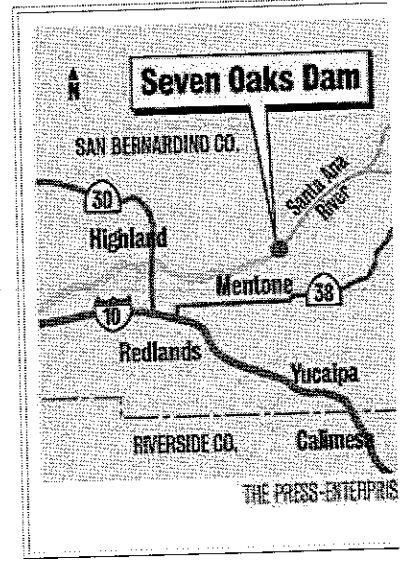
Under the settlement agreement, San Bernardino Valley Water Conservation District will reduce the amount of water it's seeking from a state permit and withdraw its protest of efforts by Riverside-based Western Municipal Water District and the San Bernardino Valley Municipal Water District to get their own state-issued rights to water.

In exchange, the water agencies will not contest the conservation district's historic use of the water.

Since 1910, the conservation district has taken water from the river and nearby Mill Creek and stored it in an adjacent aquifer known as the Bunker Hill basin, where it can be pumped for later use.

"In essence, we agreed to not disagree," said Bob Reiter, general manager of the San Bernardino Valley Municipal Water District, whose effort to get the water right dates back to 1991.

Tom Crowley, assistant general manager of the conservation district, said his agency agreed last August to



withdraw its protest after getting assurances that the Bunker Hill basin would be the first priority for the water behind the dam before any water was sent to another storage facility or aquifer.

The conservation district, Crowley said, will also allow the other water agencies to build pipelines and other facilities on its property near the dam.

Melodie Johnson, a spokeswoman for Western Municipal, said the agreement allows for the potential to transport some of that water in a proposed 28-mile pipeline so it can be served to residents in Riverside, Corona, Rubidoux, Jurupa, Norco and Lake Elsinore.

Crowley said all sides were motivated to reach an agreement before going before the state water board.

"We didn't want to go to the state board in an adversarial environment," he said.

Before the state issues any water rights, environmental laws will have to be met, said Jane Farwell, an environmental scientist with the state board.

She said those include determining how much of the dam's water will be needed to maintain the downstream habitat of three endangered species -- two plants and a kangaroo rat -- which requires regular flooding.

In the summer of 2004, Reiter's agency and Western reached similar deals with six historic users of the river's water -- including the city of Redlands -- in which they also agreed to withdraw protests.

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Lawmakers want \$50M for rocket-fuel cleanup

By Amy Frye, Staff Writer
Inland Valley Daily Bulletin

New legislation introduced Thursday in the House and the Senate could bring \$50 million to California to clean up rocket-fuel contamination.

The bill would give priority to contaminated areas in San Bernardino and Riverside counties because they are heavily affected by perchlorate contamination.

Perchlorate is a major ingredient in rocket fuel. Contaminated soil and water is known to impair thyroid function and could be potentially harmful for children and developing fetuses.

The California Perchlorate Contamination Remediation Act was introduced by Democratic Sen. Dianne Feinstein and Republican Rep. Richard Pombo of Stockton.

"So far, both the Defense Department and the Environmental Protection Agency have failed to recognize the gravity of perchlorate contamination. In the meantime, communities in California have been forced to suffer the financial burden of trying to provide safe drinking water for their residents," Feinstein said in a press release Thursday.

In addition to providing cleanup grants, the bill asks for \$8 million to develop more efficient and less expensive perchlorate cleanup technologies.

Feinstein and Pombo are asking the Environmental Protection Agency to set a national standard for perchlorate in drinking water.

The contaminant has been detected in Norco where the state is currently conducting an investigation into and cleanup of Wyle Laboratories, a munitions and aerospace testing facility that operated in the city from the 1950s to the 1990s.

Residents concerned with the impact contamination from Wyle is having on their health have been pushing the state for a faster cleanup and more comprehensive investigation.

Tony Mauro, a biologist who sits on the Citizens Advisory Group to help residents understand the status of the Wyle cleanup, praised the proposed bill.

"The problem is the equipment to clean up perchlorate is expensive and the operation of the equipment is expensive, so if they could do something to make that process faster, that's great," Mauro said.

He added that so far Riverside County has been very successful in reducing the levels of perchlorate in drinking water, but this money would help them even more.

In Rialto, Fontana and Colton, perchlorate was found in at least 20 wells and has been seeping into the cities' water supply since World War II. The contamination is thought to come from old ammunition bunkers and fireworks companies near the Mid-Valley Landfill in Rialto.

Rialto has filed lawsuits against the Department of Defense, which manufactured munitions in the area, San Bernardino County and 39 companies believed to be responsible.

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Board sides with Claremont

Vulcan Company's request for mining project denied

By Caroline An
Staff Writer

CLAREMONT — The state Mining and Geology Board on Wednesday backed the city in its dispute with Vulcan Materials Co. about its request to mine sand and gravel in the city's northeast section, but not without some criticism.

In the 4-3 vote, the board found enough evidence to support the city's denial in issuing an amendment in its General Plan that would have allowed mining in an area designated as open space.

"Vulcan is understandably disappointed with the state Mining and Geology Board's ruling last night. We are, however, pleased that the Board acknowledged its disappointment with the city's lack of responsibility and failure to implement SMARA," said Vulcan officials

in a statement released Thursday.

Throughout the deliberations, some board members were critical of several missteps made by the city, including its failure to adopt a Surface Mining and Reclamation Act (SMARA) ordinance. State law requires that cities adopt this regulation regarding the use of any land after a mining operation is completed.

"The city hasn't taken responsibility to regulate mining, allowing us to step in," said Robert Griego, a state board member. "The city has to adopt an ordinance as soon as possible."

The city, however, argues that a mining ordinance isn't necessary if mining doesn't exist. Once a mining permit is submitted, the city's logic follows, then an ordinance has to be adopted.

Derek Cole, a city lawyer,

noted that the city wasn't barring Vulcan from mining, but that they wanted to solve the zoning issue.

Vulcan's initial efforts involved a request for a zoning change for the area from open space to business/industrial park.

"We believed that the zoning issue should be addressed first," Cole said. "We are going forward with the ordinance now in light of the board's comments."

A draft of a mining ordinance that will put the city in compliance with SMARA is expected to be reviewed by the City Council this spring.

Councilmembers note that they have started the process of developing an ordinance — and last night's decision speeds up the timetable.

"In hindsight, we should have gone ahead and done it when Vulcan first approached the city," Mayor Sandy Baldonado said.

Councilmember Peter Yao felt that the board criticism was understandable.

"We were aware that we had

valuable resources in the 1980s. We should have proposed the SMARA plan and yet we failed to do so," he said.

"We didn't do it, and they were justifiable in terms of saying, 'You should have done it. There's no excuse for not doing it.'"

The area in which Vulcan wanted to mine is 214 acres at the north end of the San Antonio Spreading Grounds in front of San Antonio Dam. In 1987, the state designated the property as an area of significant mineral resources. Vulcan has leased the property from the Pomona Valley Protective Association since 1973 with the intention of mining there once its nearby Upland site was exhausted.

The plan called for operating the mine for more than 10 years.

In his statements, Vulcan attorney Joel Deutsch faulted the city for approving in 1990 Baldy View Estates, an adjacent housing development, in an area with mineral resources. In addition, he said that the city didn't prepare an impact analysis report on that development.

City staff noted that an im-

pact report was developed and sent to state agencies, including the mining board, for comment.

The city received no comments, said Greg Gubman, senior planner.

Community presence at Wednesday's meeting was estimated at nearly 300 people. Many who attended feared for their quality of life if mining were to begin in their neighborhood.

"This project is putting fear into the community," said resident Michael Kunce.

While the board decision is a victory, a civil suit brought by Vulcan against the city is still pending, and the city is mindful that Vulcan may again seek permission to mine at the site.

"We're waiting for the next shoe to drop," Baldonado said. "There's probably a lot of legs with a lot of feet so there will be a lot of shoes coming down."

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Medications Discovered in Aquifers

Various drugs are detectable in local water supplies that have been derived from treated sewage. The health risk, if any, is unknown.

By MARLA CONE
Times Staff Writer

Behind a tangle of willows, every second of every day for almost half a century, recycled sewage has gushed into an El Monte creek and nourished one of Los Angeles County's most precious resources: the drinking water stored beneath the San Gabriel Valley.

Cleansed so thoroughly that it is considered pure enough to drink, this flow from the Whittier Narrows reclamation plant meets all government standards. Yet county officials now report that they have found some potent — and until recent months undetected — ingredients in the treated waste: prescription drugs.

As new technology enables detection of infinitesimally smaller doses of chemicals in the environment, Southern California water-quality officials have learned that an array of hardy pharmaceuticals are defying even the most sophisticated sewage treatments in use.

Around the world, waterways and groundwater basins are virtual drugstores, awash in low doses of hundreds of prescription drugs excreted by people and flushed down drains.

Wherever there is sewage, there are traces of whatever pills people have popped: antibiotics and antipsychotics, birth-control hormones and beta blockers, Viagra and Valium.

"There is no place on Earth exempted from having pharmaceuticals and steroids in its wastewater," said Shane Snyder, head toxicologist at Las Vegas' water provider, the Southern Nevada Water Authority, and one of the nation's leading experts on pharmaceuticals in water. "This is clearly an issue that is global, and we're going to see more and more of these chemicals in the environment; no doubt about it."

Locally, small amounts of medicines for depression, seizures, high cholesterol, anxiety, infections, inflammation and pain — among other ailments — have been detected in the wastewater that flows into California streams and seeps into drinking-water aquifers. The contamination raises questions about the safety of reclaimed water consumed by the public and the health of wild creatures that inhabit waterways.

The concentrations are so minuscule — in parts per trillion, or a few drops in an Olympic-sized swimming pool — that scientists suspect there is little or no human danger. They acknowledge, however, that no one knows the effects of ingesting tiny doses of multiple drugs continuously over

a lifetime.

So far, concerns have focused mostly on the ecological threat. Biologists studying frogs on Prozac, insects dosed with anti-seizure drugs, algae killed by antibiotics and fish feminized by birth-control pills have discovered that some streams contain pharmaceuticals and synthetic estrogen at levels harmful to aquatic life.

"All the data we have compiled indicates these concentrations are trivial to public health. Even putting massive safety factors on this, it still wouldn't have a [human] impact," Snyder said. "Now for wastewater — that's a different story. When you have a fish or endangered species that is exposed 24 hours a day, we do need to look at this."

[See Water, Page B8]

Military Family Aid Fund Untapped

The National Guard is blamed for a lack of awareness but says the rules are too restrictive.

By RONE TEMPEST
Times Staff Writer

SACRAMENTO — A year after it was launched to help activated National Guard families suffering financial hardships, the California Military Family Relief Fund has been a major disappointment to its sponsors.

In 2005, the fund paid out only \$7,637 to just three families from among the 7,000 soldiers activated for federal duty in Iraq, Afghanistan and other postings that year. The emergency fund was designed to help National Guard families facing unexpected bills, such as food, housing, child care, utilities, medical services and insurance.

In comparison, a similar fund in Illinois but which also includes military reservists called up for duty paid \$1.1 million to 2,682 families in its first year of operation. At least half of those who were helped, said Illinois program director Eric Schuller, were members of the Illinois National Guard.

Disturbed by the California relief program's performance, Lt. Gov. Cruz Bustamante, the fund's initial sponsor and primary advocate, wrote a Jan. 2 letter to National Guard Maj. Gen. William H. Wade, requesting an explanation.

"To find that a year later that we have served only a few people is very disappointing. It's shameful," Bustamante said in an interview. "The program is not being used. It's not being used."

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TIMES

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Traces of Drugs Are Found in Water Supply

Water, from Page B1
 With about 2,000 varieties of prescription and over-the-counter drugs being sold, there are no government standards restricting any of them in drinking water or in effluent released into streams or lakes.

Water and sewage agencies aren't even required to look for them — and most don't. Testing of drinking water for drugs has been so infrequent that no one knows how much people are ingesting. A national association of wastewater agencies warned in November that pharmaceuticals are a "potential sleeping giant."

Los Angeles and Orange counties are among the world's leaders in recycling sewage to replenish water supplies, and officials there worry that the public's perception of the water supply will be tainted.

The Whittier Narrows plant, which has operated in El Monte since 1962, was the nation's first reclamation plant. Since then,

nearly half a trillion gallons of treated sewage from Whittier Narrows and two other county plants have replenished the Central Basin aquifer beneath the San Gabriel Valley, which supplies water to 4 million people.

Sewage in Southern California undergoes some of the world's most rigorous cleansing — tertiary treatment — to protect rivers and streams from bacteria and nitrogen. Much of the wastewater then is routed into aquifers, where it remains for at least six months so soil can filter out more contaminants before potable water is pumped.

In November, the Los Angeles County Sanitation Districts reported at a scientific conference that they found high levels of ibuprofen, naproxen and acetaminophen in raw sewage coming into its Whittier Narrows plant, and very small concentrations going out.

In waste that had undergone treatment, the antibiotic sulfamethoxazole and anti-cholesterol medication gemfibrozil were found at fairly high levels of around one part per billion. The antidepressant fluoxetine, the arthritis drug diclofenac, anti-ulcer and anti-seizure drugs, three more antibiotics and others were detected at lower levels, in parts per trillion. Estrogens also were measured in low levels.

Similar findings from two Los Angeles County reclamation plants will be published later this year by Jorg Drewes, an assistant professor of environmental science and engineering at the Colorado School of Mines.

Robert Horvath, the districts' technical services director, said tiny doses of over-the-counter drugs aren't that worrisome, but other less common medications can amount to an involuntary though "extremely low" public exposure. The agency, which operates 10 reclamation plants, is one of a few with the ability to test for pharmaceuticals.

"It's such a large list of compounds that even the testing is a lot of work — just teasing out which ones are important. So far, we have no [federal or state] goals to shoot for," Horvath said.

Orange County is spending \$500 million to build the world's most advanced sewage-recycling plant. When operating in 2007, it is expected to bring pharmaceuticals and other contaminants to undetectable levels.

Christian Daughton, chief of environmental chemistry at the EPA's National Exposure Research Laboratory branch in Las Vegas, has said that drugs rival

There's a question of which pharmaceuticals may be persistent in the environment, which have the greatest potential for adverse effects.'

Michael Wehner, the Orange County Water District

pesticides but unlike such conventional pollutants, they are unregulated and flow continuously into waterways from sewage treatment plants. The U.S. Geological Survey found one or more pharmaceuticals in 80% of 139 streams tested in 2002.

In a 1999 report, Daughton warned that medications "could lead to cumulative, insidious, adverse impacts" on aquatic ecosystems — such as declining reproduction and

survival rates — that "can accumulate over time to ultimately yield truly profound changes," even in protected areas such as national parks.

Fish, frogs and other creatures live, feed and breed in waterways — exposed to the drugs from birth to death.

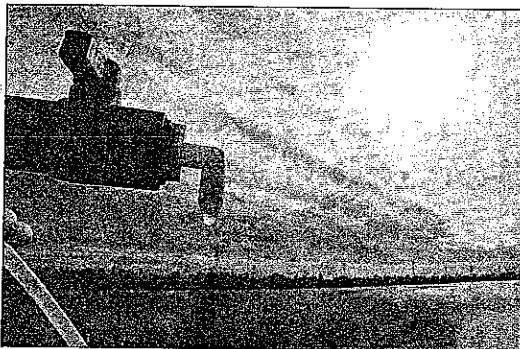
Collecting carp and other fish in a Dallas stream fed by treated sewage, Baylor University toxicologist Bryan Brooks found fluoxetine, an ingredient of Prozac and other antidepressants, in all fish sampled.

In laboratory frogs, Prozac slows growth and metamorphosis, leaving tadpoles more vulnerable to predation, according to research by University of Georgia ecotoxicologist Marsha Black. In fish, it causes lethargy and delays reproduction, and in crustaceans and shellfish, reproductive rates drop.

The most striking discovery is feminized fish. Male fish in British rivers, Nevada's Lake Mead, the Potomac River and elsewhere are growing female ovarian tissues from continuous exposure to birth-control estrogens and natural hormone



CONTAMINANTS: Ted Johnson, chief hydrologist for the Water Replenishment District of Southern California, sits near a pipe where effluent treated at the Whittier Narrows treatment plant runs into the Rio Hondo. Fish and other aquatic life are particularly vulnerable.



HEALTH: A national association of wastewater agencies has warned that pharmaceuticals are a "potential sleeping giant."

excretions in treated sewage.

Many popular medications, such as acetaminophen and ibuprofen, are eliminated during sewage treatment. But some pass out of the plants unaltered and are released into streams, oceans and groundwater basins.

"Most pharmaceuticals are designed to be tough because they have to get through your body to have a therapeutic effect," said Margaret Nellor, an environmental consultant who specializes in reclaimed water.

Two widely used anti-epileptic medications — carbamazepine and primidone — survive not only Arizona's advanced, tertiary treatment but also filtration through aquifers' soil. Even after eight years underground, they still contaminate well water used to irrigate parks in Mesa and Tucson, Drewes said.

Yet experts suspect that the millions of Americans who drink reclaimed water — which includes virtually everyone in Los

Angeles County — would experience no effects.

Drugs in wastewater are detected in nanograms though they usually are administered by doctors in milligrams, a unit 1 million times larger.

"People would have to drink the water for many hundreds of years to get a dose of a pharmaceutical equivalent to therapy," said Drewes.

Still, the public exposure is widespread, and some drugs share a common mode of action. When combined, they could lead to significant exposure.

Because some pills are intentionally flushed down toilets, Los Angeles and Orange counties will begin distributing cards to pharmacies in March advising customers to take unwanted drugs to hazardous waste round-ups or wrap them and put them in the trash.

Water agencies predict that soon they will have to tackle this new generation of contaminants.

Drugs in the environment

Tests of raw and treated sewage at Los Angeles County's Whittier Narrows Reclamation Plant show that some pharmaceuticals are resistant even to advanced treatment and are released into the San Gabriel Valley's groundwater basin in ultra-low levels.

Drugs in sewage and in treated water

(Parts per trillion)	Entering plant	Discharged into groundwater
Estrogens (female sex hormones)	69.6	4.6
Triclosan (antibiotic)	610-667	51-74
Acetaminophen (analgesic)	20,300-35,200	under 10
Naproxen (analgesic)	3,780-5,100	35-74
Ibuprofen (analgesic)	4,720-6,630	43-52
Hydrocodone (pain killer)	31-52	34-50
Sulfamethoxazole (antibiotic)	320-882	742-919
Meprobamate (anti-anxiety)	194-241	219-294
Dilantin (anti-convulsant)	39-48	98-120
Carbamazepine (anti-seizure, analgesic)	58-95	93-133
Diclofenac (arthritis)	22-30	40-63
Trimethoprim (antibiotic)	178-591	231-337
Erythromycin (antibiotic)	205-299	419-517
Gemfibrozil (anti-cholesterol)	2,300-3,020	733-1,110
Fluoxetine (anti-depressant)	under 10	13-18

*The tests of the incoming sewage and the outgoing waste were made at different times, which explains why some effluent is more contaminated than the incoming waste.

Source: Los Angeles County Sanitation Districts, Nov. 2005

Los Angeles Times

The EPA is likely to add a few pharmaceuticals to a new candidates list, which could initiate monitoring of water in 2008.

In the meantime, the newest technology can detect chemicals in parts per quintillion — equivalent to one tablespoon in the Mississippi River.

"The analytical capability has really, really outstripped our ability to understand what it means," said Michael Wehner of the Orange County Water Dis-

trict, which taps a basin replenished by the Santa Ana River, composed almost entirely of treated sewage.

"There's a question of which pharmaceuticals may be persistent in the environment, which have the greatest potential for adverse effects," he said. "The information is still sketchy compared to the traditional contaminants. There's some good work going on to help us get a handle on it, but it's still early."

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A10 Tuesday, January 31, 2006

Traces of prescription drugs found in recycled Los Angeles-area water

Associated Press

LOS ANGELES — Water quality officials have found traces of resilient prescription drugs in wastewater that has been filtered and recycled into a Southern California aquifer for eventual use as drinking water, but the amounts are so small that the health effects are unclear, a Los Angeles newspaper reported Monday.

Drugs including antibiotics, antipsychotics, birth-control hormones, Viagra and Valium routinely turn up in wastewater all over the world because people flush them down their toilets. But medications have also ended up in Los Angeles County's water supplies because of the region's aggressive efforts to turn treated sewage into drinking water.

Nearly half a trillion gallons of sewage from three treatment plants have replenished the Central Basin aquifer beneath the San Gabriel Valley east of Los Angeles, which supplies 4 million people with water.

Southern California sewage undergoes some of the world's most rigorous cleansing to remove bacteria and nitrogen, and recycled wastewater added to the drinking water supply meets all government standards. But water officials are discovering the medications as they become capable of detecting smaller amounts of chemicals.

Among the medicines found in local water supplies are small amounts of prescription drugs to treat depression, seizures, high cholesterol, anxiety, infections, inflammation and pain.

Because the medications have been found in very small amounts — the equivalent of a few drops in an Olympic-sized swimming pool — scientists suspect there is little or no human danger. But they say no one knows if there are health hazards from ingesting small doses of drugs continuously over a lifetime.

What's more clear are the health effects for fish, frogs and other creatures that spend their entire lives in waterways exposed to drugs.

Christian Daughton, chief of environmental chemistry at the EPA's National Exposure Research Laboratory branch in Las Vegas, said in a 1999 report that medications "could lead to cumulative, insidious, adverse impacts" on aquatic ecosystems, including declining reproduction and survival rates.

In British rivers, Nevada's Lake Mead, the Potomac River and elsewhere, male fish are growing female ovarian tissues from exposure to birth-control estrogens and natural hormone excretions in treated sewage.

In November, the Los Angeles County Sanitation Districts reported high levels of ibuprofen, naproxen and acetaminophen in raw sewage entering its Whittier Narrows plant, and small concentrations going out.

Because some people deliberately flush pills, Los Angeles and Orange counties will begin distributing cards to pharmacies in March advising customers to get rid of drugs at hazardous waste roundups or wrap them and put them in the trash.

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POLITICS:

Column: Water stalemate a symptom of California's governance crisis

Sacramento Bee – 2/19/06

By Dan Walters, Bee columnist

As expostulated in this space previously - perhaps ad nauseam - California faces any number of long-range political issues that stem from its rapid population growth and equally dramatic social and economic evolution, but those same factors also block responses to those issues.

California's growth and ever-increasing diversity - it's already the most complex society in the history of humankind - dissipate social cohesion and undermine the consensus necessary for political decision-making.

When journalists and academics talk or write about California's crisis of governance, they're not referring to Gov. Arnold Schwarzenegger's up-and-down governorship or the antics of legislators, but about the sclerosis that's afflicted the entire system of political government and made Californians increasingly cynical about those they elect to public office.

It explains why the governor and lawmakers this year are publicly acknowledging the ill repute in which they are held and are pledging to work together on universally recognized problems, such as the state's chronic lack of investment in highways, levees, schools and other forms of public infrastructure.

Whether they succeed is, in effect, a test of whether California's political system is irretrievably broken and the state has, as many suggest, become ungovernable or whether there is hope for resurrection.

There are any number of examples of how cultural and economic diversity interact with the "checks and balances" of American-style government to create political gridlock in California, but few are starker, or more important, than an adequate supply of clean water, on which the state's human and economic well-being depend.

As with highways and other infrastructure systems, California is living off the decisions that earlier generations of voters and politicians made on water during the two decades that followed World War II. We have one of the

planet's most extensive systems for moving water from where it originates - in the mountains of Northern California, mostly - to where it's needed and used. The federal government, the state government and local water agencies operate pieces of the system.

It has, for the most part, served us well, but with age, changes in the farm economy (which consumes much of the water), population growth, and other factors, the system needs expansion and upgrading. A major problem is that the State Water Plan, first written nearly a half-century ago, has never been completed. Most of the water that's being shipped from Northern California to Southern California via the California Aqueduct is still being pulled out of the Sacramento-San Joaquin Delta, which is suffering much environmental degradation as a result, rather than being routed around the Delta, as the state plan envisioned.

The Department of Water Resources has just unveiled a new version of the plan, emphasizing regional cooperation on water-related issues, a more activist approach by the state government (including a big chunk of Schwarzenegger's infrastructure bonds) and a fresh look at the Delta's problems.

It's a welcome start after decades of wheel-spinning, but water, like government in general, suffers from a lack of broad consensus.

Those who want to develop more water and reservoirs to hold it have been locked in an epic, decades-long battle with those who believe that water development despoils the environment and encourages more population growth. In the 1980s, the clash derailed the Peripheral Canal that was supposed to carry water around the Delta, and later it stalled the much-trumpeted "CalFed process" that was to find cooperative solutions to the Delta's problems without a Peripheral Canal. On those and other water-related issues, the lack of consensus led directly to political stalemate.

DWR Director Lester Snow, a veteran of the CalFed wars, is still hopeful that with a carrot-and-stick approach, the state can persuade local and regional water agencies to come together - but he and Schwarzenegger must first persuade the Legislature to even try to resolve its own conflicts, as well as those of outside interest groups. Water is, indeed, symptomatic of California's larger crisis of governance.

Article Last Updated: 1/28/2006 12:13 AM

Water, water everywhere

Researchers look into rainwater for irrigation

Mason Stockstill, Staff Writer
San Bernardino County Sun

ONTARIO - Millions of gallons of water are wasted each year here, and a group of former engineering students from UC Riverside believe they have a way to save it.

The source of the water is rain, and the group's idea is as old as the concept of irrigation: Catch the water falling from the sky, and use it to water our lawns.

As simple as it sounds, storage and irrigation systems using harvested runoff could save the region millions of dollars in utility costs, according to the group's research.

"The main thing is to see how clean the water is," said Greg Guillen, one of the researchers. "Hopefully, we can just catch it, fill it and put it on the lawn."

The group of five came up with the project while they were undergraduates in the university's engineering program. The idea was that as Southern California becomes paved over with more streets and buildings, more rainwater is diverted into storm drains that eventually run to the ocean.

If the water sliding off the roofs of large buildings is clean enough, the students figured, there's no reason why it shouldn't be put to use.

"This is not necessarily a big source of water," said Mark Matsumoto, associate dean of the engineering department and the group's adviser. "But if the idea is to save as much water as possible, this is one way to do it."

The project has several components. First, the students built a catch basin outside a building on campus to collect rainwater as it is funneled off the roof.

They later tested the water quality, which is particularly important for the "first flush" that is, the water that hits the roof during the first rainfall of the season.

"If you can imagine how dirty the roof is at the end of the summer after it hasn't rained for months, we want to measure what that rainwater's like coming off there the first time," Guillen said.

That data will determine what the water can be used for and whether it needs to be treated, Guillen said.

In addition, the researchers used computer models to calculate how much water could be saved and re-used. They chose Ontario because of the high number of warehouses and other buildings (such as Ontario Mills) with large roof areas.

"They looked at the space in terms of rooftop area in a couple of areas, and thought that Ontario was one that would benefit from catching the rainwater from the rooftop," said Kawai Tam, a lecturer at UC Riverside involved with the project.

The computer models found that harvesting rainwater in Ontario could yield as much as 2,200 acre-feet of water each year more than 700 million gallons, enough to meet the annual household needs of nearly 10,000 people.

Though it sounds simple, saving rainwater will take some work. Individual property owners would need to install plumbing systems and storage tanks to hold all the water, and then connect them to existing irrigation systems such as lawn sprinklers.

The group has already won grants from the Metropolitan Water District and the U.S. Environmental Protection Agency to continue the research and come up with ways to make the project feasible.

Guillen envisions a system, one day, where runoff is diverted into a central supply so that individual properties won't be relying only on their own irrigation systems.

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Article Last Updated: 1/26/2006 10:20 PM

Critics rip EPA well-water standard

California proposes tougher standards for perchlorate

Andrew Silva, Staff Writer
San Bernardino County Sun

The U.S. Environmental Protection Agency on Thursday proposed a cleanup standard for a rocket fuel ingredient that's four times weaker than the level proposed by California and is woefully inadequate to protect fetuses and children, critics said.

Perchlorate has contaminated numerous wells in San Bernardino County and elsewhere in California, leading to cleanup projects that will cost tens of millions of dollars and take decades to complete.

The EPA has proposed a preliminary goal of 24.5 parts per billion, compared to a health goal of 6 parts per billion in California. Many experts argue the standard should be set at 1 part per billion.

"A precautionary approach would be to not allow any," said Penny Newman, director of the Riverside-based Center for Community Action and Environmental Justice. "This is rocket fuel. To set a level of 24 is unconscionable."

Perchlorate, a salt that provides the oxygen to propel rockets, flares, fireworks, air bags and other products, can reduce thyroid function and is thought to be dangerous to fetuses and young children.

Sen. Barbara Boxer, D-Calif., slammed the Bush administration for the proposal.

"This standard fails to protect pregnant women, children and other vulnerable individuals from this dangerous health hazard," she said in a written statement. "EPA's standard also ignores new and mounting evidence that this toxic chemical is more prevalent in food than previously thought."

Perchlorate has been found in breast milk of nursing women, cow milk and lettuce.

The EPA proposal is based on a review of the current science by the National Academy of Sciences. Previously, the agency recommended a level of 4 to 18 parts per billion.

The recommendation is designed to protect a 154-pound person who consumes two liters of water per day.

The proposed level is one-tenth the dose at which any ill effects are seen "to protect the most sensitive population, the fetuses of pregnant women who might have hypothyroidism or iodide deficiency, it is also protective of other sensitive populations, such as (newborns) and developing children," wrote Susan Parker Bodine, assistant administrator, in the memo that went out to regional EPA offices.

A former rocket plant in Mentone is the source of a major plume of contamination that has been moving west for years. Aerospace giant Lockheed Martin has spent millions to clean up the contaminated groundwater and is the target of a lawsuit by Redlands residents.

Rialto, Colton and Fontana are also wrestling with roughly 20 wells closed because of perchlorate. The contamination is thought to have originated from old munitions bunkers and fireworks manufacturers near the county-owned Mid-Valley Landfill in Rialto.

Though California has a health goal of 6 parts per billion, that is not an enforceable drinking water standard. The state is two years behind a statutory deadline to establish a standard.

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Huntington Beach OKs Desalination Plant on PCH

LA TIMES

3/1/06

By JEAN O. PASCO
Times Staff Writer

A controversial proposal to build what would be the largest desalination plant in the nation along the Huntington Beach coast was approved early Tuesday after months of consideration.

Poseidon Resources Corp.'s plans to build a \$250-million desalination facility next to the AES power station on Pacific Coast Highway at the city's southern edge were approved by the Huntington Beach City Council on a 4-3 vote.

The plant would produce as much as 50 million gallons of fresh water daily by tapping ocean water already pumped into the power station to cool the huge electrical facility.

The plant still must receive approvals from the California Coastal Commission, the state Regional Water Quality Control Board and the State Lands Commission.

Most of the water would be sold to as-yet-unknown buyers, although Huntington Beach has agreed to buy a modest amount — 3.2 million gallons a day — at a rate less than what it now pays for imported water from the Metropolitan Water District. About a third of the city's water is imported; the rest is groundwater. The city uses about 34 million gallons a day.

"Obviously, I'm pleased with the vote regardless of the numbers," Poseidon Senior Vice President Billy Owens said after the council voted following hours of debate. "After all of this time, we have a good relationship with

the city. We're not going to cause any problems. We just need our chance."

The vote was a huge victory for Poseidon, a small, privately held firm based in Connecticut that has fought for two years to build a landmark desalination plant on the Southern California coast. The company's plant in Tampa Bay, Fla. — half the size of the one approved for Huntington Beach — was taken over by a public water agency and has been beset by financial and technical problems.

Another Poseidon facility proposed in Carlsbad is expected to go before the City Council there in May.

The desalination proposal was vigorously opposed by some residents and environmental groups, who lamented the building of more industrial plants along the city's tourist-heavy beaches. They also cautioned that the plant's briny discharge could kill sea life. Other critics said the project was an improper use of a public resource — the ocean — for private profit.

"Frankly, it would be irresponsible of us to make our city a guinea pig for this," said Mayor Dave Sullivan, who joined Councilwomen Jill Hardy and Debbie Cook in opposing the permits.

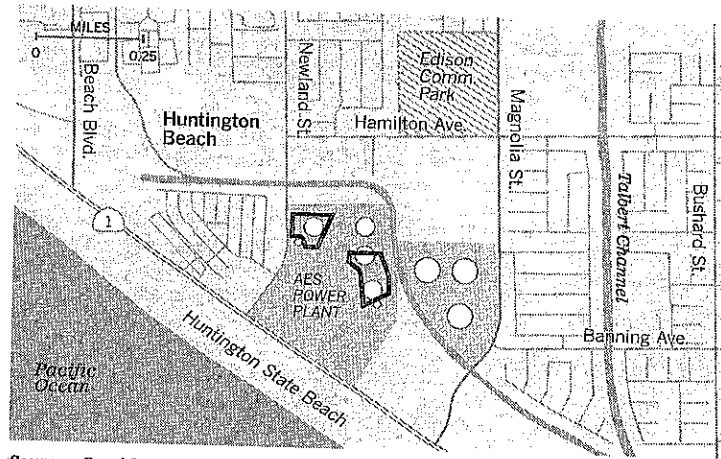
More than 100 people spoke at a meeting packed with four times that many spectators. Reaction was mixed, though many who spoke for the project belong to labor unions that would benefit from construction jobs.

Other supporters praised desalination as a proven technology for giving Southern California a source of fresh water other

Salt-free effort

The Huntington Beach City Council approved development permits for a proposed desalination plant across from Huntington State Beach. The \$250-million facility would be the largest desalination plant in the nation.

□ Proposed desalination facilities ○ Existing storage tank



Sources: Poseidon Resources of Connecticut, city of Huntington Beach

Los Angeles Times

than groundwater and the Colorado River. Though the Metropolitan Water District has said water supplies are adequate through 2030, several speakers urged the city to plan ahead.

"We live in a desert, and we need all the sources of fresh water that we can develop," said Councilwoman Cathy Green, who supported the project with council members Keith Bohr, Gil Coerper and Don Hansen.

In September, the city narrowly approved an environmental review of the plant, following a five-hour hearing at which nearly 80 residents, environmen-

talists and experts spoke. It was the second attempt for Poseidon, whose earlier environmental study was rejected because the council said it understated the potential effects on marine life.

Poseidon offered several incentives to the city, including building a 10-million-gallon storage tank for emergency water use; paying \$2 million to the city; and providing another \$1.9 million for street improvements.

One point of contention wasn't resolved with Tuesday's vote: The city contends the company must pay a tax on its electric use amounting to \$840,000 a

year; Poseidon says its share would be only \$50,000 a year.

The company is banking that water prices will surge in coming years, making the high electric cost of producing its water worth the investment. It plans to sell its water for about \$1,000 an acre-foot, company officials said. Groundwater from an aquifer costs about \$200 an acre-foot; imported water is about \$500 an acre-foot. An acre-foot is roughly the amount that two families use in a year.

Cook argued that the plant was relying on an expensive energy source — natural gas. Future energy shortages could push prices so high, she said, that no one would buy the desalted water.

Hardy said she was opposed because most of the water would be shipped elsewhere, particularly to fuel development in southern Orange County, where 90% of water is imported.

The firm wants to build its Huntington Beach and Carlsbad plants next to power stations to use their cooling water pipes, which range from 12 to 25 feet in diameter, to draw in ocean water for their operations.

Piggy-backing on the electric plants has drawn additional opposition from environmentalists who say the facilities are outdated eyesores that kill fish, plankton and crustaceans by sucking in millions of gallons of seawater.

Environmentalists are pressuring the state to phase out all ocean cooling pipes for coastal power plants by 2020.

Times staff writer Sara Lin contributed to this report.

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