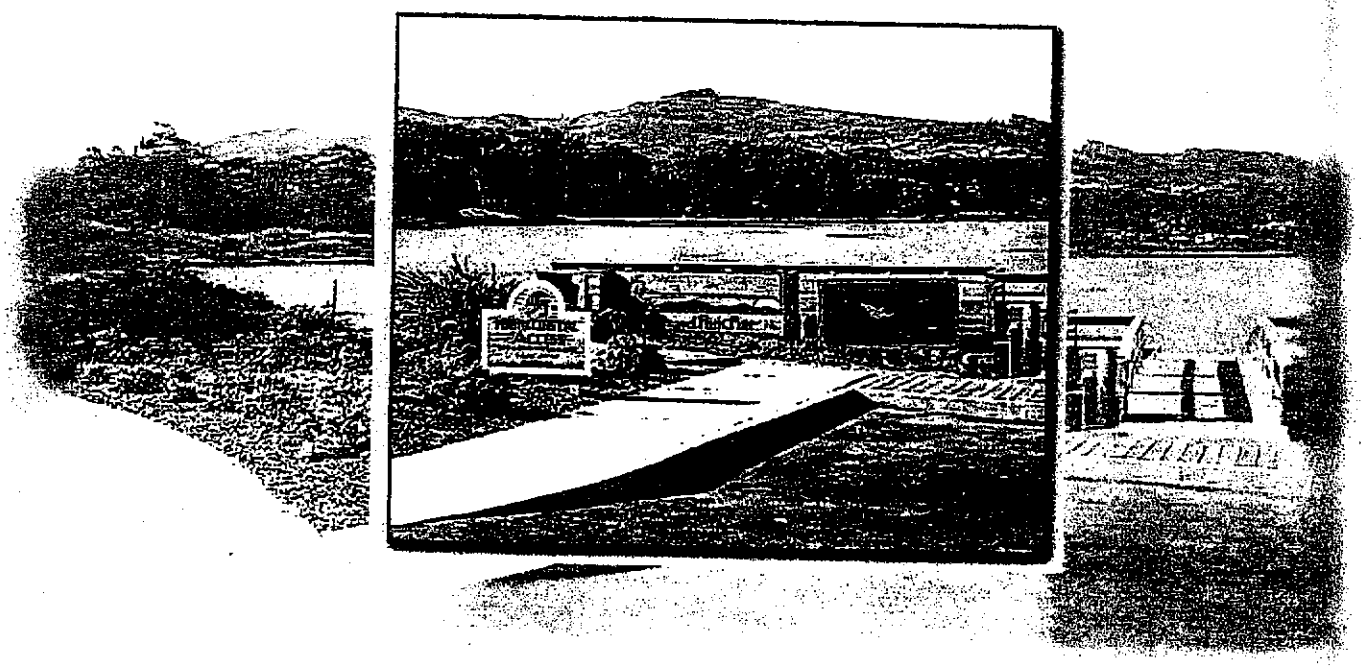
Los Osos Community Services District



Urban Water Management Plan December 2000

John L. Wallace & Associates

Maddaus Water Management

Los Osos Community Services District

URBAN WATER MANAGEMENT PLAN

FINAL REPORT

TABLE OF CONTENTS

Section 1	Introduction and Summary
Section 2	Study Area Characteristics
Section 3	Analysis of Historical and Projected Water Demand
Section 4	Water Supply
Section 5	Current Water Conservation Program
Section 6	Alternative Water Conservation Measures
Section 7	Evaluation of Long-Term Water Conservation Measures
Section 8	Recommended Plan
Section 9	Water Shortage Plan

APPENDICES

Appendix A	Description of Water Conservation Best Management Practices and Other Measures
Appendix B	Production and Consumption Data for Los Osos Community Services District and Cal Cities
Appendix C	Public Utilities Commission Rule 14.1 Mandatory Water Conservation and Rationing Plan

List of Tables

1-2 Budget For Recommended Plan 1-8

2-2 Population and Employment Forecasts 2-3

3-3 LOCSD and Cal-Cities Rate Structure 3-5

3-6 Projected Consumption With Naturally Occurring Conservation 3-8

3-10 Estimated Average Daily Indoor Water Use for Current and New Households Due to Plumbing Code Changes 3-12

3-11 Data Used in Plumbing Fixture Replacement Calculations for Residential Toilets, Showerheads, and Commercial Toilets 3-12

4-1 Water Supply Sources 4-2

6-1 Best Management Practices and Customized Measures Selected For Further Evaluation 6-2

7-2 Measures Selected for Further Evaluation 7-3

7-4 Market Penetration Of Measures For New And Existing Customers 7-7

7-6 Unit Water Savings Of Conservation Measures 7-9

7-7 Projected Water Savings, Millions of Gal/Day 7-10

7-8 Cost Of Conservation Elements 7-12

7-9 Benefit Cost Analysis 7-14

8-1 BMPs Selected For Recommended Plan 8-3

8-2 Budget For Recommended Plan 8-8

List of Figures

1-1 Program Savings 1-6

2-1 Service Area Map 2-2

2-3 Projected Population and Employment within the LOCSD Service Area 2-4

3-1 LOCSD and Cal-Cities Consumption vs. Rainfall 3-2

3-2 Comparison of Total Production Between Naturally Occurring Conservation Versus the Recommended Program Conservation Measures 3-3

3-4 Comparison of Local Water Rates 3-6

3-5 Average Water Consumption Per Account 3-6

3-7 Use Breakdown-Consumption Per Account 3-9

3-8 Indoor End Use Breakdown 3-10

3-9 Outdoor End Use Breakdown 3-11

4-2 Effluent Disposal 4-5

7-1 Evaluation Process 7-1

7-3 Benefit-Cost Analysis Methodology 7-5

7-5 Assess Market Penetration 7-8

Section 1
Introduction and Summary

The Los Osos Community Services District (LOCSD or District) was approved by voters in November 1998 and began operations in 1999 under the Community Services District Law of the California, Government Code, § 61000 et al. The District is pursuing the implementation of a community-wide wastewater project due to groundwater contamination and in response to cease and desist orders issued by the Central Coast Regional Water Quality Control Board (RWQCB). Commitments have been received by the State Water Resources Control Board (SWRCB) to provide up to $70.5 million in funding from the State Revolving Fund program. This water conservation plan has been prepared in compliance with that funding program, and the need to identify water conservation measures that enhance the community's ability to live within its local water supply.

The total area of the District is 5.38 square miles. Its current population is 14,768, and the projected population at build-out is 19,653. The prohibition zone established by the RWQCB lies entirely within the District's boundaries, although it is smaller than the District. The current estimated population within the prohibition zone is 13,560, and the projected population at build-out is approximately 17,268. At build-out, the District will collect, treat, and dispose of the wastewater from 88% of the population living within the District's boundaries. The Water Agencies will provide water service to 100% of the population within the prohibition zone.

The following three water purveyors exist within the District's boundaries:

- The District,
- Cal Cities (Southern California Water Company), and
- S & T Mutual Water Company.

The District has approximately 2,734 (Aug. 2000) service connections, serving an estimated population of 8,149. Cal Cities Water Company, a subsidiary of the Southern California Water Corporation, has 2,567 service connections and serves an estimated population of 5,459. S&T Mutual Water Company has 175 service connections and serves an estimated population of 535. S&T Mutual Water Company currently does not meter its water customers; therefore, demand information could not be obtained for their connections. Since they represent less than 5% of the service connections covered by this plan, the information basis for this plan covering the District's water system and customers, and the Cal Cities water system and customers, still exceeds the 75% coverage requirement of the SWRCB guidelines. Within the context of this report, the District and Cal Cities are collectively referred to as the "Water Agencies." The RWQCB prohibition zone is also referred to as the "Project Area."

The purpose of this section is to explain the objectives of an Urban Water Management Plan (UWMP), describe how this plan was developed, and summarize the recommendations for the District, including recommendations on measures that should be implemented concurrently with Cal Cities and/or S & T Mutual Water Company. Within the context of this report all three

agencies (including S & T Mutual Water Company) are collectively referred to as the "Water Purveyors."

PURPOSE AND SCOPE OF PLAN

The purpose of this plan is to identify water conservation measures that are cost beneficial and that enhance the community's ability to manage its local water resources in a self-sufficient manner.

This plan is prepared in accordance with the 1993 State Water Resource Control Board (SWRCB) Water Conservation Guidelines (Appendix F of the State Revolving Fund Loan Program), with certain modifications based on proposed updates to those guidelines. Specifically, the 16 Best Management Practices (BMP's) identified in the 1993 guidelines have been modified to 14 BMP's in the proposed guideline update. These guidelines require the water purveyor to either:

1. Become a signatory of the "Memorandum of Understanding Regarding Urban Water Conservation in California (MOU)", September 1991, as amended, or
2. Prepare and adopt an Urban Water Management Plan, specific to their needs.

The District has selected the second option above. The 1993 guidelines parallel the California Water Code (Section 10610 et. seq.). The specifics are in sections 10631, 10632 and 10633. They are summarized as follows:

Section 10631

This section requires an evaluation of methods related to the conservation of water, as well as describing the local water demand and supply. Originally 16 Best Management Practices (BMPs) were suggested for cost-effectiveness evaluation. In 1997, the California Urban Water Conservation Council (CUWCC), who administers the MOU, revised the list of BMPs. Four BMPs were eliminated, two new ones were added, and others were revised, resulting in a new list of 14 BMPs. In order to prepare a current plan, the new list of 14 BMPs was used in this study.

Section 10632

This section requires the preparation of an urban water shortage contingency plan. Shortages of up to 50 percent are to be planned. To comply with this section, the purveyor must adopt a water shortage contingency ordinance. The District is currently preparing its Ordinance, which will be attached as an exhibit in the final version of this plan.

Section 10633

This section requires that the water conservation plan is to provide information on the availability of reclaimed or recycled water and its potential for use as a water source in the purveyor's service area. The District is currently studying methods to use reclaimed water or recycled water in areas

where potable water is not required. That study is being prepared by Montgomery Watson of Americas, which is discussed in Section 4.

Plan Submittal Requirements

In addition to being available for review and comment by the public, the District's Wastewater Committee, Cal Cities, the District Board, and staff, the District's plan will be submitted to the State Water Resource Control Board for approval. The plan described in this report will meet the requirements for the State Revolving Fund Program. Then, the plan will be submitted to the California Department of Water Resources (DWR) by December 31, 2000.

PLAN DEVELOPMENT AND PUBLIC PARTICIPATION

LOCSD followed the following procedures for review of the draft Urban Water Management Plan:

- Wastewater Committee and Board of Director public meetings on preliminary plan evaluation, (May 31, 2000 and June 1, 2000, respectively);
- Wastewater Committee meeting to review draft conclusion and recommendation, (August 22, 2000);
- Workshop on the plan with the Board of Directors, (scheduled for September 6, 2000);
- Introduction of the plan at Board of Directors meeting – beginning of the comment period, (scheduled for September 7, 2000);
- Plan distribution to State Water Resources Control Board, (scheduled for September 8, 2000);
- After the close of public comment, (October 20, 2000), responses and edits will be incorporated into the final plan document prior to the hearing that will be conducted for the Board of Directors to consider Plan adoption;
- Legal notice will be published in the *Tribune* and *Sun Bulletin*;
- Public hearing held and adoption by resolution at a regular LOCSD Board Meeting; and
- Recommended Addendum after completion of Groundwater Safe Yield Analysis.

SELECTION OF THE RECOMMENDED PLAN

Based on the results of the benefit-cost evaluation (See Section 7) and other criteria, a recommended plan was selected (See Section 8). Of the 14 BMPs and four additional potential measures identified, eleven could be quantified and evaluated for benefits and costs. The following two items create benefits for conserving water and are the main forces for the benefit-cost analysis of the BMPs:

1. Disposal costs for treated wastewater; and
2. Cost of supplemental (imported) water.

The District's wastewater project has encountered challenges during the preliminary engineering phase associated with the disposal of treated wastewater. Hydrogeological, land availability, cost, and endangered species have all contributed to constraints for disposal of the District's treated wastewater. Although recycling water can potentially help during dry weather conditions, the primary constraints facing the District are during wet weather conditions.

If supplemental water is needed in the future for the District and Cal Cities, it would be expensive. The Central Coast region of the State is relatively unpopulated and lacks the economies of scale (large population base) compared to more urbanized areas of the State.

PLAN ELEMENTS

The measures that are recommended for the community, at this time, are listed below. Other programs should be re-evaluated after the District completes the Groundwater safe yield analysis that is in progress. Lastly, other recommendations are incorporated into the recommended plan. See Section 8 and Appendix A for a more detailed description of the recommended measures and BMP's.

1. Community Fixture Replacement Program,
2. Washing Machine Rebate Partnership, and
3. Public Education.

The single most important recommendation of the plan is the Community Fixture Replacement Program which will require retrofit of plumbing prior to the connection of a structure to the District's wastewater system. (BMP's # 1, 2 and 14). The mandatory retrofit program includes replacing toilets and showerheads that meet current low-flow plumbing code requirements. The program will minimize wastewater flows at the commencement of wastewater system operations and help mitigate the challenges and costs of disposal. Likewise, immediate implementation of this and the other measures will better enable the District to live within its local water resources, reducing or deferring the needed for imported water.

Implementation of the Public Information recommendations in this plan should be accomplished through joint efforts of the District and Cal Cities. A rebate to customers who purchase a new horizontal axis washing machine is also recommended. The mandatory retrofit program, and washer rebate program should be implemented by the District as a component of its wastewater project.

Described below are the estimated water savings, costs, and implementation schedule of the recommended plan elements. The measures are summarized in Section 8 and described in more detail in Appendix A.

Other BMPs may be recommended for implementation once they are re-evaluated after the completion of the safe yield analysis of the community groundwater basin, which is in progress.

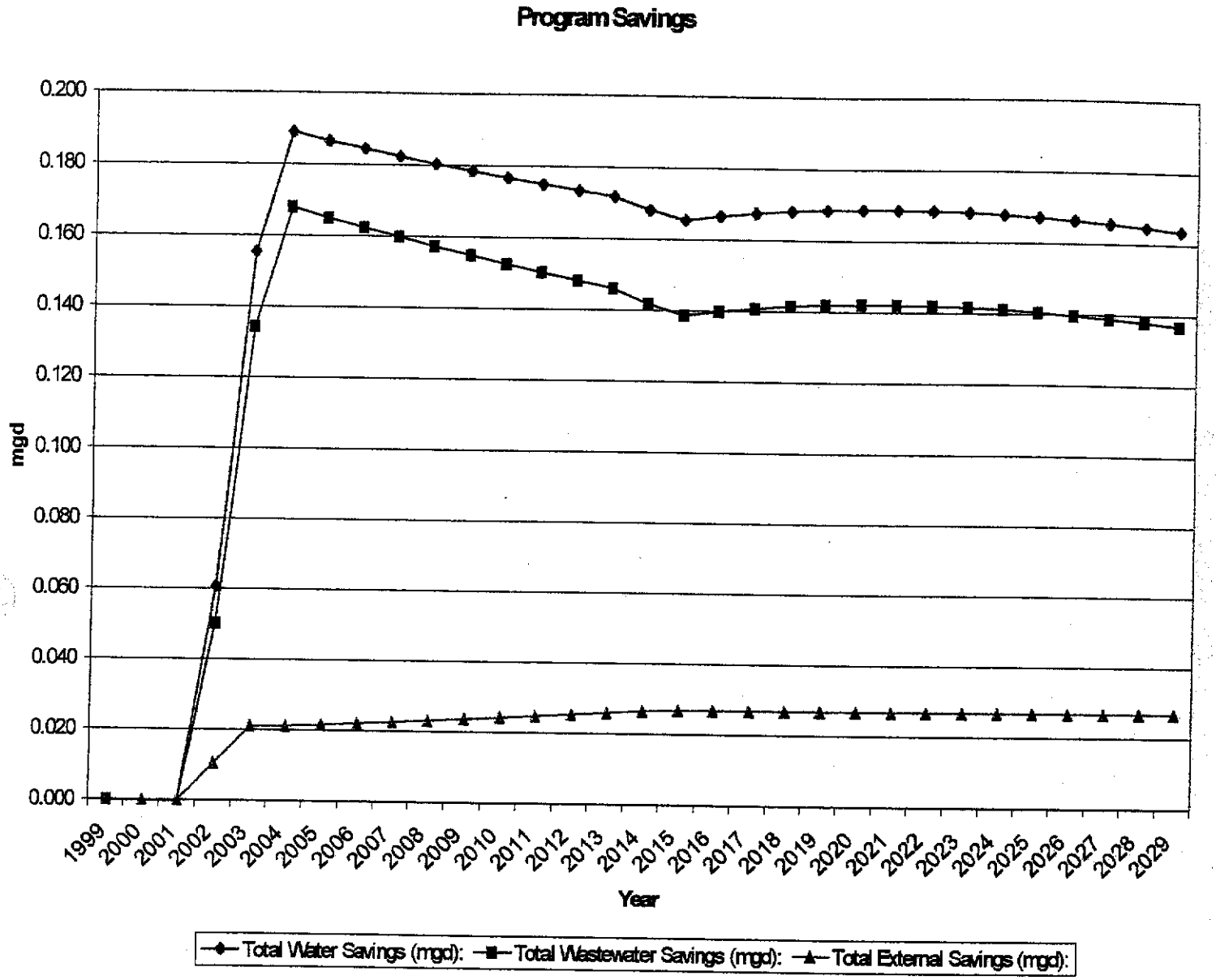
PROJECTED WATER SAVINGS

The plan will result in water savings and wastewater flow reductions, principally from the Community Fixture Replacement Program and Public Education. By the year 2010, these two programs will save about 177,000 gallons per day. In addition, there may be savings from other BMPs, after final evaluation after preparation of the groundwater safe yield analysis. Rebates through BMP 6 will save about an additional 3,000 gallons per day. Thus, by 2010, the Plan will save about 180,000 gallons per day. The Plan will reduce water demands about 9 percent by 2010. The Plan will reduce indoor consumption 14.5%. The plan will reduce wastewater flows 150,000 gallons per day by 2010. Cumulative, the savings are approximately 200 acre feet per year.

BENEFITS

The Plan will have a benefit-cost ratio of about 2.88 to 1. This means that, over 30 years, the Community will benefit $2.88 for every $1 invested in conservation. Another way to look at this is the avoided cost, or savings, from not importing water. In 2010, for example, the Plan will be saving 180,000 gallons per day. This translates to nearly 200 acre-feet of savings per year, at an imported water value of approximately $280,000 per year. Of course, the Plan will continue to save water indefinitely, so the benefits will continue even after the money on the program has been spent. Water savings are illustrated on Figure 1-1.

FIGURE 1-1


Program Savings
0.200
0.180
0.160
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
mgd
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
Year
Total Water Savings (mgd):
Total Wastewater Savings (mgd):
Total External Savings (mgd):

IMPLEMENTATION

The implementation of the recommended measures includes a schedule, budget and staffing. Some of the measures, and other recommendations, should be implemented jointly by the Water Purveyors, including efforts that could be pursued under the Groundwater Analysis and Management Agreement executed by and between the three Water Purveyors. That agreement establishes, among other requirements, that the Water Purveyors will exercise good faith efforts to agree upon and implement groundwater management strategies, which include the conservation of water resources. Although they only represent a small percentage of the water connections, S & T Mutual Water Company should nevertheless consider undertaking efforts to meter their customers, especially considering their proximity to the coast and existing concerns relating to pumping that may influence seawater intrusion.

Schedule

The plan period covers thirty years from 2000 to 2029. It can start as soon as program budgets are approved. This is planned to occur in the year 2002. All programs will start once budgeted. The following is the schedule for the three measures:

		Implementation Period
1.	Community Fixture Replacement	2002-2004
2.	Washing Machine Rebate	2002-2018
3.	Public Education	2002-2029

Budget

Table 1-2 shows the recommended budget for the plan elements, shown for each measure. These are expressed for each of the first five years and years five year increments thereafter. These funds are in addition to current expenditures, and are shown in '2000 dollars', (not adjusted for inflation). Recall that the water savings will translate to reduced disposal costs ($80,000 per year) and imported water costs ($280,000 per year) for a total of $360,000 per year, or 2.69 times the average annual budget for the first 10 years. In other words, the District will earn a very good return on its conservation investment.

TABLE 1-2
BUDGET FOR RECOMMENDED PLAN

Year	Program			Total
	BMP 6 Residential Washer Rebate	BMP 7 Public Information	Community Fixture Replacement: Toilet(2 per household)/Showerhead Fixture & Appurtenances/District Administration/Inspection	
2002	$3,066	$5,110	$287,438	**$295,614**
2003	$3,781	$10,220	$574,875	**$588,876**
2004	$4,496	$10,279	$290,743	**$305,518**
2005	$5,211	$10,456	$0	**$15,667**
2006	$5,926	$10,697	$0	**$16,623**
2002-2006	**$22,480**	**$46,762**	**$1,153,056**	**$1,222,298**
2007-2011	$57,120	$57,291	$0	**$114,411**
2012-2016	$18,600	$63,569	$0	**$82,169**
2017-2021	$0	$64,845	$0	**$64,845**
2022-2026	$0	$64,845	$0	**$64,845**
2027-2029	$0	$64,845	$0	**$64,845**

Staffing

The District has several options for completing the work. They can do some of it in-house, and will need to contract out inspection. The budget for public will need additional staff or an independent contractor. This person would work with existing staff and Cal Cities to implement the existing and new public information program. Existing staff would also prepare budgets and staff reports to the Board of Directors, citing plans and accomplishments of the conservation program.

RESOLUTION FOR ADOPTING THE PLAN

The Resolution to adopt the Plan is included on subsequent pages.

LOS OSOS COMMUNITY SERVICES DISTRICT
RESOLUTION NO. 2000-

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE LOS OSOS COMMUNITY SERVICES DISTRICT ADOPTING AN URBAN WATER MANAGEMENT PLAN

WHEREAS the Los Osos Community Services District (LOCSD or DISTRICT) was approved by voters in November of 1998 and began operations in 1999 under the Community Services District Law of the State of California, Government Code, § 61000 et al.; and

WHEREAS the District is pursuing the implementation of a community wide wastewater project in response to cease and desist orders issued by the Central Coast Regional Water Quality Control Board (RWQCB); and

WHEREAS commitments have been received by District from the State Water Resource Control Board (SWRCB) to provide the District with up to 70.5 million in funding from the State Revolving Fund program to assist the District in financing the community-wide waste water project; and

WHEREAS the State Revolving Fund program requires the District to adopt an Urban Water Management Plan as a condition of funding; and

WHEREAS the District has retained the firm of John Wallace and Associates and Maddaus Water Management to prepare an Urban Water Management Plan; and

WHEREAS based on the staff report, staff presentation and public comment received at hearing the Board of Directors of the Los Osos Community Services District finds:

1. That the Urban Water Management Plan attached hereto as Exhibit **A** complies with the requirements of the State Revolving Fund program.

2. That the hearings adopting the Urban Water Management Plan have been appropriately noticed pursuant to the Brown Act.

3. That adopting the Urban Water Management Plan attached hereto as Exhibit **A** is in the interest of the District.

NOW THEREFORE BE IT RESOLVED, DETERMINED AND ORDERED by the Los Osos Community Services District Board of Directors as follows:

1. The Urban Water Management Plan attached hereto as Exhibit A is approved and adopted.

2. If necessary, District staff is directed to return to the Board with implementation procedures at a future date.

Upon the motion of Director _____, seconded by Director _____, and upon the following roll call vote, to wit:

AYES:
NOES:
ABSENT:
ABSTAINING:

the foregoing Resolution is hereby passed, approved and adopted by the Los Osos Community Services District this _____ day of _____, 2000.

_____
ROSEMARY BOWKER, President
Board of Directors, Los Osos
Community Services District

ATTEST:

_____
BRUCE BUEL, General Manager
and Secretary to the Board

Section 2
Study Area Characteristics

The community of Los Osos has been subject to a building moratorium since 1988 that has resulted in only limited development in the community since that time. Upon completion of the District's wastewater project (Project), the moratorium will be lifted and development can once again proceed under normal circumstances. This section contains the demographic forecasts of population and employment. The data is used in subsequent sections to estimate water demands and water savings from conservation programs.

WATER SERVICE IN LOS OSOS

The two primary water providers within the District's Project Area are the District and Cal Cities. The District is a Community Services District governed by its Board of Directors, which is comprised of five members who are elected by voters within the District's boundaries. Each member normally serves a four-year term. Section 61000 of the California Government Code provides the District with its legislative authority to conduct its business.

Cal Cities is a subsidiary of Southern California Water Company, which is a California Corporation regulated by the Public Utilities Commission (P.U.C.). Southern California Water Company is a subsidiary of American States Water Company, a publicly traded corporation. Policies are established by Corporate Directors in accordance with P.U.C. regulations.

The following list is a summary of the District's facilities:

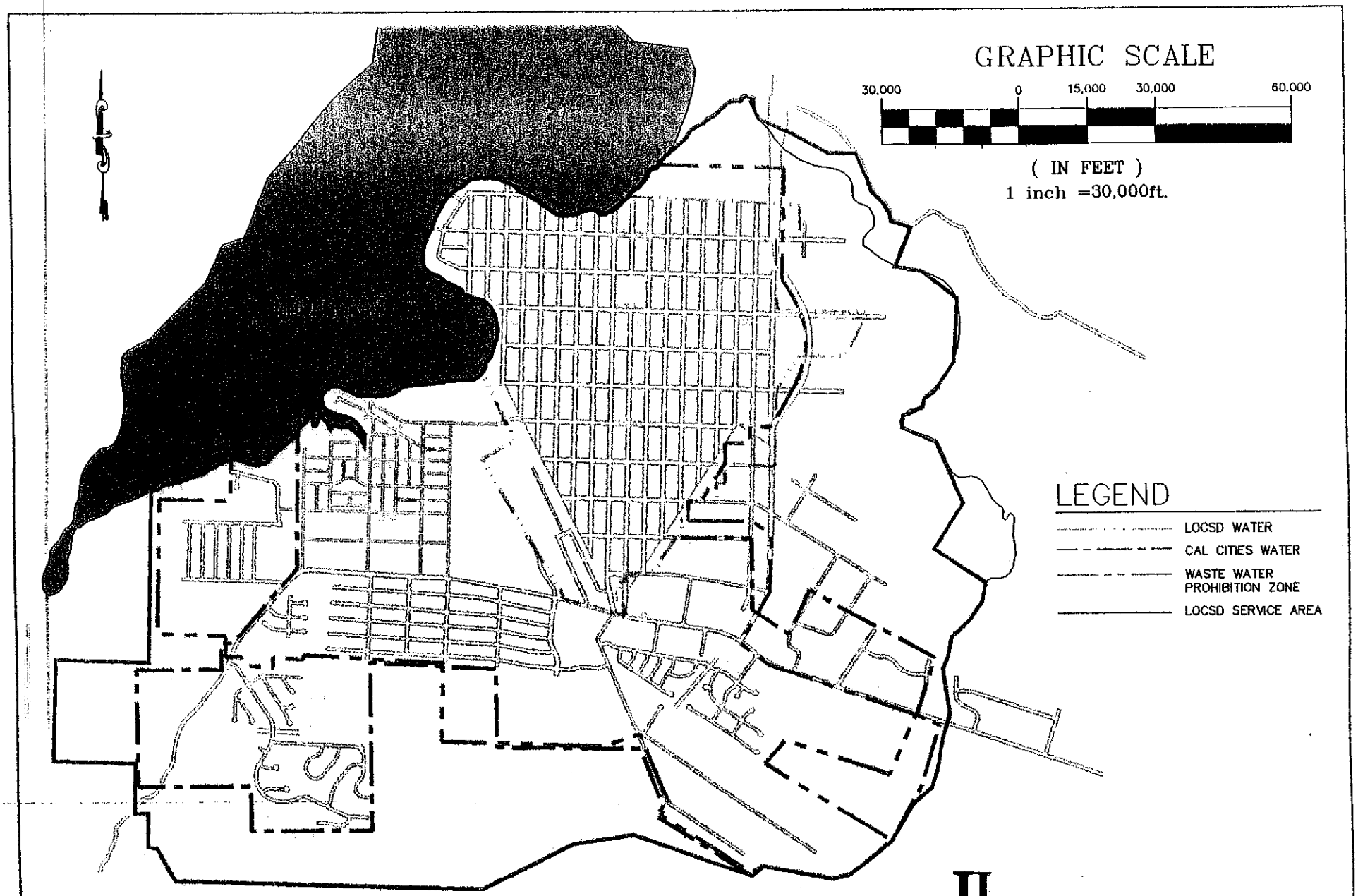
- 5 Active Wells,
- 3 Storage Tanks with combined capacity 1.28 million gallons, and
- Feet of pipeline (information not available)

The following list is a summary of Cal Cities' facilities:

- 4 Active Wells,
- 4 Storage Tanks with combined capacity of one million gallons, and
- 201,500 Feet of pipeline.

PROJECT AREA AND WATER AGENCIES SERVICE AREAS

Figure 2-1 illustrates the District's wastewater Project Area (RWQCB prohibition area), and the water service area boundaries for the District and Cal Cities. Los Osos is located at the south end of Morro Bay, on the Central Coast.



LOS OSOS
SERVICE AREA MAP

JLWA John L. Wallace & Associates
Civil Engineering · Surveying · Planning
4115 So. Broad St B5 San Luis Obispo, Ca
(805)544-4011 FAX 544-4294

DRAWN BY: KEW
December 2000

DEMOGRAPHIC FORECASTS

Population information for the District and Cal Cities were obtained from the 1990 Census, and adjusted based on the development that has occurred, albeit limited. Development information was obtained from the San Luis Obispo County Department of Planning and Building.

This data was adapted to reflect the portion of each census tract that is contained within the District and Cal Cities boundaries. Future increases in population are estimated at 2.3% per year upon completion of the District's wastewater project (August 2004). Estimated growth for 2004 is 1.15%. The annual population increase of 2.3% was based on the Los Osos Community Advisory Council's recommended growth rate. It is also consistent with Table 2-3 of the February 1999 Draft Estero Area Plan Update.

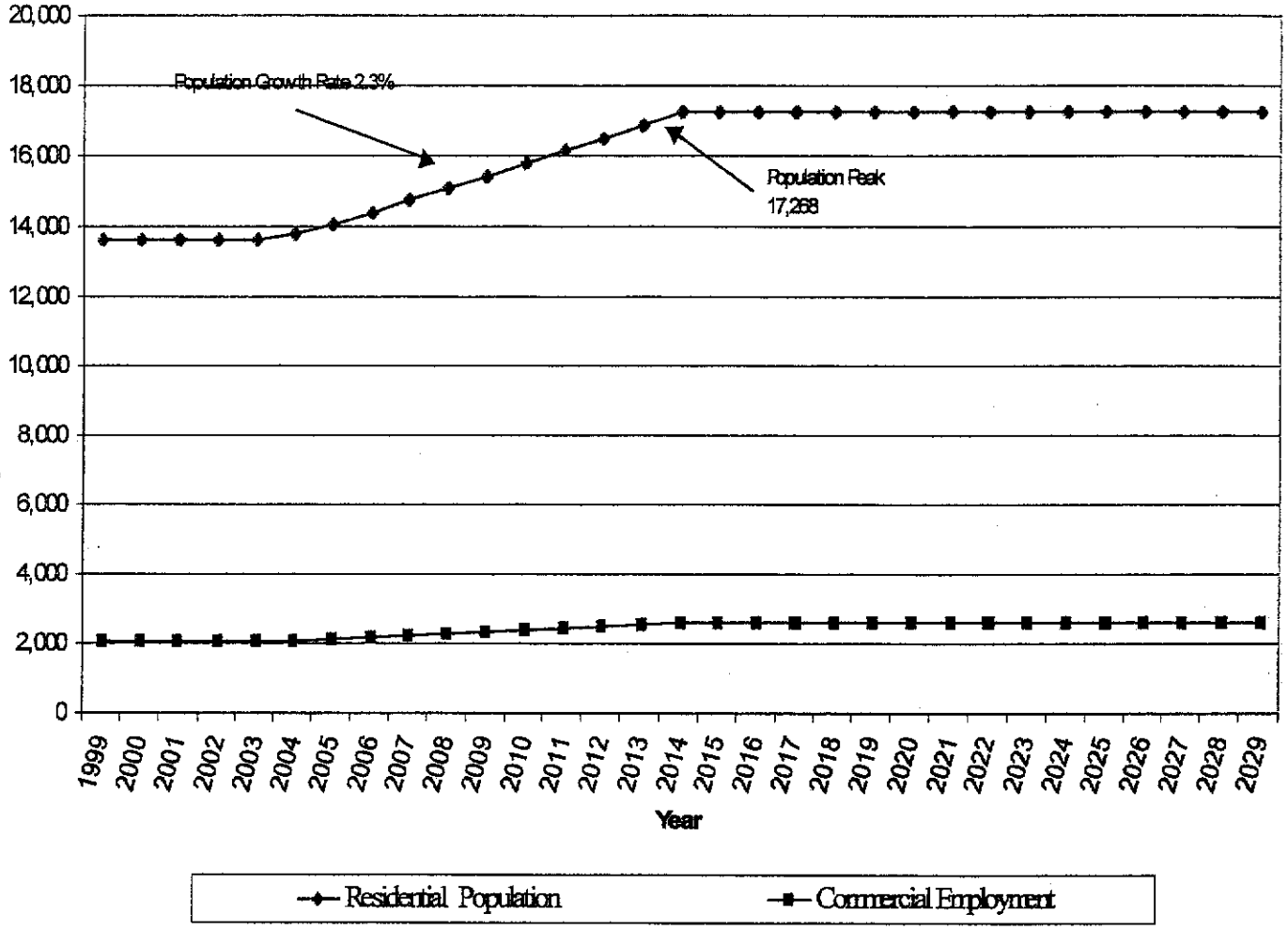
TABLE 2-2
POPULATION AND EMPLOYMENT FORECASTS

Parameter	2000	2005	2010	2015	2020
Population	13,608	14,081	15,777	17,268	17,268
Employment (jobs)	2,053	2,077	2,327	2,605	2,605
Average Household Size	2.66	2.66	2.66	2.66	2.66

Many of the residents who are employed commute out of the community to their work locations. Roughly 15 % of the population is estimated to work within the community. As population increases in the community, employment demographics are estimated to change at the same rate, 2.3% per year until build-out at 2014. Figure 2-3 graphically illustrates population and employment projections.

FIGURE 2-3

PROJECTED POPULATION AND EMPLOYMENT WITHIN THE LOCSD SERVICE AREA



Section 3
Analysis of Historical and Projected Water Demand

In order to properly manage the District's water use and evaluate conservation opportunities, a detailed water demand forecast is needed. This section analyzes the historical water use to establish a base use for the Water Agencies and then forecasts future water use using the demographic data of Section 2.

OBJECTIVES

The initial objective of this section is to analyze the Water Agencies' historical water use patterns. Figure 3-1 illustrates the combined water use for the Water Agencies with a comparison to rainfall. Appendix B illustrates the water use for the District and Cal Cities, respectively. The peaks and troughs shown in the illustrations result from seasonality, and highs and lows are shown to be caused by extreme weather conditions.

The second major objective is to project or forecast water demand for the Water Agencies for 2000 and for five-year points thereafter through 2029. Baseline projections are made via a three-step process:

1. Projections of water use per account based on historical use,
2. Projections of account growth based on population projections, and
3. A forecast of demand, distinguishing indoor consumption versus outdoor consumption and in total.

The baseline forecast is made with estimates of naturally occurring conservation. The final step is to integrate the effects of naturally occurring conservation and new conservation programs that are identified and justified in Sections 6 through 8. Comparison of the two forecasts defines the expected impact of conservation efforts within the District. See Figure 3-2.

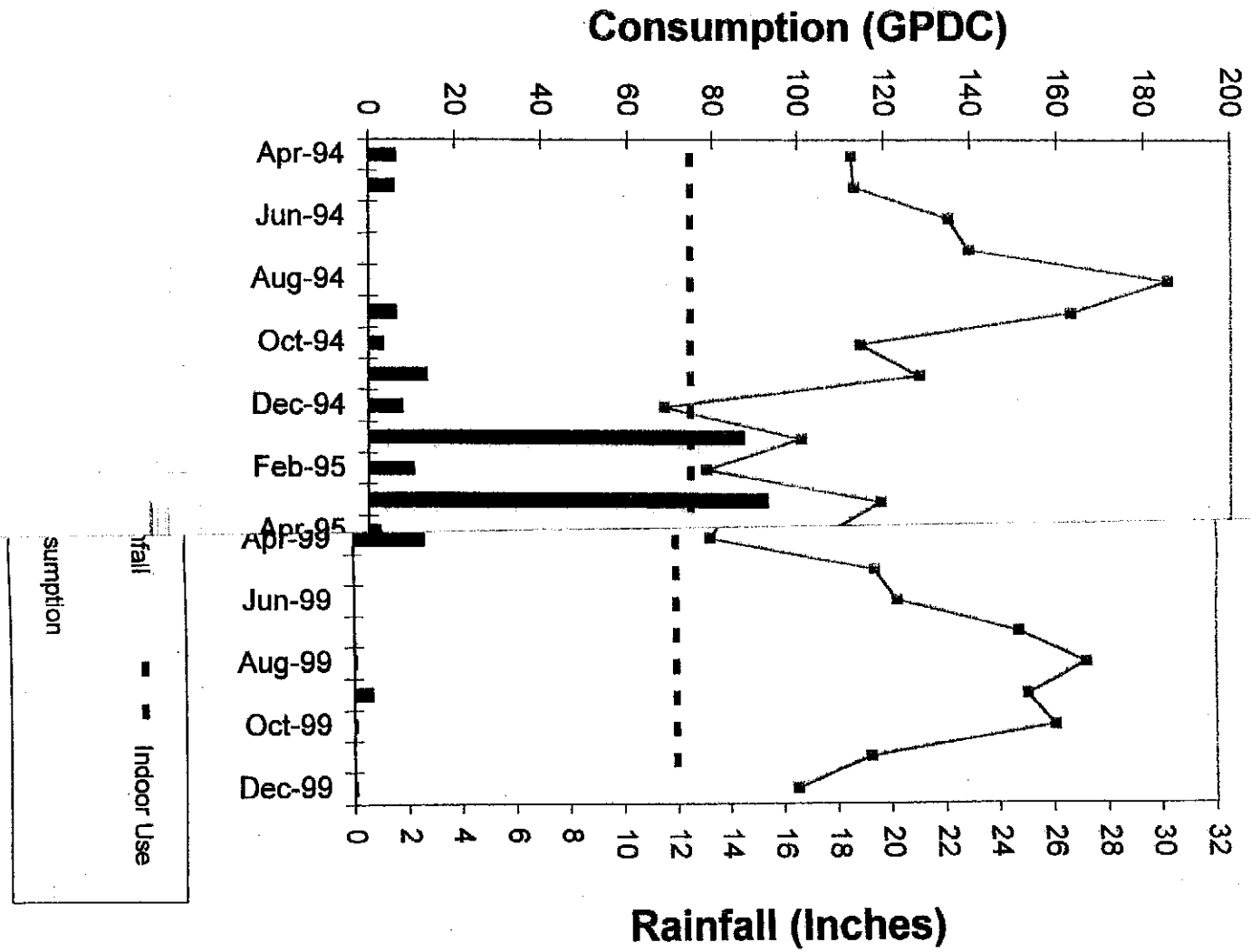
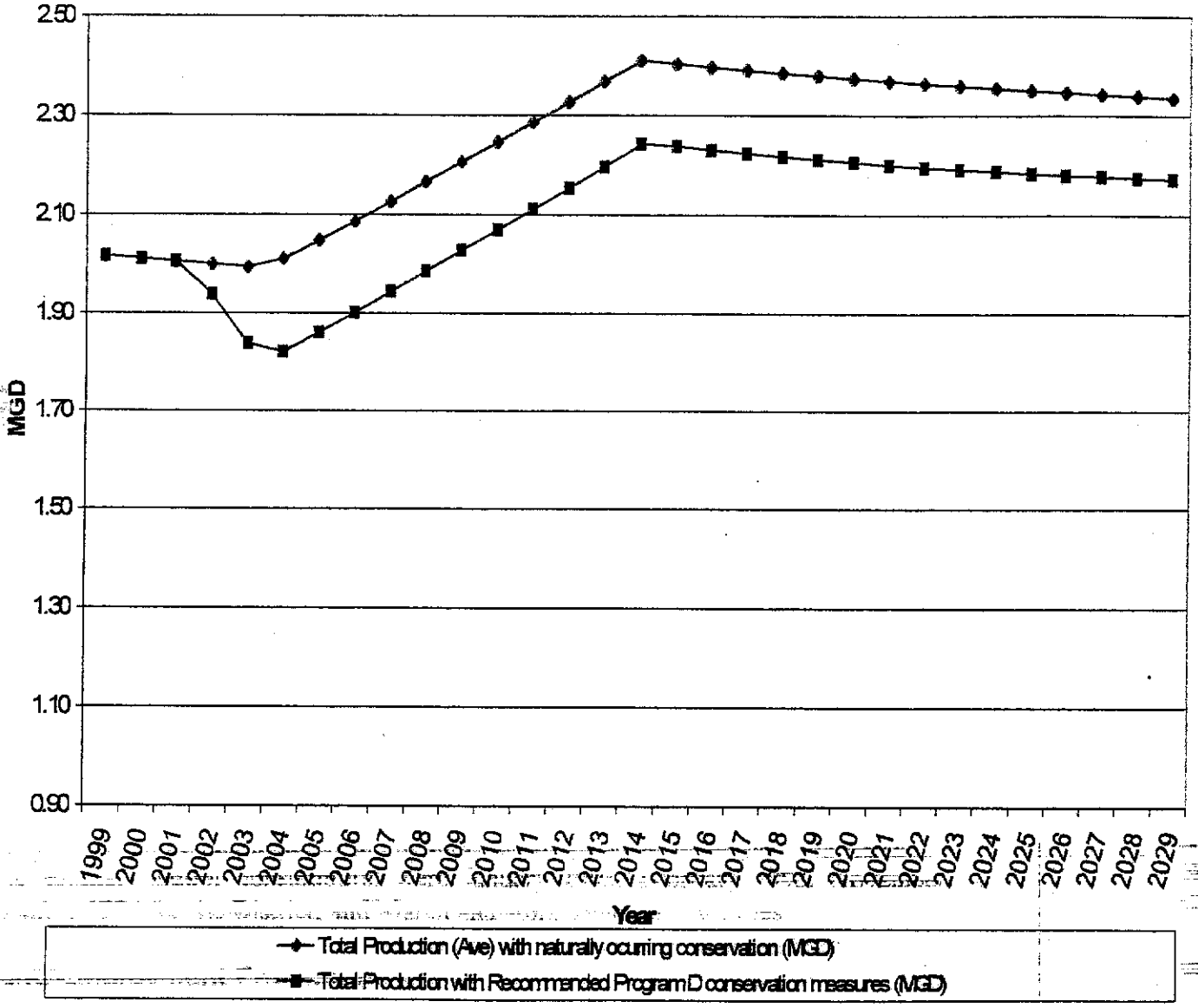

Consumption (GPDC)
200
180
160
140
120
100
80
60
40
20
0
Apr-94
Jun-94
Aug-94
Oct-94
Dec-94
Feb-95
Apr-95
Apr-99
Jun-99
Aug-99
Oct-99
Dec-99
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
Rainfall (Inches)
Indoor Use

FIGURE 3-2

COMPARISON OF TOTAL PRODUCTION BETWEEN NATURALLY OCCURRING CONSERVATION VERSUS THE RECOMMENDED PROGRAM CONSERVATION MEASURES



Forecasts of demand also include estimates of residential and non-residential accounts. Since the community is predominantly a residential community, and because the Water Agencies do not maintain billing records that identify the various categories of non-residential customers, this report does not contain detailed analysis on non-residential categories of customers.

DATA COLLECTED AND USED

All of the data used in the analysis of historical water demand was provided by the District and Cal Cities. The following is a summary of that data:

Customer Billing Data

Customer billing data was provided by month for the period January 1994 through December 1999. This data (consumption and number of accounts billed) was obtained from the District and Cal Cities. The historical analyses were conducted with the maximum data available. In no case did the lack of historical data adversely affect the accuracy or reliability of analytical results.

A summary of consumption and account data is provided in Appendix B.

SEASONALITY

The peaks and valleys that can be noticed in Figure 3-1 indicate changes in consumption during wet seasons versus dry periods. Reduced consumption in winter periods coincides with reduced landscape (outdoor) irrigation during the rainy season. High consumption in the summer coincides with greater outdoor irrigation. From this information, we can understand that winter consumption is primarily indoor water usage while summer consumption is a combination of indoor and outdoor demand.

Weather Data

The highs indicated in the peaks, and the lows indicated in the valleys indicate extreme weather conditions. For example, the rains from El Niño in February 1998 produced the lowest demand. That demand was unusually low compared to the demand during the rainy seasons in other years. The low demand during El Niño likely resulted since some homes in low-lying areas of the community encountered septic tank failures, and indoor consumption was curtailed. The specific periods used to estimate indoor consumption were January 1993, February 1993, November 1994, and December 1994 for the District, and March and April 1998 for Cal Cities.

Population and Employment Projections

Population projections for the Community of Los Osos are based on 2.3% increases per year, beginning with the completion of the wastewater project and the lifting of the building moratorium (1.15% for 2004 based on an estimated project completion date of August 2004). The San Luis Obispo County Growth Management Ordinance limits the community-wide rate of

growth to a 2.49% per year. Population within the community can potentially grow at a greater rate than the countywide limit, especially if "pent-up" demand resulting from the moratorium is greater than the growth pressures throughout the rest of the County at the time that the moratorium is lifted. Nevertheless, the Los Osos Community Advisory Council has recommended to the County an annual growth limit of 2.3%. The estimated population at build-out for the community of 19,653 and the build-out population with the Project area of 17,268 is within the timeframe of the study. The benefit-cost conclusions in Section 7 remain valid if growth in any specific year, or period of years, differs from the assumed rate of growth. The recommended water conservation programs are also independent from growth rate assumptions since those recommendations are primarily driven by the marginal cost of wastewater disposal, and the marginal cost of imported water, and not the timing of growth.

Water Rate History & Evaluation

The cost of water to District customers and Cal Cities customers is different since each agency sets its rates and charges independent from the other agency. Table 3-3 illustrates the current rate structure for each agency. The rate structure for Los Osos, is a conservation oriented structure since it charges higher rates for water at higher levels of consumption. The Cal Cities rate structure charges a single rate of $1.747 per 100 cubic feet of water used, without any increase in the charge at higher levels of consumption.

Figure 3-4 provides a comparison of the rate structure for the Agencies to those of other coastal agencies in their general locale. The costs of water for Los Osos is comparatively low, and the rate structures have not had a noticeable impact on overall community consumption (although some households in any community will conserve water to minimize their water bill). Figure 3-5 shows the average daily consumption per account to other coastal agencies in the general locale of Los Osos, which also supports the conclusion that the rate structures have not noticeably impacted overall community water demand.

TABLE 3-3
LOCSD AND CAL CITIES RATE STRUCTURES

LOCSD		Units
Minimum Bi-monthly Charge	$ 15.00	9 ccf
Consumption Charges:		
for 10 ccf to 15 ccf	$ 0.90	per ccf
for 16 ccf to 21 ccf	$ 1.00	per ccf
for 22 ccf and above	$ 1.25	per ccf
Cal Cities		
Minimum Monthly Charge	$ 18.70	0 ccf
Consumption Charge	$ 1.75	per ccf
ccf = 100 cubic feet		

FIGURE 3-4
COMPARISON OF LOCAL WATER RATES

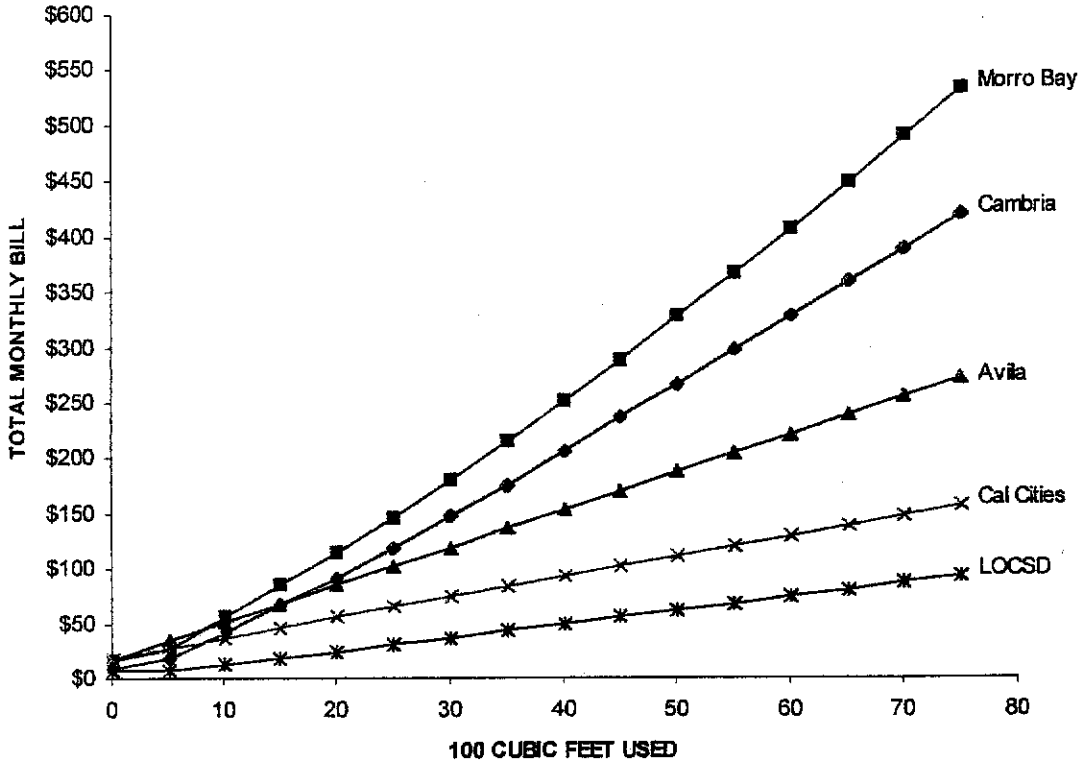
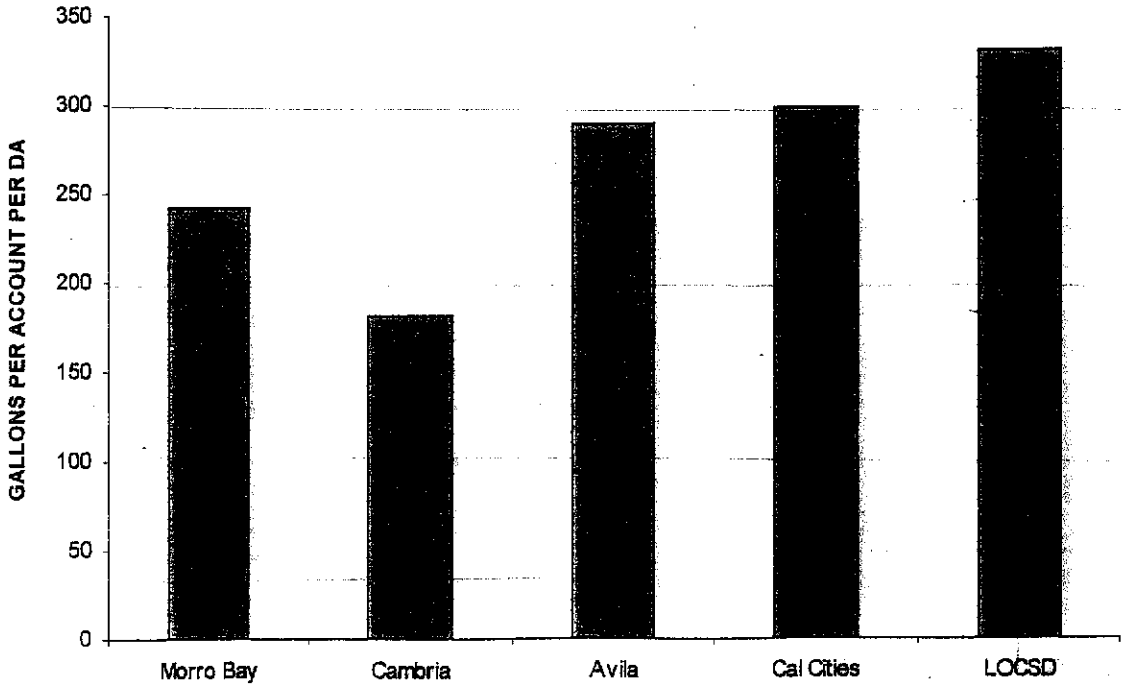


FIGURE 3-5
AVERAGE WATER CONSUMPTION PER ACCOUNT



Historical Conservation Programs

A summary of conservation measures undertaken during the period of analysis was provided by the District and Cal Cities, and is summarized in Section 5. In addition to existing conservation measures and future programs, naturally occurring conservation also occurs due to replacement of plumbing fixtures and changes in customer habits.

METHODS OF ANALYSIS AND PROJECTION

Statistical and spreadsheet models were developed to quantify the water use patterns and illustrate the results numerically and graphically. The models identify two baselines of water use: 1) the average monthly use per account for the entire period of record, and 2) an average of specific winter periods which represent indoor consumption.

Projections were established using the following procedures:

1. Actual monthly consumption from District and Cal Cities' billing;
2. Calculations of consumption per account and per capita;
3. Calculations of estimated residential, non-residential, indoor, and external consumption;
4. Projections of future demands based on population increases with naturally occurring conservation; and
5. Projections of future demands with naturally occurring conservation and recommended programs.

Table 3-6 provides an illustration of future projected consumption with naturally occurring conservation.

Figures 3-7 through 3-9 provide estimates of the current "end-use" of water for residential, non-residential, indoor, and outdoor demands. The estimates were developed based on data from the Water Agencies, discussed in Section 2, and the Residential End Users of Water study published in 1999 by the American Water Works Association Research Foundation.

Tables 3-10 and 3-11 provide additional data reflecting estimates of water use for indoor fixtures, savings that will result from fixture replacement, and the proportionate share of low, medium and high flow fixtures that currently exist.

TABLE 3-6
PROJECTED CONSUMPTION WITH NATURALLY OCCURRING CONSERVATION

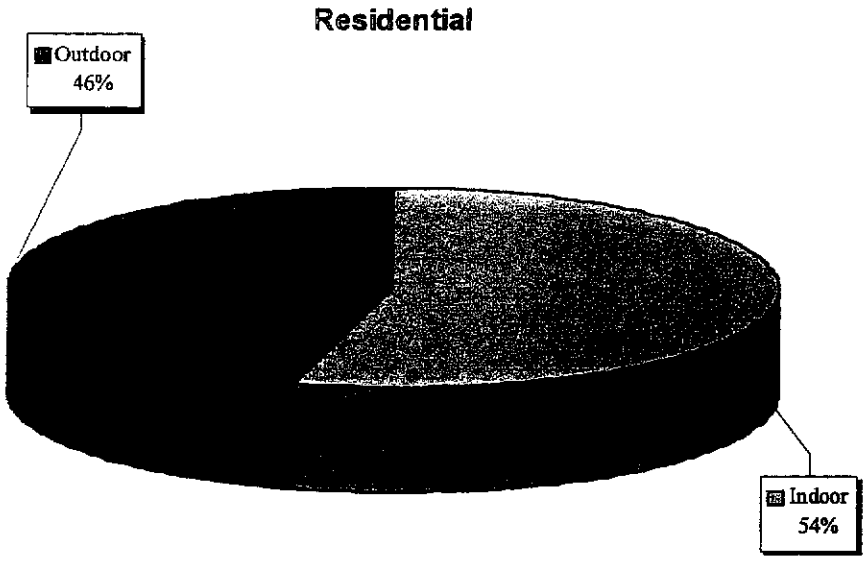
YEAR	Consumption Per Account by Consumer Category		Number of Accounts per Consumer Category		Total consumption by Consumer Category		Total Consumption gal/d [1] (100%)
	Residental (gal/d)	Commercial (gal/d)	Residential	Commercial	Residential gal/d [1] (90%)	Commercial gal/d [1] (10%)	
1999	315.9	717.5	5,110	250	1,614,400	179,400	1,793,800
2000	314.8	715.6	5,110	250	1,609,000	178,900	1,787,900
2001	313.8	713.7	5,110	250	1,603,600	178,400	1,782,000
2002	312.8	711.9	5,110	250	1,598,600	178,000	1,776,600
2003	311.9	710.1	5,110	250	1,593,700	177,500	1,771,200
2004	310.6	707.8	5,169	253	1,605,600	179,000	1,784,600
2005	309.2	704.9	5,288	259	1,634,700	182,400	1,817,100
2006	307.8	702.2	5,409	265	1,664,800	185,800	1,850,600
2007	306.4	699.6	5,534	271	1,695,700	189,400	1,885,100
2008	305.0	697.2	5,661	277	1,726,500	193,100	1,919,600
2009	303.4	694.9	5,791	283	1,757,100	196,900	1,954,000
2010	301.7	692.7	5,924	290	1,787,600	200,800	1,988,400
2011	300.0	690.7	6,061	297	1,818,000	204,800	2,022,800
2012	298.1	688.7	6,200	303	1,848,200	208,900	2,057,100
2013	296.4	686.8	6,343	310	1,879,700	213,100	2,092,800
2014	294.8	685.1	6,485	317	1,911,300	217,300	2,128,600
2015	293.7	684.1	6,485	317	1,904,800	216,900	2,121,700
2016	292.8	683.2	6,485	317	1,898,600	216,600	2,115,200
2017	291.9	682.3	6,485	317	1,892,700	216,300	2,109,000
2018	291.0	681.4	6,485	317	1,887,100	216,000	2,103,100
2019	290.2	680.5	6,485	317	1,881,700	215,700	2,097,400
2020	289.4	679.7	6,485	317	1,876,600	215,500	2,092,100
2021	288.6	678.9	6,485	317	1,871,700	215,200	2,086,900
2022	287.9	678.1	6,485	317	1,867,000	215,000	2,082,000
2023	287.2	677.3	6,485	317	1,862,600	214,700	2,077,300
2024	286.6	676.6	6,485	317	1,858,300	214,500	2,072,800
2025	286.0	675.9	6,485	317	1,854,300	214,300	2,068,600
2026	285.4	675.2	6,485	317	1,850,400	214,100	2,064,500
2027	284.8	674.5	6,485	317	1,846,600	213,800	2,060,400
2028	284.2	673.9	6,485	317	1,843,100	213,600	2,056,700
2029	283.7	673.2	6,931	317	1,966,300	213,400	2,179,700

Note:

1) Quantities rounded to the nearest hundred

Source:baseline sheet: \\JLWA01\Proj\384-LOCSD\H2O Conservation Plan\DSS Draft Models\ *Los Osos DSS8-25_baseline.xls*

FIGURE 3-7 USE BREAKDOWN-CONSUMPTION PER ACCOUNT



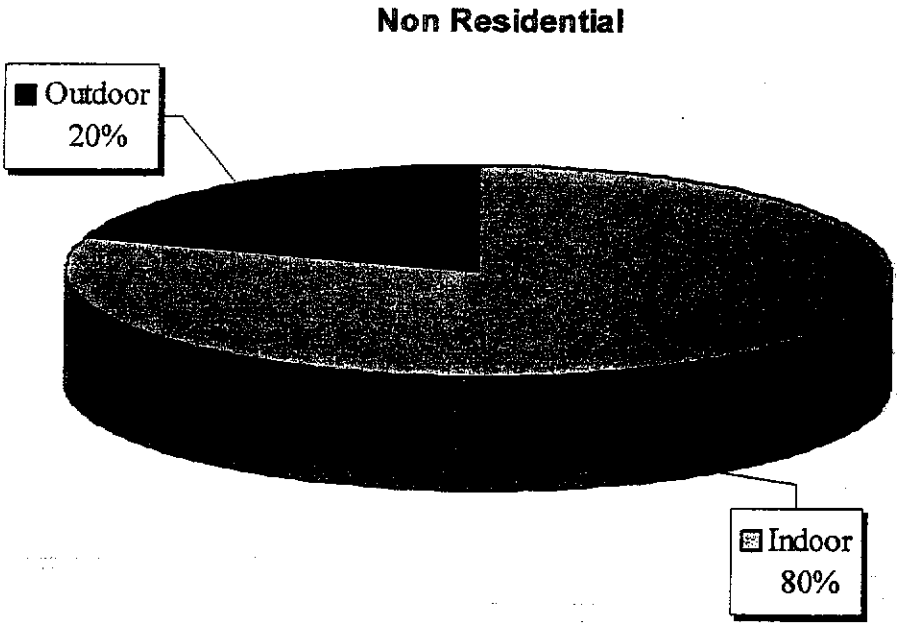
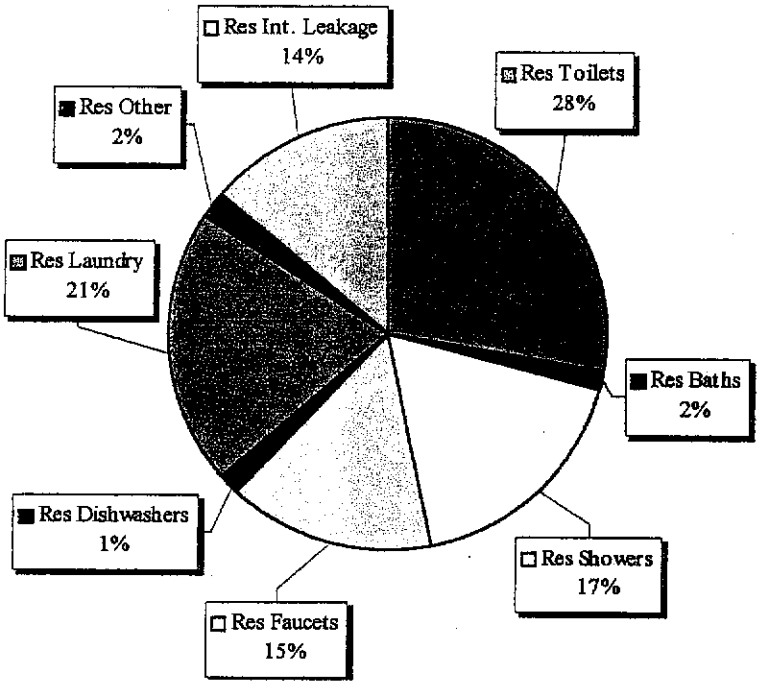


FIGURE 3-8 INDOOR END USE BREAKDOWN

Residential



Non Residential

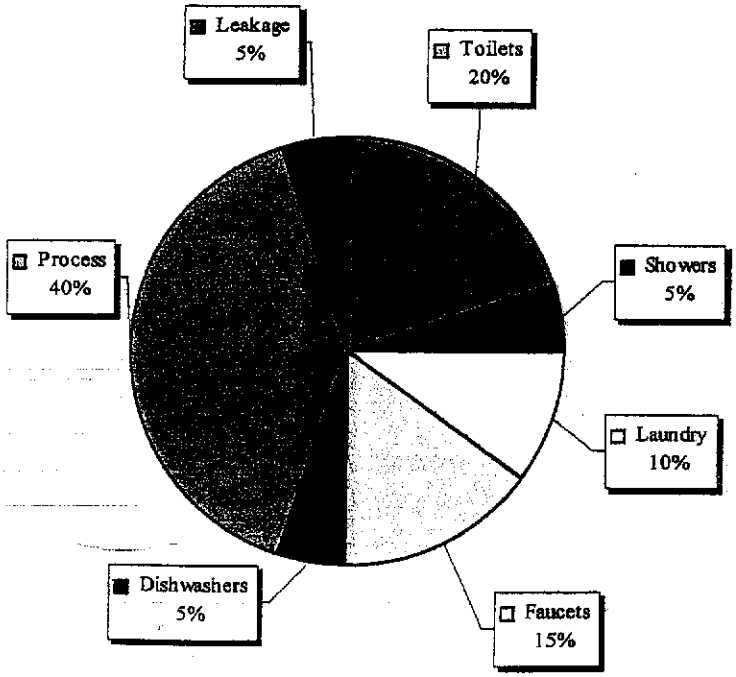
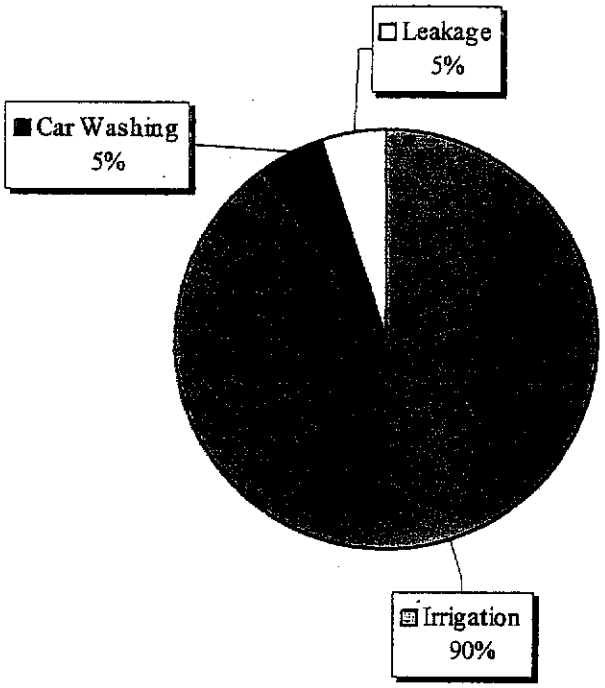


FIGURE 3-9 OUTDOOR END USE BREAKDOWN

Residential



Non Residential

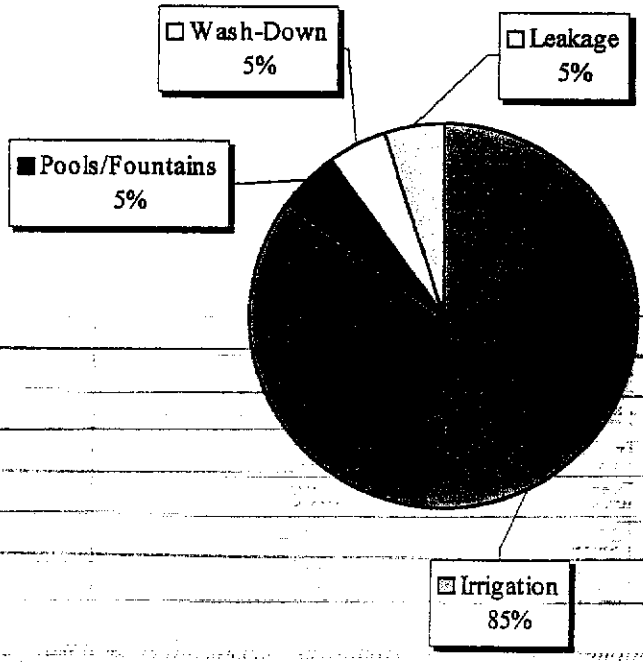


TABLE 3-10

Estimated Average Daily Indoor Water Use for Current and New Households Due to Plumbing Code Changes

End Use	Existing Households		New Households		Water Savings	
	gal/account/day	percent	gal/account/day	percent	gal/account/day	percent
Residential Toilets	47.4	27.7%	22.7	19.6%	24.7	52.0%
Residential Showers	29.1	17.3%	23.0	20.1%	6.1	21.0%
Residential Faucets	26.2	15.3%	25.7	21.9%	0.5	2.0%
Residential Laundry	35.7	20.9%	35.7	21.4%		
Residential Dishwashers	2.2	1.3%	2.2	2.0%		
Residential Int. Leakage	23.6	13.8%	23.6	10.1%		
Residential Other	3.6	2.1%	3.6	3.1%		
Residential Baths	2.7	1.6%	2.7	2.4%		
Total	170	100.0%	139	100.0%	31	18.1%

Source:1) baseline sheet of file:*Los Osos DSS8-17_baseline* .xls, 2) AWWARF

TABLE 3-11

Data Used in Plumbing Fixture Replacement Calculations for Residential Toilets, Showerhead, and Commercial Toilets

Parameter	Residential Toilets	Residential Showerheads	Commercial Toilets
Initial Proportions			
Low Volume	15.0%	20.0%	20.0%
Moderate Volume	25.0%	15.0%	25.0%
High Volume	60.0%	65.0%	55.0%
Total	100.0%	100.0%	100.0%
Volume per Use (Gallons)			
Low Volume	1.6	12.5	1.6
Moderate Volume	3.6	14	3.5
High Volume	4.5	17	4.5
Rate of replacement per year	3%	5%	3%
Mean Water Savings per Person (gal/d)	9.45	2.29	7.52
Mean No. of Uses per User per Day	4.63	0.71	3.81

Source: DSS model file name: *Los Osos DSS8-25_Baseline.xls file sheets: restoiletfix,resshowerfix,comtoiletfix*

Section 4
Water Supply

The sole source of water for the Community of Los Osos has been its groundwater basin. Over the past decade, the community has made decisions on imported water. This section describes the water available to LOCSD.

SOURCES OF WATER

Table 4-1 shows the pumping records of the District and Cal Cities over the past ten years.

In addition to the Water Agencies, the groundwater underlying the community is pumped by S&T Mutual Water Company for use by its customers, by the County of San Luis Obispo for park irrigation, large lot residences for private use, and by agricultural interests.

In July, 1989, the California Department of Water Resources (DWR) published a report entitled Geohydrology and Management of Los Osos Valley Groundwater Basin San Luis Obispo County. The report attempted to, among other items, estimate the safe yield of the groundwater basin, analyze whether sea water has intruded, evaluate groundwater management alternatives and determine whether the community needs to import supplemental water.

Subsequent to the preparation of the DWR report, under the terms of the Groundwater Analysis and Management Agreement, the water purveyors hired URS Greiner Woodward Clyde to prepare a model of the groundwater basin, in part due to concerns over the reliability of the DWR evaluation. That model has been prepared along with the Baseline Report of the Los Osos Valley Groundwater Basin, Los Osos, California dated August 3, 2000 and the Management Scenario, Los Osos Valley Groundwater Basin, Los Osos, California dated August 14, 2000. As the next step in its water management planning efforts, the District has recently hired consulting engineers and geohydrologists to prepare a water management plan for the District and a safe yield analysis of the groundwater basin.

A reliable safe yield estimate of the groundwater basin, adopted by the District, does not exist at this time. However, the existing reports do identify concerns and recommendations that indicate water conservation is important.

For this plan, and specifically the benefit cost evaluation in Section 7, it is necessary to understand the incremental cost of water. Reducing water costs provides a benefit when water conservation measures are implemented.

If the incremental cost of water is assumed to be groundwater, the savings (benefit) from conservation is relatively small (about $60.00 per acre foot). If the incremental cost of water is

TABLE 4-1

WATER SUPPLY SOURCES

Year	LOCSD			Cal Cities			Combined Total Production (AF)
	Cumulative Well Production		Yearly Production (AF)	Cumulative Well Production		Yearly Production (AF)	
	Ave Daily Production (MGD)	Ave (GPDA)		Ave Daily Production (MGD)	Ave (GPDA)		
1994	0.915	328.6	1,024.4	0.887	359.3	993.2	2,017.6
1995	1.030	368.4	1,153.4	0.881	356.8	986.8	2,140.2
1996	0.988	353.3	1,107.1	0.918	370.3	1,028.3	2,135.4
1997	1.057	379.4	1,184.3	0.987	394.6	1,105.6	2,289.9
1998	0.957	339.3	1,071.4	0.885	350.5	991.3	2,062.8
1999	1.036	372.0	1,160.0	0.980	381.9	1,097.7	2,257.7
Total AVE	0.984	352.3	1,102.4	0.923	368.9	1,033.9	2,136.3

Notes

MGD: Million Gallons Per Day

GPDA: Gallons Per Day Per Account

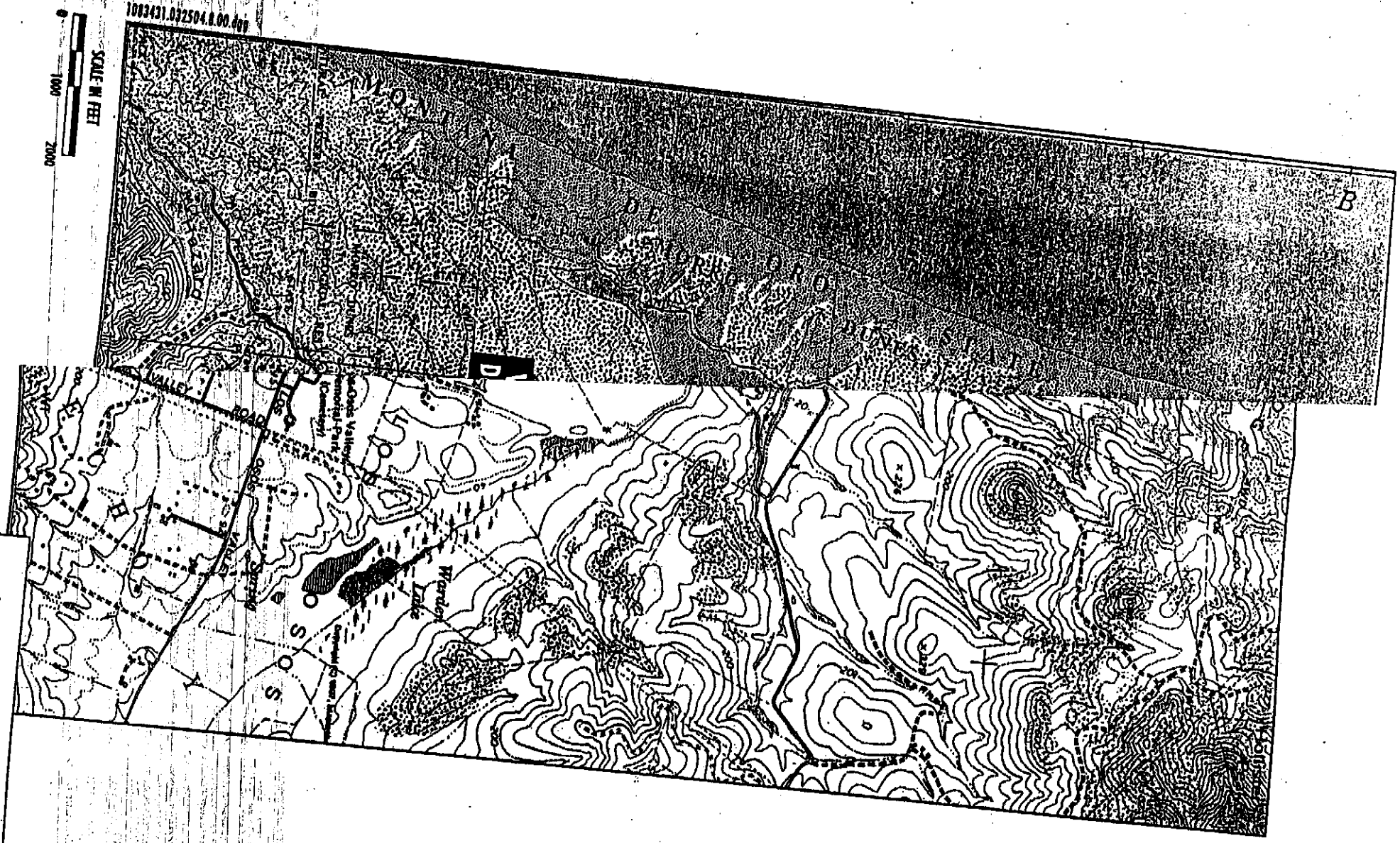
AF: Acre Foot

N/A: Not Available

Calculation:

Ave Daily Production MG/Day * 1,000,000 gallons * 365 days / 325850 gallons= AF

Source: LOCSD 1993-1999 and Cal Cities 1994-1999 Well Log data sheets



LOS OSOS WASTEWATER PROJECT
Effluent Disposal

Section 4 – Water Supply
LOCSD Urban Water Management Plan

Figure 4-2

assumed to be supplemental water, the savings (benefit) from conservation is significant (about $1,400.00 per acre foot). A solid understanding of the safe yield of the groundwater basis would provide us the ability to understand the level of demand above which groundwater pumping should not increase, and when imported water would be needed without conservation. Without this information, we must use a general understanding of the groundwater basin, and community goals, as the basis for our evaluation of water conservation.

The importance of the existing information is that recognizes the concern over seawater intrusion. Management scenarios and alternative pumping rotations were simulated in order to "minimize the potential for seawater intrusion." The potential for seawater intrusion can also be mitigated by implementing water conservation efforts. A community goal to manage local water resources in a sustainable manner is supported by the District, which is not participating in any supplemental water project (see discussion below). (Cal Cities is currently participating in the planning phase of the Nacimiento Water Project.) In practical terms, in order for the community to meet its goal of resource sustainability, it needs to implement enough conservation to reduce water demand to a quantity equal to the safe yield of the groundwater basin. It seems likely that conservation will be needed. Nevertheless, the extent that conservation should be implemented cannot be estimated until after completion of the safe yield analysis. In Section 8, recommendations are made on which measures should be re-evaluated after completion of the safe yield analysis.

Groundwater Management

In 1994, the District, Cal Cities, and S & T Mutual Water Company entered into an agreement entitled Groundwater Analysis and Management Agreement (Master Agreement). Under the terms of this agreement, cooperative water conservation measures may be implemented.

The agreement establishes a contractual framework for groundwater management with voluntary participation in specific groundwater management programs. Before specific programs are implemented in a cooperative manner, the terms and conditions of that program are established in an addendum to the Master Agreement. The preparation of the groundwater basin model is an example of a cooperative program implemented for the beneficial management of the groundwater basin. Water conservation should also be implemented in a cooperative manner.

Supplemental Water

During the past decade, several decisions have been made regarding the acquisition of supplemental water for the community. In 1992, the acquisition of water from the State Water Project was rejected by the communitys. Subsequently, Cal Cities and County Service Area No. 9 (the predecessor agency of LOCSD) executed agreements to participate in the planning phases of the Nacimiento Water Project. In January 2000, the District rescinded its participation.

Although it is unlikely that State Water and/or Nacimiento Water will be acquired for the community in the forseeable future, they nevertheless represent the community's primary supplemental water alternatives. The ability of the community to avoid, over the long term, the need to import supplemental water will depend in part on the success and early implementation of conservation measures. The wastewater project is also likely to have an impact on the

groundwater basin. As discussed in the URS Greiner Woodward Clyde reports, water that currently percolates into the groundwater basin throughout the community will be located to specific disposal area, and will change current groundwater flow patterns.

The cost of supplemental water is $1,400 per acre foot. The cost of State Water for the City of Morro Bay is currently about $1,450 per acre foot. The estimated cost of Nacimiento Water, in 1997, was $1,100 to $1,300. Project managers for the Nacimiento Water Project currently estimate that delivery of treated water to Los Osos would cost $1,400 per acre foot. The revised EIR on that project is scheduled for completion in December 2001.

Reclaimed/Recycled Water

LOCSD has hired Montgomery Watson to prepare a Water Reclamation/Recycling Plan for the Project area. Similar to this water conservation plan, the reclamation/recycling plan is intended to identify programs for the community's resource sustainability. The reclamation/recycling plan is currently being prepared to evaluate programs such as Leachfield/Subsurface Disposal, Groundwater Recharge, Recycled Water Use, and Surface Water Discharge. The plan is being prepared in conjunction with engineering of the wastewater project to determine the cost and overall feasibility of treated wastewater disposal. Regulatory requirements, site development, and other constraints will have a significant impact on conclusions reached in that plan. Figure 4-2 illustrates various disposal sites that are being evaluated. An ocean outfall for the wastewater project is not being considered.

Section 5
Current Water Conservation Program

The District and Cal Cities have separately pursued some limited water conservation programs. Since the current groundwater pumped is relatively inexpensive, conservation efforts may not be cost-effective until resource constraints are approached and imported water is needed (or can be deferred by conservation). This section highlights those programs that currently exist.

MEASURES IMPLEMENTED BY THE DISTRICT

The District's water conservation efforts, since the beginning of its operations in 1999, primarily consist of Non Promotion Water Pricing (BMP # 11), and Metering (BMP # 4) and the preparation of this plan. Under the auspices of the District's predecessor agency (County Service Area No.9), no prior conservation plan had been prepared. The current efforts are therefore a significant additional step for the District.

The District's ascending unit cost rate schedule (3 tiers), is discussed in Section 3. The overall costs for groundwater are, however, relatively low and the conservation effect of the rate schedule does not appear to be significant.

The District meters the consumption of all its customers. In preparation of future water management efforts, the District should assign customers to categories, monitor use patterns, and develop a system to monitor and report on un-accounted for water

The District has not imposed any mandatory use restrictions.

MEASURES IMPLEMENTED BY CAL CITIES

Current measures implemented include:

- Public Information (BMP # 7);
- School Education (BMP # 8);
- Efficient Landscape Irrigation Promotion (Moisture Sensor Program) (BMP # 5);
- Plumbing Retrofit Kits (Shower heads, dyes to identify toilet leaks) (BMP#2); and
- Main Replacement Program to reduce Unaccounted-for Water (BMP # 3).

Cal Cities has not imposed any mandatory water use restrictions.

Cal Cities' public information program represents general literature encouraging water conservation and providing information on how to conserve. Its school education program, with a motto of "Learning to be Water Wise" targets 5th grade students at the elementary schools in the community. Its landscape irrigation- moisture sensor program focuses on customers with

large lawns, including Cabrillo Estates, Bayview Heights, and Monarch Grove. Cal Cities identifies customers with large lawns, sends a letter to those customers, performs a water audit, and utilizes moisture sensors to regulate landscape irrigation. When requested, Cal Cities will help customers investigate leaks. It provides plumbing retrofit kits to replace showerheads and dyes to help locate toilet leaks. Its main replacement program has recently focused on Redfield Woods.

STATUS OF BEST MANAGEMENT PRACTICES

Section 6 explains and defines the current list of Best Management Practices (BMPs) in California. A complete description is given in Appendix A. The following BMPs have been implemented, and should continue to be implemented.

- BMP 3 – System Water Audits, Leak Detection and Repair;
- BMP 4 – Metering; and
- BMP 11 – Conservation Pricing.

BMPs which have been partially implemented (by Cal Cities only) include:

- BMP 1 – Residential Water Audits;
- BMP 2 – Residential Plumbing Retrofit;
- BMP 5 – Large Landscape Conservation Programs and Incentives;
- BMP 7 – Public Information; and
- BMP 8 – School Education.

BMP # 10, Wholesale Agency Assistance Program does not apply to the service area. Nevertheless, Cal Cities does receive considerable support from its parent company, Southern California Water Company. In addition, the average un-accounted for water was about 11% based on the historical data obtained for this plan. Therefore, leak detection and repairs required by BMP # 3 are not applicable unless a future water audit indicates a higher level of water loss.

Section 6
Alternative Water Conservation Measures

Water conservation should be based on the need for and benefit from conserving water. This need can be driven by the possibility of a water supply shortfall (due to increased demand to accommodate population growth), cost savings due to reduced power costs, avoided costs of purchasing imported water, and benefits from reducing wastewater discharges.

BASIS FOR SELECTING WATER CONSERVATION MEASURES

This section describes water conservation measures that may be applicable to the Project area. The cost-effectiveness of each measure is evaluated in Section 7.

Review of Water Demands

Conservation measures should target water uses that have the highest demand, where water savings can be achieved at low cost, and where multiple benefits result.

The major focus of the conservation program for the community at this time should be indoor water use, because it will reduce water demand, wastewater flows, and can be effectively implemented. (Typical indoor water use for residential customers is about 170 gallons per day per account (gpda), which represents an average of about 2.66 occupants.) Up to 500 gpda is used in peak summer months by residential customers. Overall, 86 percent of total indoor usage is residential use. Hence, the emphasis of the indoor conservation program should be indoor residential use.

LIST OF BEST MANAGEMENT PRACTICES

The intent of Best Management Practices (BMPs) is to encourage water utilities to evaluate a number of measures and use those that are appropriate as the cornerstone of their conservation program. Residential, non-residential, indoor, and outdoor uses are targeted by BMPs in order to make a comprehensive water conservation program.

The current list of BMPs in California contains 14 practices or measures. The list developed in 1991 by the California Urban Water Conservation Council contained 16 measures. The list was changed in 1997 when four measures were dropped, two new ones added, and revisions were made to others. Table 6-1 lists the BMPs plus four other measures suggested for consideration by the Water Agencies. Detailed descriptions of each measure is provided in Appendix A.

TABLE 6-1
BEST MANAGEMENT PRACTICES AND CUSTOMIZED MEASURES SELECTED FOR FURTHER EVALUATION

BMP #	Measure	Customer Categories Targeted
1.	Water Surveys for Single-Family and Multi-Family Residential Customers	Single family and Multi-Family Residential
2.	Residential Plumbing Retrofit	Pre-1992 Single family and Multi-Family Residential Dwellings
3.	System Water Audits, Leak Detection and Repair	System
4.	Metering	Implemented
5.	Large Landscape Conservation & Incentives	Accounts with large irrigation demands
6.	High-Efficiency Appliance Promotion	New & Existing Residential
7.	Public Information (P.I.)	All
8.	School Education	Residential
9.	Commercial/Industrial/Institutional(CII) Conservation	CII
10.	Wholesale Agency Assistance	Not Applicable
11.	Non-Promotional Pricing	All
12.	Water Conservation Coordinator	All
13.	Water Waste Prohibition	All
14.	Residential ULF Toilet Replacement	Residential
Alternative # 1	Partial Retrofit (1,022 Homes, 2 years)	Residential
Alternative # 2	Complete Retrofit (1,022 Homes, 2 years)	Residential
Alternative # 3	Community Fixture Replacement (2 years)	All
Alternative # 4	Community Retrofit Ordinance (14 years)	All

Further discussion of these measures is provided below.

BMP # 1. Water Surveys for Single-Family and Multi-Family Residential Customers

The Water Agencies would offer an indoor and outdoor water survey to existing single-family and multifamily residential customers with high water use. Surveys should target the top 20 percent of water users to ensure significant water savings. It is important to target high water users otherwise, the survey may not produce the savings needed to justify the program. The surveyors would focus most on outdoor water use, identifying water waste, offering information to improve water use efficiency, and preparing a customized lawn irrigation schedule. Surveyors would also conduct a brief indoor survey and install low-cost conservation devices such as low-

flow showerheads. Each single-family survey would last approximately one and one-half hours; multifamily surveys would last longer, depending upon the building size and the complexity of the irrigation system. Various delivery methods have been used to increase effectiveness and reduce survey unit costs.

BMP # 2. Residential Plumbing Retrofit

Homes built before 1980 generally do not have low flow showerheads, low flush toilets or faucet aerators. Even some homes built prior to 1992 may not have these devices because of a lack of plumbing code enforcement. The U.S. Energy Policy Act of 1992 has required 1.6 gallons per flush (gpf) toilets, 2.5 gallons per minute (gpm) showerheads, and 2.5 gpm faucets since January 1994. To promote indoor water conservation, the Water Agencies would give owners of pre-1992 homes retrofit kits with sufficient equipment and instructions to retrofit two bathrooms. Retrofit kits would contain easy-to-install low flow showerheads, faucet aerators, and toilet tank retrofit devices. The kits would be distributed to and, if requested, installed at all single family and multifamily residential homes. In some cases, this program could be considered an alternative program to Residential Water Surveys and seeks to get a high installation rate of retrofit devices for less money than the cost of a survey.

BMP # 3. Systems Water Audits, Leak Detection, and Repair

Some system water losses, or unaccounted-for water (UAW), are authorized. Authorized losses include flushing hydrants by fire departments. The remainder of UAW is caused by leaks or meter inaccuracy. The purpose of this measure is to reduce leaks from older systems and from broken pipes, joints, or valves. Up to 40 percent of all UAW can be attributed to leaks. For example, if the UAW is greater than 10 percent of total production, then the leakage could be 4 percent, and the Water Agencies may find a leak-detection and repair program beneficial. Lower UAW levels usually indicate that leak-detection and repair would not be cost-effective and the BMP requires no action if UAW is less than 10 percent (other than studies to verify that it is).

BMP # 4. Metering

The Water Agencies have complied with most of the provisions of this BMP, since customer connections to the system are metered and are billed based on volume of use. (As a note, S & T Mutual Water Company customers are not metered). The Water Agencies have mixed use meters serving both domestic use and landscape irrigation. After preparation of the safe yield analysis, the Water Agencies should re-evaluate whether a program should be developed to provide incentives to customers to switch mixed use accounts to dedicated landscape meters.

BMP # 5. Large Landscape Conservation and Incentives

This measure is designed to reduce peak demand by improving outdoor irrigation efficiency. All public and private irrigators of landscapes larger than one acre (suggested size cut-off) are candidates for this measure. The Water Agencies would provide nonresidential customers support and incentives to improve their landscape water use efficiency. The support can vary depending on whether the account has a dedicated landscape meter, which is common for larger

sites. This support may incorporate the development of water budgets for irrigators to help track their conservation efforts and free landscape water audits upon request.

BMP # 6. High-Efficiency Appliance Promotion Programs

LOCSD, initially, would encourage customers to purchase high efficiency (tumble action) washing machines as a component of its wastewater project and subsequently as a part of joint water conservation efforts with the other Water Purveyors. These machines can reduce clothes washer water use by about one-third but they currently cost considerably more to purchase. Promotions could include an in-store appliance labeling program, advertisements, rebates, or other activities. Such a promotion program is intended to encourage residential customers to purchase water-efficient washing machines and dishwashers. Where cost-effective to the Water Agencies, and where the energy company is offering a rebate, they shall offer a rebate to customers to help off-set the purchase price differential. The rebate shall be calculated based on the avoided cost of the water saved by the program. Rebates by the Agencies are not required if the maximum cost-effective rebate is less than $50.

BMP # 7. Public Information Programs

This measure is an expansion of the Cal Cities' existing public information efforts. It serves as the 'glue' to tie all the other measures together. It would not only address specific measures, but also cultural/social aspects of establishing or enhancing a water conservation ethic within the community; most importantly, it would convey to the public an understanding of why water conservation is important. Programs include community gardens utilizing recycled water, store-front displays, theatrical productions by school children, poster contests, T-shirt design contests, speakers to employee and community groups, presentations and tours with hands-on demonstrations; radio and television time, and printed educational material such as bill inserts. The Water Agencies would attempt to put the water use from the same period in the prior year on customer water bills. Public education would continue to be used to raise awareness of other conservation measures available to Water Agency customers.

BMP # 8. School Education Programs

Long-term results to eliminate wasteful water-use habits are best achieved by education of young people. The program will especially target school-age children with presentations, poster contests, printed educational materials, and theatrical presentations. They, in turn, will inform their parents of the importance of water conservation on California's Central Coast. Teaching children to respect that water is a precious resource will help them grow into responsible adults with a conservation ethic. Educational material must meet state education frameworks, and grade appropriate materials should be distributed to grade levels K-3, 4-6, 7-8, and high school.

BMP # 9. Commercial/Industrial/Institutional Programs

Commercial, industrial, and institutional (CII) customers will be ranked according to annual water use. Commercial customers are defined to be any business that provides or distributes a product or service, such as hotels, restaurants, office buildings, commercial businesses or other places of commerce. These do not include multi-family residences. Institutional customers are

any water-using establishment dedicated to public service. Industrial customers are any water users that are primarily manufacturers or processors of materials as defined by the Standard Industrial Classifications (SIC) Code numbers 2000 through 3999.

The Water Agencies could achieve a ten-percent reduction in annual non-residential water use over a ten year period using water surveys, customer incentives and/or other means. Alternatively, instead of a performance goal, the Water Agencies could commit to offering water surveys on a repeating basis to at least ten percent of CII customers.

BMP # 11. Conservation Water Pricing Programs

Under this measure, the Water Agencies could further modify their existing water rate structures with the objective of reducing consumption. Traditional objectives in rate structure design include that the rates be based on the costs to serve, that they provide adequate and stable revenues, that they be fair or equitable among customers classes and volume users, and that they be easy to implement and administer. Conservation, or non-promotional, rates provide a financial incentive to ratepayers to reduce their water use, usually by applying a surcharge on peak months' usage or by charging a higher unit rate for water as more units are used. Alternatively, once the safe yield of the groundwater basin is better known, surcharges can be established for excess water use above the safe yield allocable to customers. These rates are often not based on historical costs to serve each customer group or rate block and therefore are held, by some ratepayers, to be unfair. It is, therefore, essential that new rates be developed through a public process that assures acceptance of the purpose and design of the rate structure. It is important to recognize that, for whatever new type of rate structure selected, greater leverage can be achieved from a combination of price with indoor and outdoor conservation programs than from price alone. Conservation water pricing makes the most sense as part of a broad demand management program.

BMP # 12. Water Conservation Coordinator

The Water Agencies will need to designate a water conservation coordinator. Duties of the coordinator shall be:

- Coordination and oversight of conservation program implementation.
- Preparation and submittal of the progress reports to various parties.
- Communication and promotion of water conservation issues to agency senior management;
- Coordination with operations and planning staff; preparation of annual conservation budget; preparation of water conservation plan updates.

BMP # 13. Water Waste Prohibition

The Water Agencies will need to enact and enforce measures prohibiting gutter flooding, single pass cooling in new connections, non-recirculating systems in all new conveyor car washes and commercial laundries, and non-recycling decorative water fountains.

BMP # 14. Residential ULFT Replacement

The Water Agencies would implement a toilet replacement program offering incentives to existing residential customers who replace their high water-use toilets with ultra low-flush (ULF) toilets. ULF toilets reduce toilet-flushing water to about 1.6 gpf. This is a significant water saving from an average of 5-7 gpf for regular toilets, and from 3.5 gpf for low-water-use toilets. Since January 1, 1994, the federal Energy Policy Act of 1992 has limited toilets sold for residential use to 1.6 gpf.

Sometimes the toilet replacement program also includes shower and faucet retrofit. This is most convenient when the program includes installation by a licensed plumber under contract to the Water Agencies.

This program, could be applicable to all existing residential dwellings or could be targeted at one sector, such as multifamily buildings. It would have an overall goal, such as, replacing approximately 25 percent of existing targeted residential toilets with ULF toilets within ten years, or by the year 2010, or matching the effectiveness of a retrofit-on-resale ordinance. Other programs could deal with nonresidential toilets. This replacement rate amounts to about 2.5 percent per year. The Water Agencies would develop an application procedure for those dwelling owners intending to replace toilets. Those who would install the toilets as part of new construction or remodeling requiring a permit would not be eligible since these customers should not be given an incentive for complying with the new laws.

ALTERNATIVE MEASURE- Partial Retrofit

Partial Retrofit (1,022 homes)-A partial retrofit would include replacing residential toilets, showerheads, and fixing internal residential leaks by 10% of the total number of customers for two years.

ALTERNATIVE MEASURE- Complete Retrofit

Complete Retrofit (1,022 homes)-A complete retrofit would include replacing residential toilets, showerheads, laundry, and fixing internal residential leaks by 10% of the total number of customers for two years.

ALTERNATIVE MEASURE- Community Retrofit By Retrofit On Resale Ordinance

This measure is similar to BMP 14 except that implementation would be through an ordinance requiring that bathrooms be retrofitted on the sale of the home. The measure would also be extended beyond toilets and also require low flow showerheads at the time of sale.

This requirement would be applicable to all existing residential dwellings. It would have an overall goal of replacing approximately 90 percent of existing targeted residential toilets with ULF toilets and 90 percent of existing showerheads at the rate of 7 percent per year. Seven

percent per year is the assumed housing turnover rate. Thus this program would extend 13 years to reach 90 percent.

ALTERNATIVE MEASURE- Community Fixture Replacement

This measure is also similar to BMP 14 and a retrofit on resale program except that implementation would involve subsidized retrofit and a requirement (ordinance) mandating that bathrooms be retrofitted before hook-up to the new sewer system. The measure would also be extended beyond toilets and require low flow showerheads before sewer hook-up.

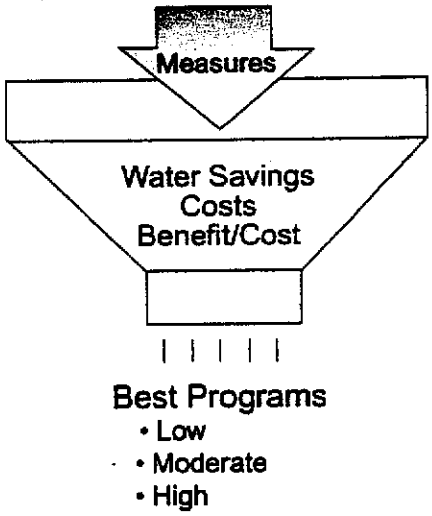
In this measure Los Osos would defray about half of the residential customer's cost of compliance by providing toilets and showerheads free of charge. Residential customers could either install the devices themselves or hire a plumber to do it. They could also select and purchase a toilet and showerhead at their own expense rather than accept the District models. Customers would have to produce a certificate of compliance or the District would inspect the home before hook-up. This inspection would occur when the sewer from the house to the main is inspected, so that there would be minimal added inspection cost on the part of the District.

During implementation of the measure, the District may also choose to require fixture replacement for non-residential customers prior to connection to the wastewater system. Although non-residential demand is relatively low compared to residential demands, and do not effect the overall magnitude of project water savings, issues of equitable treatment among all customers may compel the District to require fixture replacement for non-residential customers as well as residential customers. The lack of specific demand information for non-residential connections results in uncertainty over estimating water savings that would result from non-residential customers, but savings additional savings will occur and expanding the measure will not affect the overall cost effectiveness of the program. The District may choose to also require the non-residential customers to cover the entire cost of the program including fixture acquisition.

Section 7
Evaluation of Long-Term Water Conservation Measures

Section 6 presented a description of alternative water conservation measures considered for possible implementation. In this section, the water savings are estimated and cost for the measures developed. This section also describes how economic benefits are estimated. Benefits and costs are compared in a formal present-worth analysis and conclusions are drawn about which measures produce cost-effective water savings. This process can be thought of as an economic screening process, shown in Figure 7-1, that can be used to help decide which, if any, measures should be recommended.

FIGURE 7-1 EVALUATION PROCESS



The text that follows assumes the reader is somewhat familiar with benefit-cost analysis, as it is used for evaluating conservation measures, so that the results can be emphasized and the description of the methodology can be brief. Additional background can be obtained from Maddaus et al.'s article "Integrating Conservation into Water Supply Planning" in *Journal AWWA* (November, 1996) and the AWWA publication "Evaluating Urban Water Conservation Programs: A Procedures Manual" (1993).

CONSERVATION MEASURE EVALUATION

As part of the evaluation process, the list of measures described in Section 6 were subjected to an initial feasibility screening process. The 14 BMPs, and four other measures, were narrowed to a list of eleven measures with quantifiable water use reductions or cost savings (see Table 7-2). These eleven potentially cost effective measures were subsequently evaluated in detail, including a benefit-cost analysis.

Devices, Measures, and Programs

The following terms are used in the evaluation process:

- **Device** - A physical item of hardware, such as a new toilet, or specific action by individuals, such as cooling tower audits, that would save water if the recommendations are implemented or carried out by the District, Cal Cities or some other group.

- **Measure** - A device(s) plus a distribution method and possibly an incentive, such as a rebate, targeted at a particular type of end user that, when implemented, will save water.

- **Program** - A set of one or more measures that would be managed together.

- **Plan** - A long-range set of programs with an estimated budgets, schedules, and staffing plan.

Menu of Water Conservation Alternatives

The list of potential measures included in the evaluation process is shown in Table 7-2. Only those measures with quantifiable benefits and costs were included in the more detailed analysis discussed later in this Section. It is assumed that the measures that were not evaluated quantitatively will be implemented, if applicable and as called for in the BMPs. Most of these other measures either do not apply to the Project Area or are low cost measures that would not materially affect the cost of implementing the recommended plan. It is presumed that the recommended plan will be comprised of these measures plus those that are clearly cost-effective.

Some of the measures overlap in water savings; that is, they target the same areas for water conservation. This potential overlap will be accounted for, where necessary, during the combination of measures into a recommended plan in Section 8.

Results of Evaluation

Table 7-2 shows the alternatives selected for further evaluation. A detailed description of the selected measures is given in Appendix A. This appendix covers the expected market penetration, water savings and costs of the measure.

OVERVIEW OF THE BENEFIT-COST METHODOLOGY

The evaluation of alternative measures was done using benefit-cost analysis. The purpose of this analysis is to identify which of the above measures are cost-effective for the entity to pursue. Benefit-cost analysis has been used by many water agencies to evaluate and help select a water conservation measure best suited to local conditions. This analysis requires a locale-specific database on water use, demographics, and land use.

TABLE 7-2
MEASURES SELECTED FOR FURTHER EVALUATION

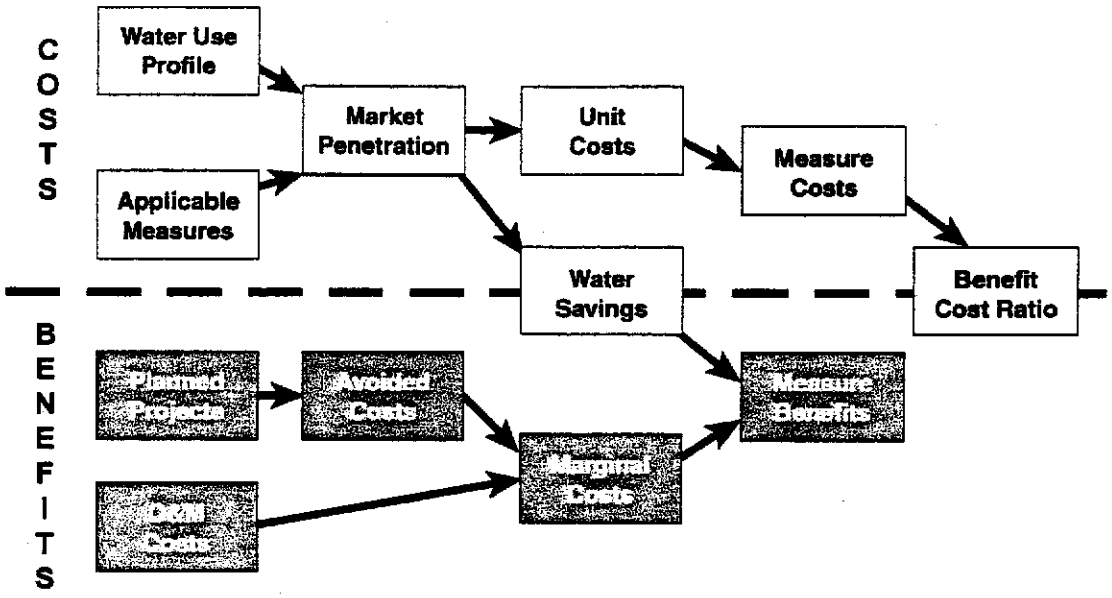
BMP #	Measure	Measure Evaluated in Benefit/Cost Analysis
1	Water Surveys for Single-Family and Multi-Family Residential Customers	YES
2	Residential Plumbing Retrofit	YES
3	System Water Audits, Leak Detection and Repair	NO
4	Metering	NO
5	Large Landscape Conservation & Incentives	YES
6	High-Efficiency Appliance Promotion	YES
7	Public Information (P.I.)	YES
8	School Education	NO
9	Commercial/Industrial/ Institutional Conservation	YES
10	Wholesale Agency Assistance	N/A
11	Non-Promotional Pricing	NO
12	Water Conservation Coordinator	NO
13	Water Waste Prohibition	NO
14	Residential ULF Toilet Replacement	YES
	Partial Retrofit	YES
	Complete Retrofit	YES
	Community Retrofit by Retrofit on Resale Ordinance	YES
	Community Fixture Replacement	YES

The following steps can be used to implement the methodology, shown graphically in Figure 7-3:

1. Develop baseline water use projections without conservation. Projections should cover each key customer category and be broken down into indoor and outdoor use. These were presented in Section 3.
2. Identify possible water conservation measures and screen the measures qualitatively to identify those that are applicable to the service area. Develop appropriate unit water savings and cost factors for each measure.
3. Estimate the affected population (or number of accounts) for each conservation measure by multiplying the total service area population (accounts) by the measure's projected population (or accounts) that implement the measure. This factor is called the market penetration or installation rate.
4. Estimate total annual average and peak day water savings. The water savings are computed by multiplying unit water savings, per measure, by a market penetration or installation rate, and then multiplying by the number of units in a particular service area (such as dwelling units) targeted by a particular measure.

5. Identify types of benefits to the water agency and calculate the unit value of capital project deferrals and reduced operation and maintenance costs. The results are then expressed in unit value form, i.e., dollars per 1000 gallons saved.
6. Quantify total benefits for each year in the planning period by multiplying average water savings by the unit benefit.
7. Determine initial and annual costs to implement the measures based upon pilot projects, local experience, and the costs of goods, services, and labor in the community. This is multiplied by the number of units participating each year and then added to overall administration and promotion costs to arrive at a total measure cost, which may be spread over a number of years.
8. Compare benefits and costs by computing the present worth of costs and benefits over the planning period.
9. Select a recommended conservation plan containing cost-effective measures (i.e., benefit-cost ratios greater than one and acceptable non-quantifiable impacts).

FIGURE 7-3
BENEFIT-COST ANALYSIS METHODOLOGY



WATER SAVINGS

Estimated water savings are useful to help utility planners forecast how future demands may be impacted by water conservation. Savings normally is expected to be true for the Water Agencies where savings should develop slowly; reaching full maturity after full market penetration is achieved. This may occur five to ten years after the start of implementation with the exception of the Community Fixture Replacement Program which will result in substantial savings (full market penetration over a 24 month period).

Methodology and Sources of Data

Data necessary to forecast water savings of measures include specific data on water use, demographics, market penetration, and unit water savings. These are described as follows:

Base Water Use

Base water use (without conservation) projections were developed through the year 2029 in Section 3. Base water use was projected to increase from 2.016 (mgd) in 2000 to 2.34 mgd in 2029.

Demographics

Demographic data were presented in Section 2. Service area population, total dwelling units, and residential and non-residential demand were used to evaluate measures.

Market Penetration

The market penetration for existing customers is the estimated percentage of customers that will be participating in the measure by the end of the measure. Estimates are based on measure design, and experience from similar measures implemented by other water agencies (see Figure 7-3). Market penetrations adopted for use in this project are shown in Table 7-4.

The concept of market penetration can be explained by way of an example utilizing large lot landscape surveys. If approximately 10,000 residential dwellings exist when a measure begins, and the ultimate penetration rate of 10 percent will be reached after three years, then 1000 customers would have participated by the third year. Each year 333 new dwellings would be surveyed until all 1000 had been audited. Certain measures require maintenance or repetition. For example, surveys would need to be done every year in order to maintain savings because the effects of the surveys may have a limited life. Thus, if water savings from the surveys are assumed to last five years (the life of the measure), then additional surveys (in this case 333) or other appropriate follow-up with prior surveyed homes may be done every year to ensure the water savings are permanent.

Errors in market penetration estimates for each measure can be significant because they are based on previous experience, chosen implementation methods, and projected effort and funds allocated to the measure. The potential error can be corrected, through re-evaluation of the measure, as the implementation of the measure progresses. For example, if the market penetration required to achieve the needed savings turns out to be more or less than predicted, adjustments to the implementation efforts can be made. Larger rebates or more promotions may be used to increase the market penetration, for example. The process is iterative to reflect actual conditions and helps to ensure the market penetration and needed savings are achieved regardless of future variances between estimates and actual conditions.

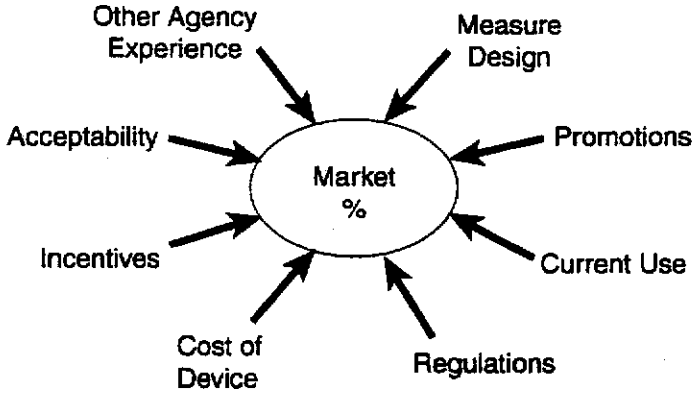
In contrast, market penetration for mandatory ordinances can be more predictable. The Community Fixture Replacement Program would be adopted by Ordinance requiring that plumbing is retrofit before connection of a structure to the District's wastewater project. The program can assure an almost 100% market penetration for those properties that connect to the District's wastewater system.

TABLE 7-4

MARKET PENETRATION OF MEASURES FOR NEW AND EXISTING CUSTOMERS

BMP #	Measure	Customer Categories	Applicable Market	Target Market	Acceptance Rate	Total Market Penetration	Comments
1	Water Surveys-Residential	SFR, MFR	100%	100%	20%	20%	
2	Residential Plumbing Retrofit	SFR, MFR Existing	pre-1992 homes	100%	50%	50%	
3	Systems Water Audits, Leak Detection, and Repair	Pub New & Existing	100%	100%	100%	100%	100% if UAW > 10%
4	Metering	All	100% new	100%	100%	100%	complete
5	Large Landscape Water Conservation	CII Existing	All commercial accounts	20%	50%	10%	
6	High-Efficiency Appliance Promotion	Res New & Existing	replacement appliances	15% per year	5-20%	.6-3% per year	washing machine
7	Public Information Programs	All	100%	100%	100%	100%	
8	School Education Programs	Res	100%	100%	100%	100%	
9	Commercial/ Industrial/ Programs	CII	100%	Top 20%	50%	10%	
10	Wholesale Agency Assistance	All	Retailers	100%	100%	100%	
11	Non-Promotional Water Pricing	All	100%	100%	100%	100%	
12	Water Conservation Coordinator	All	100%	100%	100%	100%	
13	Water Waste Prohibition	All	100%	100%	100%	100%	
14	Residential ULFT Replacement	Res	Pre-1994 homes	100%	7% per year	7% per year	
	Partial Retrofit	Res	Pre-1994	100%	20%	20%	
	Complete Retrofit	Res	Pre-1994	100%	20%	20%	
	Resale Ordinance	Res	Pre-1994	100%	7% per year	7% per year	
	Fixture Retrofit	Res	Pre-1994	100%	100%	100%	

FIGURE 7-5
ASSESS MARKET PENETRATION



Unit Water Savings

Unit water savings, presented in Table 7-6, are expressed either on percent reduction in water use per account or on a per-capita or per-employee basis. Long-term savings reflect some decline from initial levels due to device removal and reversions to old habits. Long-term savings are those that are sustainable.

TABLE 7-6

UNIT WATER SAVINGS OF CONSERVATION MEASURES

BMP #	BMP Measure	Long-Term Savings		Section 1
		Interior	Exterior	Total
1	Water Surveys for Single-Family and Multi-Family Residential Customers	5%	10%	6%
2	Residential Plumbing Retrofit	21% of shower use		
3	System Water Audits, Leak Detection and Repair			Variable %, if UAW > 10%
4	Metering			
5	Large Landscape Conservation & Incentives		15%	
6	High-Efficiency Appliance Promotion	4.5 gcd		
7	Public Information (P.I.)			3% of Residential Use
8	School Education			Included in P.I.
9	Commercial/Industrial/Institutional Conservation	13.5%		
10	Wholesale Agency Assistance			Not Applicable
11	Non-Promotional Pricing			Varies
12	Water Conservation Coordinator			Included in others
13	Water Waste Prohibition			Included in others
14	Residential ULF Toilet Replacement	10.5 gcd		
	Partial Retrofit (1,022 homes)	10.5 gcd (toilets) 21% shower 50% leakage		
	Complete Retrofit	10.5 gcd (toilets) 21% shower 50% leakage 4.5% gcd (laundry)		
	Retrofit on Resale	10% gcd (toilets) 21% showers		
	Community Fixture Replacement	10% gcd (toilets) 21% showers		

Estimated Water Savings

The projected total water savings associated with the affected market are shown in Table 7-7. The snapshot of annual savings is given for three specified years: 2005, 2010, and 2020. The total savings assume the measures begin in 2002.

TABLE 7-7

PROJECTED WATER SAVINGS, MILLION GAL/DAY

BMP	Measure	2005	2010	2020
1	Water Surveys for Single-Family and Multi-Family Residential Customers	0.01	0.02	0.03
2	Residential Plumbing Retrofit	0.01	0.01	0.01
3	System Water Audits, Leak Detection and Repair	ND	ND	ND
4	Metering	ND	ND	ND
5	Large Landscape Conservation & Incentives	<0.00	<0.00	<0.00
6	High-Efficiency Appliance Promotion	0.10	0.10	0.10
7	Public Information (P.I.)	0.05	0.05	0.06
8	School Education	ND	ND	ND
9	Commercial/Industrial/ Institutional Conservation	<0.00	<0.00	<0.00
10	Wholesale Agency Assistance	N/A	N/A	N/A
11	Non-Promotional Pricing	ND	ND	ND
12	Water Conservation Coordinator	ND	ND	ND
13	Water Waste Prohibition	ND	ND	ND
14	Residential ULF Toilet Replacement	0.05	0.08	0.08
	Partial Retrofit (1,022 homes)	0.004	0.04	0.03
	Complete Retrofit (1,022 homes)	0.05	0.05	0.04
	Replacement on Resale	0.04	0.08	0.12
	Community Fixture Replacement	0.14	0.12	0.11

ND – Not Determined.

COSTS OF MEASURES

The costs associated with implementing conservation measures depend upon each measure's design. Cost categories include labor by Water Agencies' staff or outside contractors to administer and perform any required fieldwork, expenses, incentives, and one-time setup costs or inspection. The mandatory measure, such as a plumbing fixture replacement ordinance, may involve both costs to the District and costs to the customer for implementation. Since all water conservation costs are invariably paid for by the customer (either directly or indirectly through rate increases), it is best to minimize total costs while maximizing total benefits.

Some of the measures, such as Public Information, could be implemented through use cooperative efforts between the District and Cal Cities. Other measures, such as the plumbing fixture replacement, will need to be implemented by independent contractors, during work on the wastewater project.

Costs were determined for each of the measures based on industry knowledge and past experience. Costs may include incentive costs, usually determined on a per-participant basis; fixed costs, such as

marketing; variable costs, such as the costs to staff the measures and to obtain and maintain equipment; and a one-time setup cost. The setup cost is for measure design by staff or consultants, any required pilot measure, and preparation of materials that will be used in marketing the measure. Measure costs were estimated for each year between 2002 and 2029. Costs were spread over the time period depending on the length of the implementation period for the measure. Some of the costs occur uniformly over the planning period; others occur only in the first three to five years, after which implementation is finished and only the costs to maintain the measure are incurred.

Lost revenue due to reduced water sales is not included as a cost because the conservation measures evaluated herein generally take effect over a span of time that is sufficient to enable timely rate adjustments, if necessary, to meet fixed cost obligations. It is important to recognize that cost savings are not based on the price of water that the District and Cal Cities sells to its customer.

The total costs over the first five years for each measure are shown in Table 7-8. Because each measure has a different spending stream associated with it, the table also shows the average annual cost in the tenth year of the program. Some programs are complete in less than ten years so the cost in the tenth year is zero. A present worth was computed for the annual values and used in the benefit-cost analysis, as discussed below.

BENEFITS

Lower consumption gained by water conservation will enhance the community's to serve its build-out population without importing additional water supplies and treatment facilities. The benefits from conservation were based on reduced pumping (energy costs), avoiding the cost of supplemental water, and reduced wastewater disposal costs.

While many costs associated with operation and maintenance of a water system are fixed and will not vary with the level of consumption or production, other costs are directly related to the level of production. For example, energy costs and chemical costs are frequently directly related to production levels.

BENEFIT-COST ANALYSIS

The economic feasibility of water conservation measures depends on comparing the costs of the measures to the benefits provided. The two previous sections developed the costs and potential benefits associated with the conservation measures. This section brings these two pieces together to determine the economic viability of the measures.

TABLE 7-8

COST OF CONSERVATION ELEMENTS

BMP #	Measure	Unit Cost $/Unit	First Five Years Utility Cost $
1	Water Surveys for Single-Family and Multi-Family Residential Customers	$40 per Account	$20,487
2	Residential Plumbing Retrofit	$25 per kit	$63,875
3	System Water Audits, Leak Detection and Repair	ND	ND
4	Metering	ND	ND
5	Large Landscape Conservation & Incentives	$1,000 per site	$25,058
6	High-Efficiency Appliance Promotion	$100 per rebate	$22,479
7	Public Information (P.I.)	$2.00 per resident per year	$46,762
8	School Education	ND	ND
9	Commercial/Industrial/ Institutional Conservation	$3,000 per site	$75,173
10	Wholesale Agency Assistance	ND	ND
11	Non-Promotional Pricing	ND	ND
12	Water Conservation Coordinator	ND	ND
13	Water Waste Prohibition	ND	ND
14	Residential ULF Toilet Replacement	$250 per dwelling	$448,153
	Partial Retrofit (1,022 homes)	$750 per dwelling	$724,054
	Complete Retrofit (1,022 homes)	$1,500 per dwelling	$1,448,109
	Retrofit on Resale	$450 per dwelling	$10,000
	Community Fixture Replacement	$450 per dwelling	$1,153,056

NA – Not Available
ND – Not Determined

Methodology

Benefit-cost analysis can be performed from several different perspectives, based on who is affected. For conservation measures in this plan, benefit-cost analyses include utility and total resource (community). The "utility" benefit-cost analysis is based on the benefits and costs to the water agencies. The "community" benefit-cost analysis includes utility benefit and costs together with property owner/customer benefits and costs.

As described above, the costs used for this analysis are the actual costs paid by the Water Agencies to save water. These include the incentives, measure administration, marketing, surveys, evaluations, and other costs detailed previously in this section. The utility perspective offers two advantages for this analysis. First, it considers only the water saving measure costs that will be directly borne by the utility. This enables the utility to fairly compare potential investments for

saving and supplying water. Second, because revenue shifts are treated as transfer payments, the analysis is not complicated with uncertainties associated with long-term rate projections and rate design assumptions.

No specific benefit-cost analysis can be used without shortcomings. The principal weakness of the utility perspective is that it does not count the benefits accrued or costs incurred outside of the utility. Costs incurred by customers striving to save water while participating in conservation measures are not considered. Similarly, other factors external to the utility, such as environmental effects, are not included in the benefit-cost analysis from the utility perspective. Because these external factors are often difficult to quantify, they are frequently excluded in economic analyses.

All benefits (e.g., avoided costs) and costs used as inputs to this analysis are estimated in 2000 dollars. Although the analysis extends forward for thirty years, neither benefits nor costs are inflated for future years. The simplifying assumption is to ignore inflation, since it will apply to both benefits and costs. While this assumption is appropriate for this study, the effect of not projecting inflation is to undervalue the difference between total benefits and costs.

The time value of money is not ignored, however. The value of all future costs and benefits, even though they are in 2000 dollars to begin with, are discounted to 2000 at the annual discount rate of 3 percent. Cash flows discounted in this manner are referred to as "Present Value" sums throughout this study.

Results

Table 7-9 summarizes the water saving and economic performance of the alternative measures, with details shown for each measure. Table 7-9 includes performance statistics for each measure. The benefit-cost ratio presented for each measure indicates a wide range in cost-effectiveness between measures.

In Section 8, a recommended conservation plan is developed along with water savings specific to that plan. The plan will include some of the cost-effective measures plus the other measures that were not evaluated quantitatively and apply the LOCSD's situation and would be beneficial to the District and it's customers.

TABLE 7-9
Benefit-Cost Analysis
Comparison between Ground Water, Supplemental Water and Wastewater Disposal Costs

Measures	Water Savings (mgd)[1]	Cost of Savings ($/mg)[1]	Benefit Cost Ratios - Ground Water				Benefit Cost Ratios Assuming Supplemental Water[2]			
			No additional disposal costs		Additional disposal costs[3]		No additional disposal costs		Additional disposal costs[3]	
			Water Utility	Total Community	Water Utility	Total Community	Water Utility	Total Community	Water Utility	Total Community
BMP 1 Residential Audits	0.022	731.76	0.2	0.7	0.6	1.1	3.2	3.7	3.6	4.1
BMP 2 Residential Retrofit	0.013	398.37	0.8	7.3	2.9	9.5	6.7	13.3	8.8	15.4
BMP 5 Large Landscape Conservation	0.000	18,320.97	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
BMP 6 Residential Washer Rebate	0.003	1,817.59	0.1	0.5	0.4	0.7	1.0	1.0	1.3	1.1
BMP 7 Public Information	0.048	334.54	0.6	2.4	1.8	3.6	7.3	9.1	8.5	10.3
BMP 9 CII Conservation	0.002	2,823.40	0.1	0.1	0.3	0.3	0.9	0.9	1.1	1.1
BMP 14a ULFT Replacement (Rebate)	0.066	1,273.97	0.2	0.2	0.8	0.8	2.0	2.0	2.6	2.6
BMP 14b ULFT Replacement (Ordinance)	0.066	12.79	22.1	0.2	83.6	0.8	194.3	1.9	255.9	2.5
Partial Retrofit (1,022 homes 2 yrs)	0.035	1,849.81	0.2	0.4	0.6	0.9	1.5	1.7	2.0	2.2
Complete Retrofit (1,022 homes, 2 yrs)	0.044	2,909.65	0.1	0.4	0.4	0.7	0.9	1.3	1.2	1.6
Community Fixture Replacement (2 yrs)	0.104	845.01	0.4	0.5	1.3	1.0	3.1	1.9	4.1	2.4
Community Retrofit Ordinance (14 yrs)	0.086	9.20	28.8	0.4	109.1	0.8	253.4	1.6	333.7	2.0

Notes
1) Averaged over 30 years
2) Supplemental Water of 1,400 Acre Foot
3) Disposals Costs means and additional cost of wastewater disposal for the amount of $1,469/mg on top of the $270/mg operating and maintenance costs
ULFT: Ultra low flow toilets
CII:Conservation Programs for Commercial, Industrial, Institutional Customers
Source:\\JLWA01\Proj\384-LOCSD\H2O Conservation Plan\Report\FINAL REPORT\Measure Comparison.xls

Section 8
Recommended Plan

The purpose of this section is to select and describe in detail the recommended Urban Water Management Plan. The Plan considers the 18 measures described in Section 6 and is tailored to the District. The Plan will improve the water use efficiency throughout the District in a cost-effective and acceptable manner, reduce wastewater flows and disposal costs, and reduce or defer needs for imported water.

SELECTION OF RECOMMENDED PLAN

This section describes how the alternatives evaluation in Section 7, along with other qualitative information, was used to select the plan.

Selection Criteria

Selection criteria included the following:

- Benefit-cost ratio;
- Long-term water savings;
- Annual costs;
- Impact on District staffing and budget;
- Socioeconomic impact on customers; and
- Other considerations.

Shown in Table 8-1 are the measures selected for the recommended plan. Table 8-1 also identifies programs that the District should consider after implementation of the programs recommended in this plan and after the District's Safe Yield Analysis is completed.

The major emphasis of this plan is reducing indoor water use. BMP's 1, 2, and 14 will be partially or entirely implemented with the recommended Community Fixture Replacement Program. Implementation of the plan will reduce indoor consumption, and wastewater flows by an estimated average of 150,000 gpd. The benefit-cost ratio is 2.88:1. Those benefits are more fully discussed below.

Reduction in landscape irrigation is not a major emphasis in this plan. Nevertheless, since the benefit-cost ratio indicated that those programs can also be effective, they have not been eliminated. The benefit of outdoor programs is driven by the potential cost of imported water.

Table 7-9 showed the benefit-cost evaluation of the measure effecting outdoor consumption assuming:

A) The cost of saved water equals the cost of supplying groundwater, and
B) The cost of saved water equals the cost of imported water.

The benefit cost conclusions are substantially different depending on whether the cost of water is assumed to be groundwater or supplemental water.

As discussed in Section 4, a Safe Yield adopted by the District does not exist. The District's upcoming safe yield calculation of its Master Water Plan are intended to increase the District's knowledge of its groundwater supply, at which time the District should re-evaluate the potential effectiveness of outdoor water conserving programs.

Table 7-9 also illustrates the benefit-cost evaluation for the programs that are recommended in the plan. The assumption that imported water will be needed if conservation programs are not implemented again has an impact on benefit-cost conclusions.

Indoor programs are the major emphasis of this plan because they are shown to be cost beneficial, they meet the community goal of pursuing resource sustainability, and they provide multiple benefits including:

A) Reduced wastewater flows and reduced wastewater disposal costs;
B) Reduced need for importing water; and
C) Provide homeowner with other benefits such as lower costs of utility bills including gas and electricity.

Although some uncertainty may exist regarding the potential need for imported water, existing studies provide an indication that conservation is needed to defer or reduce the need to import water. In addition to the benefit-cost analysis other factors exist that compel the conclusions supporting the recommended programs:

A) The availability of sites for the District to dispose its treated wastewater is limited, which can make the acquisition and development of those sites difficult – regardless of cost.
B) The development of the District's wastewater project provides a unique opportunity to implement an administratively concise and efficient retrofit program with bulk purchasing capabilities for fixtures.
C) The ability of the community to be resource self-sufficient is enhanced by implementing effective water conservation measures.

In addition to the recommendation that result from the benefit-cost evaluation, other BMPs should be implemented according to how they are defined in the latest MOU by the CUWCC. The steps the District needs to undertake are outlined in this section.

TABLE 8-1
BMPS SELECTED FOR RECOMMENDED PLAN

Measure	Selected	Not Selected	Comments
BMP # 1 Water Surveys for Single-Family and Multi-Family Residential Customers		Overlaps with Community Fixture Replacement Program	Re-evaluate after Safe Yield Analysis for outdoor benefits
BMP # 2 Residential Plumbing Retrofit		Covered by Community Fixture Replacement Program	
BMP # 3 System Water Audits, Leak Detection and Repair	Continue current efforts		UAW < 10% Prepare annual water audit
BMP # 4 Metering	Establish customer categories for billing, monitor unusual usage		Re-evaluate Irrigation Meters after Safe Yield Analysis
BMP # 5 Large Landscape Conservation & Incentives			Re-evaluate after Safe Yield Analysis
BMP # 6 High-Efficiency Appliance Promotion	PG&E Partnership		Low B/C so small program only
BMP # 7 Public Information (P.I.)	Expand current efforts of Cal Cities		Use P.I. to publicize other measures
BMP # 8 School Education	Expand current efforts of Cal Cities		
BMP # 9 Commercial/Industrial/ Institutional Conservation		Not cost-effective	Too few CII accounts, low water savings
BMP # 10 Wholesale Agency Assistance		Not Applicable	
BMP # 11 Water Conservation Pricing	Implemented		Inclining block rates in place
BMP # 12 Water Conservation Coordinator	Designate or hire staff		
BMP # 13 Water Waste Prohibition	Incorporate into Rules & Regulations		
BMP # 14 Residential ULF Toilet Replacement		Covered by Community Fixture Replacement Program	
Community Fixture Replacement Program	Require indoor fixture replacement prior to connection to District's wastewater project		District pays for fixtures, customers pay for installation

DESCRIPTION OF THE PLAN

A summary of each plan element is provided below, organized by BMP and measure. A more detailed description of each measure, including delivery mechanisms, assumed market penetration, unit costs and water savings, is provided in Appendix A.

BMP # 1. Water Surveys for Single-Family and Multi-Family Residential Customers

Since the Community Fixture Replacement Program will substantially reduce indoor usage, this BMP should be re-evaluated after the preparation of the Safe Yield Analysis for the benefits of reducing outdoor usage.

BMP # 2. Residential Plumbing Retrofit- Covered by the Community Fixture Replacement Program

BMP # 3. Systems Water Audits, Leak Detection, and Repair

Some system water losses, or unaccounted-for water (UAW), are authorized. Authorized losses include flushing hydrants by fire departments, or water use in unmetered District buildings. The remainder of UAW is caused by leaks or meter inaccuracy. The purpose of this measure is to reduce leaks from older systems and from broken pipes, joints, or valves. This BMP requires no action if UAW is less than 10 percent (other than studies to verify that it is). Starting in 1995, and after system rehabilitation efforts by the District, UAW dropped below 10 percent, and it still is below this figure. The District will monitor UAW by comparing water produced with water sales on a monthly basis with annually reporting to the District's Board of Directors. Should the UAW exceed 10 percent on an annual basis, the District will undertake a system water audit to identify that portion of the UAW suspected of being caused by leaks. If cost-effective, the District will increase leak detection and repair efforts and continue meter replacements, until the UAW is lowered below ten percent.

BMP # 4. Metering

The Water Agencies complied with most of the provisions of this BMP, since the connections to the system are metered and are billed based on volume of use. The Water Agencies do have mixed use meters serving both indoor use and landscape irrigation. After the Safe Yield Analysis is prepared, the District can re-evaluate the merits of a program to provide incentives to customers to switch mixed use accounts to dedicated landscape meters and separate indoor use meters. Incentives could include discounts on connection fees or higher sewer use fees (based on billed water use) so that the customer finds it cost-effective to install a separate irrigation meter. This would enable the landscape water use to be better controlled since water budgets would be prepared for new irrigation meters under BMP 5. These budgets and the potential to save water and money are also customer incentives. The Water Agencies should assign customers to categories and monitor unusual usage based on categories or prior usage.

BMP # 5. Large Landscape Conservation and Incentives

This measure is designed to reduce peak demand by improving outdoor irrigation efficiency. It should be re-evaluated after preparation of the Safe Yield Analysis.

BMP # 6. High-Efficiency Appliance Promotion Programs

LOCSD will encourage customers to purchase high efficiency (tumble action) washing machines. These machines can reduce clothes washer water use by about one-third but they currently cost considerably more to purchase. The District will work with PG&E to promote these machines. The District will offer a $100 rebate to their customers.

BMP # 7. Public Information Programs

This measure is an extension of the Cal Cities' existing public information efforts. It serves as the 'glue' to tie all the other measures together. It would not only promote specific conservation measures and rebates, but also cultural/social aspects of establishing or enhancing a water conservation ethic among the LOCSD customers; most importantly, it would convey to the public an understanding of why water conservation is important.

The recommended plan includes budget for new programs. New programs could include poster contests, T-shirt design contests, speakers to employee and community groups, presentations and tours with hands-on demonstrations; advertisements in the local newspaper. The Water Agencies will attempt to put the water use from the same period in the prior year on customer water bills. Public education would continue to be used to raise awareness of other conservation measures available to Water Agency customers. The single-family homeowners would be targeted for receiving information on landscape water efficiency and low water use landscaping.

BMP # 8. School Education Programs

Long-term results to eliminate wasteful water-use habits are best achieved by education of young people. The program will especially target school-age children with presentations, poster contests, printed educational materials, and theatrical presentations. They, in turn, will inform their parents of the importance of water conservation in southern California. Teaching children to respect the value of water will help them grow into responsible adults with a conservation ethic. Educational material must meet state education frameworks, and grade appropriate materials should be distributed to grade levels K-3, 4-6, 7-8, and high school.

BMP # 9. Commercial/Industrial/Institutional Programs

This program is currently not cost-effective.

BMP # 10. Wholesale Agency Assistance- Not Applicable

BMP # 11. Conservation Water Pricing Programs

The District has a conservation pricing structure in place for its customers. Cal Cities' customers pay for water on a uniform rate basis. The District will keep conservation rates in-place over the duration of the plan.

BMP # 12. Water Conservation Coordinator

The Water Agencies will designate a water conservation coordinator. Duties of the coordinator shall be:

- Coordination and oversight of conservation programs and BMP implementation.
- Preparation and submittal of the progress reports to various parties.
- Communication and promotion of water conservation issues to agency senior management; coordination with operations and planning staff; preparation of annual conservation budget; preparation of water conservation plan updates.

BMP # 13. Water Waste Prohibition

The Water Agencies will enact and enforce measures prohibiting gutter flooding, single pass cooling in new connections, nonrecirculating systems in all new conveyor car wash and commercial laundries, and nonrecycling decorative water fountains. The District will draft and include language in its proposed ordinance updating its Rules and Regulations.

BMP # 14. Residential ULFT Replacement- Not Applicable- Overlaps with Community Fixture Replacement Program

ALTERNATIVE MEASURE – Community Fixture Replacement Program

New toilets and showerheads meeting the current plumbing code would be installed over a two-year period for residential customers, and optionally for non-residential customers as discussed in the measure description on page 6-7, according to a District ordinance as a condition of connecting to the District's wastewater system.

In this measure Los Osos would defray about half of the customer's cost of compliance by providing toilets and showerheads free of charge. Customers could either install the devices themselves or hire a plumber to do it. Customers could also select and purchase a toilet and showerhead at their own expense rather than accept the District models. Customers would have to produce a certificate of compliance, or the District would inspect the home before hook-up. This inspection would occur when the sewer from the house to the main is inspected, so that there would be minimal added inspection cost on the part of the District.

PROJECTED WATER SAVINGS

The plan will result in water savings, principally from the mandatory Community Fixture Replacement Program, and Public Information. By the year 2010, these two programs will save about 177,000 gallons per day. In addition, there will be savings from the washer rebate program, depending upon the number of customers that purchase high-efficiency washing machines, and the partnership arrangement with PG&E.

BENEFITS

The Plan will have a benefit-cost ratio of about 2.88 to 1. This means that, over 30 years, the District will receive $2.88 for every $1 invested in conservation. Another way to look at this is the reduced cost of wastewater disposal and avoided cost of supplemental water, due to water saved. In 2010, for example, the recommendations will be saving 180,000 gallons per day. This translates to nearly 200 acre-feet of savings per year, at a current value of $360,000 per year. Of course, the recommendations will continue to save water for 20 years or longer, so the benefits will continue even after the money on the program has been spent.

IMPLEMENTATION

The ten-year implementation plan includes a schedule, budget and staffing.

Schedule

The plan period covers ten years. It can start as soon as budget for programs is approved. This is planned to occur in the year 2002. The community retrofit program will be completed in 2004, while the public education and washing machine program will continue.

Budget

Table 8-2 shows the recommended budget for the plan elements. These are expressed for each of the first five years (start-up phase) and 5 year increments thereafter. These projected budgets are in addition to current expenditures. Grant funding for the Community Fixture Replacement Program may be available California Department of Water Resources and/or the U.S. Bureau of Reclamation.

Staffing

The Water Agencies will need to utilize various resources to implement the existing plan. Water Agencies' staff may be able to work on the start-up phase that includes developing administrative policies and procedures. Existing staff should also be prepared to respond to general public inquiries, and provide the public with general literature, on the implementation of conservation measures.

It is difficult, however, to envision that existing staff has time available to develop detailed procedures and guidelines for implementation.

Implementation of the measures recommended in this plan will require a coordinated effort of resources. An ordinance for the Community Fixture Replacement Program will need to be prepared by legal counsel. Management of the measure will require coordinating the acquisition and distribution of replacement fixtures, database management for tracking the parcels that have been retrofit versus those that have not been retrofit, management of the inspections and plumber certifications. The District will need additional staff to accomplish these efforts. Alternatively, the District may add these tasks into the scope of work for the management of the District's wastewater project, or, hire an independent contractor/consultant to manage the measure.

The District may require assistance in developing the washing machine rebate program. Coordination of program development with PG&E and development of the District's procedures will need to be accomplished. District policies will need to be adopted by the District's Board of Directors.

The District should consider hiring an independent contractor/consultant for public education, and it should request that Cal Cities Water Company and S & T Mutual Water Company share in the cost of public education. The terms of the Groundwater Management Agreement, executed in 1994, specifically states that the Water Purveyors shall "exercise good faith efforts" in developing groundwater management strategies, which include water conservation.

TABLE 8-2
BUDGET FOR RECOMMENDED PLAN

	Program			
			Community Fixture Replacement	
Year	BMP 6 Residential Washer Rebate	BMP 7 Public Information	Toilet(2 per household)/Showerhead Fixture & Appurtenances/District Administration/Inspection	Total
2002	$3,066	$5,110	$287,438	**$295,614**
2003	$3,781	$10,220	$574,875	**$588,876**
2004	$4,496	$10,279	$290,743	**$305,518**
2005	$5,211	$10,456	$0	**$15,667**
2006	$5,926	$10,697	$0	**$16,623**
2002-2006	**$22,480**	**$46,762**	**$1,153,056**	**$1,222,298**
2007-2011	$57,120	$57,291	$0	**$114,411**
2012-2016	$18,600	$63,569	$0	**$82,169**
2017-2021	$0	$64,845	$0	**$64,845**
2022-2026	$0	$64,845	$0	**$64,845**
2027-2029	$0	$64,845	$0	**$64,845**

Section 9
Water Shortage Plan

Concurrent with the consideration of this Final Plan, the District Board of Directors will also be considering adoption of an Ordinance that includes Water Conservation and Emergency Water Shortage Regulations, which are included on the immediately subsequent pages. Cal Cities Water Company complies with Rule No. 14.1 "Mandatory Water Conservation and Rationing Plan" established by the Public Utilities Commission. That rule is attached as Exhibit "C", and is summarized below.

INTENT OF THE DISTRICT'S WATER SHORTAGE PLAN

The following is a list of the key components of the water shortage plan:

- Stages of action to be undertaken in response to water shortages, including up to a 50 percent reduction in water supply;
- Estimates the minimum water supply available at the end of 1, 2, and 3 years;
- Actions to be undertaken to prepare for, an implement a catastrophic interruption in water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster;
- Consumption reductions consistent with up to a 50 percent reduction in water supply;
- An analysis of impacts of the above actions on revenues and expenditures of the water supplier; and
- A draft water shortage contingency resolution or ordinance.

SUMMARY OF PUBLIC UTILITIES COMMISSION RULE 14.1

Rule 14.1 provides for a voluntary and mandatory conservation measures, and established the procedures that Cal Cities must follow for PUC approval and authorization.

Rule 14.1A, Conservation - Non-Essential or Unauthorized Water Use, establishes voluntary conservation measures including the restrictions on potable water use for landscaping, construction, and other outdoor uses.

Rule 14.1B, Rationing of Water Usage, establishes mandatory conservation and rationing, and requires PUC approval.

Rule No. 14.1C Enforcement, establishes detailed mandatory programs including the voluntary measures (which become mandatory), establishes enforcement provisions (including flow restrictions), and authorizes water allocations and excess use penalties.

Rule 14.1D & E, Appeal Procedure and Publicity establishes customer appeal rights and plan noticing requirements.

LOS OSOS COMMUNITY SERVICES DISTRICT
ORDINANCE NO. __

AN ORDINANCE OF THE BOARD OF DIRECTORS OF THE LOS OSOS COMMUNITY SERVICES DISTRICT ADOPTING RULES, REGULATIONS, FEES AND CHARGES FOR DISTRICT SERVICES

WHEREAS, the Los Osos Community Services District (**District**) became effective January 1, 1999, pursuant to an election and Resolution No. 98-239 of the Board of Supervisors of the County of San Luis Obispo, and under the authority of the Cortese-Knox Local Government Reorganization Act of 1985 (Government Code §56000 et seq.); and

WHEREAS, by said Resolution No. 98-239 and the resulting election, the Los Osos Community Services District is authorized to provide water and sewer service to its residents pursuant to Government Code § 61600 (a) (b); and

WHEREAS, the District Board of Directors desires to adopt this Ordinance to establish the rules, regulations, fees and charges for District water and sewer service; and

WHEREAS, based upon facts and analysis presented the District staff,the Staff Report, and public testimony received, the Board of Directors finds:

A. The public meetings adopting this Ordinance have been properly noticed pursuant to Government Code § 54954.2 (The Brown Act); and

B. The rules and regulations that are the subject of this Ordinance are fair, reasonable and in the District's interest.

NOW, THEREFORE, BE IT ORDAINED, by the Board of Directors of the District as follows:

Section 1. Authority.

This Ordinance is enacted pursuant to Government Code § 61600(a) and (b), 61621, 61621.5.

Section 2.

The rules, regulations, fees and charges for District services that are attached hereto as Exhibit **A** are hereby incorporated herein by reference and adopted by the Board of Directors of the Los Osos Community Service District.

SECTION 3. Incorporation of Recitals

The recitals to this Ordinance are true and correct and are incorporated herein by reference.

SECTION 4. Severability

If any section, subsection, sentence, clause or phrase of this Ordinance is for any reason held to be unconstitutional, ineffective or in any manner in conflict with the laws of the United States, or the State of California, such decision shall not affect the validity of the remaining portions of this Ordinance. The Governing Board of the District hereby declares that it would have passed this Ordinance and each section, subsection, sentence, clause and phrase thereof, irrespective of the fact that any one or more sections, subsection, sentence, clause or phrase be declared unconstitutional, ineffective, or in any manner in conflict with the laws of the United States or the State of California.

SECTION 5. Effect of headings in Ordinance

Title, division, part, chapter, article, and section headings contained herein do not in any manner affect the scope, meaning, or intent of the provisions of this Ordinance.

SECTION 6. Inconsistency

To the extent that the terms of provision of this Ordinance may be inconsistent or in conflict with the terms or conditions of any prior District Ordinance(s), Motions, Resolutions, Rules, or Regulations or any County Ordinance(s), Motions, Resolutions, Rules, or Regulations adopted by the District, governing the same subject matter thereof, then such inconsistent and conflicting provisions of prior Ordinances, Motions, Resolutions, Rules, and Regulations are hereby repealed.

SECTION 7. Effective Date

This Ordinance shall take effect and be in full force and effect thirty (30) days after its passage. Before the expiration

of the fifteenth day after passage it shall be:

A. Posted in three (3) public places with the names of the members of the Board of Directors voting for and against the Ordinance and shall remain posted thereafter for at least one (1) week; and

B. Published once with the names of the members of the Board of Directors voting for and against the Ordinance in a newspaper of general circulation within the District.

Introduced at a regular meeting of the District Board of Directors held on _____, 2000, and passed and adopted by the District Board of Directors on the ____ day of _____, 2000, by the following roll call vote, to wit:

AYES:
NOES:
ABSENT:
ABSTAIN:

_____
Rosemary Bowker, President
Board of Directors, Los Osos
Community Services District

ATTEST:

_____
BRUCE BUEL, General Manager
and Secretary to the Board

LOCSD
T:\Jon\CLIENT\llos osos\matters\District Service Regs - 112\Ordinance 2000 draft.doc

[illegible]

[illegible]

[illegible]

EXHIBIT A

LOS OSOS COMMUNITY SERVICES DISTRICT ORDINANCE NUMBER _____

An ordinance of the Los Osos Community Services District Board of Directors establishing Rules, Regulations, Fees, and Charges for District Services.

TABLE OF CONTENTS

Title 1

Chapter 2.06 Water Conservation and Emergency Water Shortage Regulations

2.06.01 Water Conservation Stages
2.06.02 Stage Implementation F.3 Water-Saving Devices
2.06.04 Violation and Enforcement
2.06.05 Review and Appeals

Section F: Water Conservation and Emergency Water Shortage Regulations

F.1 Water Conservation Stages.

F.1.1 Stage I Conservation.

(a) Upon a determination by the Board of Directors that there exists, or that there is a threat, of a ten-per-cent (10%) shortage in potable water available for distribution, the following prohibitions shall take effect:

(i) All outdoor irrigation of vegetation shall occur only between the hours of 8 p.m. and 7 a.m.

(ii) The use of potable water to wash sidewalks, walkways, driveways, parking lots, open ground and other hard-surface areas by direct application shall be prohibited.

(iii) The use of non-drinking-water fountains, except for those using recirculated water, shall be prohibited.

(iv) Use of water which results in flooding or run-off in gutters or streets shall be prohibited.

(b) In addition to the prohibitions referenced in subsection (a) above, the Board of Directors will initiate a public information campaign to educate District residents, urging water conservation and showing ways the public can save water.

F.1.2 Stage II Conservation.

(a) In addition to Stage I conservation measures, upon a determination of the Board of Directors that there exists, or there is a threat of, a twenty-per-cent (20%) shortage in potable water available for distribution, the following measures shall take effect immediately:

(i) Each residential unit shall be limited to 1900 cubic feet of water bi-monthly (234 gallons per day).

(ii) The water rate for water units exceeding 1900 cubic feet bi-monthly shall be double the then established District rate.

(ii) Use of water from fire hydrants shall be limited to fire suppression and/or other activities immediately necessary to maintain health, safety and welfare of residents within the boundaries of the Los Osos Community Services District.

(iii) The use of District potable water for construction projects shall be prohibited.

(iv) The washing of automobiles, trucks, trailers, boats and other types of mobile equipment not occurring upon the immediate premises of a commercial car wash and/or commercial service station shall be prohibited.

(v) The use of potable water to irrigate grass, lawns, ground cover, shrubbery, crops, vegetation, trees, etc., shall be limited to Saturdays, Mondays and Wednesdays for even numbered addresses and Sundays, Tuesdays and Thursdays for odd numbered addresses, or as otherwise established by resolution of the Board of Directors.

(v) Water main flushing shall only occur in emergency situations as declared by the District Manager.

(b) In addition to those measures stated in subparagraph (a) above, the Board of Directors, by resolution and/or ordinance, may adopt additional water conservation measures on an urgency basis.

F.1.3 Stage III Conservation.

WATER CONSERVATION AND EMERGENCY WATER SHORTAGE REGULATIONS COMPONENT OF LOS OSOS COMMUNITY SERVICE DISTRICT RULES AND REGULATIONS RELATING TO WATER AND SEWER SERVICE

(a) In addition to the water conservation measures established in Stage I and Stage II above, upon a determination of the Board of Directors that there exists, or that there is a threat, of a thirty-five-per-cent (35%) shortage in potable water available for distribution, the following measures shall take effect:

(i) Each residential unit shall be limited to one hundred ninety-two (192) gallons per day (1500 cubic feet by of water bi-monthly).) Each commercial customer shall be limited to sixty-five per cent (65%) of the twelve month average that occurred immediately prior to the Board of Directors' declaring Stage I conservation measures.

(iii) Pool covers shall be required for all municipal pools.

(iv) The use of potable water to irrigate grass, lawns, ground cover, shrubbery, crops, vegetation, trees, etc., shall be prohibited.

(v) Water rates shall be four times the then established water rate for customers who exceed the limitations established in (i) and (ii) above.

(b) In addition to those measures stated in subparagraph (a) above, the Board of Directors, by resolution and/or ordinance, may adopt additional water conservation measures on an urgency basis.

F.1.4 Stage IV Conservation.

(a) In addition to the water conservation measures established in Stages I, II, and III above, upon a determination of the Board of Directors that there exists, or that there is a threat of, a fifty-per-cent (50%) shortage in potable water available for distribution, the following measures shall take effect:

(i) Each residential unit shall be limited to one hundred forty-eight (148) gallons per day (1200 cubic feet of water bi-monthly).

(ii) Each commercial customer shall be limited to fifty per cent (50%) of the twelve-month average that occurred immediately prior to the Board of Directors' declaring Stage I conservation measures.

(iii) Water rates shall be four times the then established water rate for customers who exceed the limitations established in (i) and (ii) above.

(iv) New water connections to the District water system shall be prohibited.

(b) In addition to those measures stated in subparagraph (a) above, the Board of Directors, by resolution and/or ordinance, may adopt additional water conservation measures on an urgency basis.

F.2 Stage Implementation

The water department and General Manager shall monitor the supply and demand on a weekly basis during drought conditions and recommend to the Board of Directors the extent of the conservation required through implementation and/or termination of a particular conservation stage in order for the District to continue to supply adequate water to the customers. Thereafter the Board of Directors may order that the appropriate phase of water conservation be implemented and/or terminated in accordance with the applicable section of this Ordinance.

F.3 Water-Saving Devices

F.3.1 All customers are encouraged to install and use the following water conservation devices:

(a) Low flush toilets 1.6 gallons per flush or less;

(b) Low flow shower heads 2.5 gallons per minutes or less; and

(c) Drip irrigation.

F.4 Violation and Enforcement The following apply to persons violating the provisions of District's water conservation and emergency water shortage regulations.

F.4.1 First Violation. A copy of the notice will be left with someone at the residence or establishment, or left in a conspicuous place, at the time the violation is observed.

F.4.2 Second Violation. A $25 surcharge, in addition to any other penalties or fees owing, shall be assessed to the account of the violator, and a copy of the violation notice will be sent to the address of the violator by certified mail, return receipt requested, with a letter explaining the gravity of the situation and the penalties for future violations.

F.4.3 Third Violation. A $250 surcharge, in addition to any other penalties or fees owing, shall be assessed to the account of the violator, and a one-gallon per minute flow restriction will be installed at the violator's meter and left in place for seventy-two (72) hours. Installation and removal charges shall be established by District resolution and shall be assessed to the account of the violator.

F.4.4 Fourth Violation. The water meter will be removed from the premises of the violator. The meter will be reinstalled, on conditions set by the District, after the payment of District reconnection charges and the payment of all other charges, surcharges and penalties owing.

F.5 Review and Appeals. Any person who disputes the application of these Water Conservation Regulations may seek review under the following procedures:

F.5.1 Dispute Resolution Hearings shall be conducted by the General Manager or his/her designee on the following terms and conditions:

(a) The applicant shall request in writing a hearing within ten (10) days of the event giving rise to the dispute.

(b) All fines, penalties, surcharges, and service charges shall be deposited with the District.

(c) The hearing shall be conducted at a mutually acceptable time, as soon as practical.

(d) The General Manager shall consider the evidence presented at the hearing and is authorized to render a decision in his/her discretion that is consistent with the conservation measures established in Section F.1 above.

F.5.2 Appeals. The decision of the General Manager may be appealed by making written application to the Board of Directors, in care of the General Manager, within five (5) business days of the General Manager's decision. The appeal to the Board of Directors will be held under the procedures established in Sections B.3.1 and B.3.2 of Chapter I of this Ordinance.

F.5.3 Judicial review of the decision of the Board of Directors shall be pursuant to Chapter I, Section B.4 of this Ordinance.

APPENDIX A

DESCRIPTION OF WATER CONSERVATION BEST MANAGMEMENT PRACTICES AND OTHER MEASURES

The current list of Best Management Practices (BMPs) in California contains 14 practices or measures. The list developed in 1991 by the California Urban Water Conservation Council contained 16 measures. The list was changed in 1997 when four measures were dropped and two new ones added, plus revisions were made to others. The 14 BMPs are listed below along with two additional measure considered in this project and discussed in detail in this report.

TABLE OF CONTENTS

BEST MANAGEMENT PRACTICE **PAGE**

1. Water Surveys for Single-Family and Multi-Family Residential Customers A-8
2. Residential Plumbing Retrofit A-12
3. System Water Audits, Leak Detection, and Repair A-14
4. Metering A-16
5. Large Landscape Conservation Programs and Incentives A-17
6. High-Efficiency Appliance Promotion Programs A-20
7. Public Information Programs A-23
8. School Education Programs A-25
9. Conservation Programs for Commercial, Industrial, Institutional Customers A-26
10. Wholesale Agency Assistance Programs A-30
11. Non-Promotional Water Pricing Programs A-30
12. Water Conservation Coordinator A-33
13. Water Waste Prohibition A-34
14. Residential Ultra Low-Flush Toilet Replacement A-34

OTHER MEASURES

Community Retrofit by Retrofit on Resale Ordinance A-38

Community Fixture Replacement A-39

References Cited A-40

FORMAT FOR MEASURE DESCRIPTIONS

This section provides the water savings and costs associated with each program. Both factors are dependent on how the program is implemented, such as marketing and customer delivery, and the resulting participation rates. Each program description follows the format below.

Description

- Target market (customer class)
- Technology or hardware devices employed
- Overall approach to ensure participation

Marketing Strategies

- Target audience
- Marketing techniques

Delivery

- Delivery approach
- Technical assistance
- Financial incentives

Participation Rates

- Eligible customers
- Initial and long-range participation

Costs

- Staffing requirements
- Design /start-up costs
- Delivery costs
- Administrative costs

Water Savings

- Basis and available documentation
- Indoor or outdoor unit water savings factors

References for costs and water savings are provided for this report.

SUMMARY OF WATER SAVINGS ESTIMATION METHODOLOGY INCLUDING PROJECTED MARKET PENETRATIONS AND UNIT WATER SAVINGS FOR BMPS

Introduction

This section describes how water savings of BMPs and other measures can be estimated. The water savings are computed by multiplying unit water savings, per measure, by a market penetration or installation rate, and then multiplying by the number of units in a particular service area, such as dwelling units targeted by a particular program.

Water Savings

The water savings estimate is useful to help utility planners forecast how future demands may be impacted by water conservation. Savings are usually minimal in the first year of implementation, not reaching full maturity until the full market penetrations have been achieved.

The methodology can be implemented by the following steps:

1. Develop baseline, detailed water use projections without water conservation. Projections should cover each key customer category and be broken down into indoor and outdoor use.

2. For each conservation measure, estimate the affected population or number of accounts by multiplying total service area population (accounts) by the market penetration or installation rate for the measure. The market penetration rate is the likely percentage of the population that will implement the measure.

3. Determine total annual water savings for a measure by multiplying affected end uses by the measure's unit water savings, expressed as a percent reduction.

Data necessary to forecast water savings include base water use, demographics, market penetration expectations, unit water savings, and measure interaction factors. These are described as follows:

Base Water Use. Base water use (without conservation) projections are available in Section 3.

Demographics. Demographic data is available from San Luis Obispo County. Service area population, total dwelling units, and single-family and multifamily dwelling units are used for measures targeting residential categories. Employment projections are used for non-residential category analysis.

Market Penetration. The market penetration for existing customers is the estimated percentage of customers that will be participate in the measure by the end of the program. Estimates are based on measure design and experience from similar measures implemented by other water utilities. Some measures will not be applicable to Los Osos. Measures are listed in Table A-1 in the order they are described in this report.

For example, if approximately 17,000 residential dwellings exist when the Residential Water Surveys begin in 2000 and the ultimate penetration rate of 4 percent will be reached in the year 2005, then 680 customers would participate by the year 2005. Each year 136 new homes would be audited for the next five years until all 680 had been audited.

The market penetration for new customers, also shown in Table A-1, indicates the number of new customers that will participate in the measure each year. For example, if there are approximately 1,000 new customers in 2000 and 1,200 new customers in 2001 for a measure, then, if the annual penetration rate is 8 percent, 80 of the new dwelling units would be reached in 2000 and 96 would be reached in 2001.

Errors in market penetration estimates for each measure can be significant as they are based on previous experience, chosen implementation methods, and projected effort and funds allocated to the measure. The potential error can be corrected, however, as the implementation of the measure progresses. For example, if the market penetration required to achieve the needed savings turns out to be more or less than predicted, adjustments to the implementation efforts can be made. Larger rebates or more promotions may be used to increase the market penetration, for example. The process is iterative to reflect actual conditions and helps to assure that the market penetration and needed savings are achieved regardless of future variances between estimates and actual conditions.

Unit Water Savings. Unit water savings can be either expressed on a percentage of water use basis or on a per end use basis. Long-term savings reflect some decline from initial levels due to device removal and changes back to old habits and therefore reflect estimates of sustainable conservation. The projected long-term unit water savings for the measures are shown in Table A-2.

Measure Interaction Factors. Not all measures are independent of each other because they may target the same customer category or behavior. For example audits conducted as a part of the Large Landscape Water Conservation Program may have some overlap with Commercial/Industrial/Institutional Audits even though the first program is targeted at landscapes 3 acres and larger. Similarly the Residential Plumbing Retrofit, if implemented together with Residential Water Surveys, may overlap since both programs involve fixture change-outs. Most of the measures have been designed to be independent so the interaction

factor is 1.0, i.e. no interaction. If the interaction reduces the combined water savings of two measures then the factor is less than 1.0. If it raises the effectiveness then it is greater than 1.0.

TABLE A-1

MARKET PENETRATION OF CONSERVATION MEASURES FOR NEW AND EXISTING CUSTOMERS

Measure	Customer Categories	Applicable Market	Target Market	Acceptance Rate	Total Market Penetration
Residential Water Surveys	Residential	100%	100%	20%	20%
Residential Plumbing Retrofit	Residential Existing	pre-1992 homes	100%	50%	50%
Systems Water Audits, Leak Detection, and Repair	Utility	100%	100%	100%	100%
Metering	All	100% new	100%	100%	100%
Large Landscape Water Conservation and Incentives	Nonresident-ial	All commercial accounts	20%	50%	10%
High-Efficiency Appliance Promotion Programs	Residential	replacement appliances	15% per year	5-20%	.6-3% per year
Public Information Programs	All	100%	100%	100%	100%
School Education Programs	Residential	100%	100%	100%	100%
Commercial/Industrial/ Institutional Programs	Nonresident-ial	100%	Top 20%	50%	10%
Wholesale Agency Assistance	All	Retailers	100%	100%	100%
Non-Promotional Water Pricing Programs	All	100%	100%	100%	100%
Water Conservation Coordinator	All	100%	100%	100%	100%
Water Waste Prohibition	All	100%	100%	100%	100%
Residential ULFT Replacement	Residential	Pre-1994 homes	100%	7% per year	7% per year
Retrofit on Resale Ordinance	Residential	All homes	100%	7% per year	7% per year
Community Fixture Replacement	Residential	All homes	100%	100%	100%

TABLE A-2

UNIT WATER SAVINGS OF MEASURES

Measure	Applicable Customers	Water Use Reductions per End Use	Applies to
Residential Water Surveys	Residential	5% Indoor, 10% Outdoor and Leakage	Indoor/Outdoor Uses (all)
Residential Plumbing Retrofit	Residential	21%	Shower Use
System Water Audits, Leak Detection and Repair	Utility	varies[1]	Unaccounted-For Water
Metering	NA		
Large Landscape Conservation & Incentives	Nonresidential	15%	Nonresidential Irrigation Use
High-Efficiency Appliance Promotion	Residential	30%	Laundry Use
Public Information (P.I.)	Residential	3%	Indoor/Outdoor Uses
School Education	Residential	Included with P.I.	
Commercial/Industrial/ Institutional Conservation	Nonresidential	13.5%	Nonresidential End Uses (all)
Wholesale Agency Assistance	NA		
Non-Promotional Pricing	All		
Water Conservation Coordinator	All		
Water Waste Prohibition	All		
Residential ULF Toilet Replacement	Residential	52%	Residential Toilet Use
Retrofit on Resale	Residential	52% 21%	Residential Toilet Use Residential Shower Use
Community Fixture Replacement	Residential	52% 21%	Residential Toilet Use Residential Shower Use

[1] Reduce Unaccounted-for to 10%, only if currently> 10%
gcd: gallons per capita per day
NA = Not Applicable to Los Osos

BMP 1 - WATER SURVEYS FOR SINGLE-FAMILY AND MULTI-FAMILY RESIDENTIAL CUSTOMERS

Description

Los Osos would offer an indoor and outdoor water survey to existing single-family and multifamily residential customers with high water use. Surveys should target the top 20 percent of water users to ensure significant water savings. It is important to target high water users otherwise the survey may not produce the savings needed to justify the program. The surveyors would focus most on outdoor water use, identifying water waste, offering information to improve water use efficiency, and preparing a customized lawn irrigation schedule. Surveyors would also conduct a brief indoor survey and install low-cost conservation devices such as low-flow showerheads. Each single-family survey would last approximately one and one-half hours; multifamily surveys would last longer, depending upon the building size and the complexity of the irrigation system. Various delivery methods have been used to increase effectiveness and reduce survey unit costs.

Marketing Strategies

Four marketing strategies could be used. The first involves scheduling appointments with high water users. The second involves canvassing neighborhoods with known high water use and offering surveys door-to-door. The third is a combination of the two methods. The top water users would be solicited and asked to call in and make an appointment for a survey. In addition the surveyors would canvass homes as time permits. This would keep the surveyors busy and efficient and increase participation. The fourth strategy that could be used involves customers completing their own home water use survey and receiving a customized report back through the mail or over the Internet.

Scheduled Appointments: Los Osos would evaluate water bills to identify the top 20 percent of water users in the single-family and multifamily classes, on an annual average gallons per dwelling unit per day basis. Los Osos would then mail these customers a letter offering a free water survey, and schedule an survey for those that respond. Los Osos would also do a telephone follow-up for customers who do not respond to the letter offer. The multifamily survey program would target building owners and management companies. The program would be marketed through direct contact with major management companies or landlords and direct mail for the smaller building owners. This method has been used since 1988 in various states, and thousands of homes have been surveyed.

Door-to-Door Marketing. A more recent innovation is canvassing neighborhoods known to have high water use. Los Osos would identify these neighborhoods through visual inspection confirmed by billing system inquiries. Areas with large landscaped lots, or low income areas with indoor leaks or areas with poorly managed landscaped areas would be targeted. Los Osos would provide advance notice that surveyors will be in the area (usually by a door hanger, postcard or letter). Surveyors would then canvass the area offering the survey service. Canvassing is usually conducted in the afternoons, evenings, and on Saturdays. If customers are

not home, notices are left explaining how the customer can schedule an appointment. Because this method has not been used in Los Osos area before, this method would need to be piloted before proceeding with a large program.

Surveys over the Internet. One company now offers a variation of the home water survey sent through the mail or over the Internet. Homeowners can download survey forms to fill out and mail or e-mail completed forms back to the company. The company then prepares a customized survey report, with recommended ways to save water and projected water and dollar savings. The report can be mailed or sent over the Internet. If necessary, the company can send a surveyor to the home to complete the survey if the homeowner needs help. This program is a variation of the first measure, involving home water survey kits, but goes further by having the homeowner follow a structured water survey procedure. The other difference is that a customized report is generated, specific to the home surveyed. Los Osos may also utilize its web site for internet purposes.

Combined Appointments and Canvassing. The top 20 percent of water users would be solicited, as in the first method. In addition Los Osos would identify suspected high water use neighborhoods for canvassing. The scheduling for canvasses would be more flexible allowing the surveyors to canvass when they are not busy with appointments. The advantage of this method is that the high water users are targeted but the surveyors will always be busy if the response rate is problematic.

Delivery

Trained part-time staff or an outside contractor would perform the surveys. Surveys would be conducted during all year round. Before the survey begins the surveyor would provide material explaining the services to participants. Additionally, Los Osos would encourage customers to accompany the surveyor during the site visit. Specific activities for each indoor survey would include:

- Locate meter and teach customers how to read it;
- Check for faucet and toilet leaks and recommend repair;
- Adjust toilet tank float arms, as necessary, to eliminate any waste overflow;
- Install toilet displacement devices, early closure flappers, or fill cycle regulators, as appropriate;
- Install faucet aerators and low-flow showerheads in bathroom; and
- Identify opportunities to replace toilets, washing machines, etc., with water-conserving models.

The outdoor survey would consist of the following:

- Provide basic literature and guidance about irrigation and landscaping (e.g., mulching, water-efficient plant material, soil, water and plant relationships);
- Recommend adjustments to the irrigation system to correct identified leaks, over spray, and runoff;
- Collect information about grass type, soil type, precipitation rate of existing irrigation system, and develop a customized irrigation schedule in minutes of watering time per week for spring, summer, and fall.
- Collect information about landscaping to assist with the design of other landscape conservation programs; and
- Advise the customers about the benefit of low-water-use landscaping.
- Provide irrigation schedule.

The fourth method, that relies on survey forms to be completed by the homeowner, would ask for pertinent information so that the above recommendations could be included in the report.

The surveyors would describe the survey findings and recommendations to the customers orally and in a written report. They would give the customer water-conservation tips and information on other conservation programs offered by Los Osos. In addition, Los Osos would mail an annual follow-up letter to all participants at the start of the irrigation season to remind them to irrigate efficiently. Los Osos would provide follow-up surveys every five years to ensure continued savings. The measure incentives are the free survey, water conservation literature, and giveaways such as low-flow showerheads, aerators, and watering schedules. These incentives would be advertised in the program literature used to publicize the program.

Participation Rates

This program would target the top 20 percent single and multifamily accounts. Using scheduled appointments, experience has shown that approximately 20 percent of the contacted customers would participate in the survey.[1,2] Overall, about 4 percent of the single- and multifamily accounts are expected to participate. When door-to-door canvassing is used, and depending on the ratio of people at home in the neighborhood, participation rates of 40 to 50 percent have been reported.[3] For a combined program, where half of the surveys are done by appointments and half by canvassing, a participation rate of 25 percent can be expected. Although there are no published statistics concerning the Internet self-survey/custom report method, the participation rate should be similar to the first type of program since participants are being solicited by similar methods.

Costs

Los Osos would manage and market the program with part-time staff and/or independent contractor(s). It is assumed that Los Osos would use contract labor for the surveys. Marketing expenditures would cover the costs of developing, printing, and mailing or distributing program brochures. Precipitation rates for hose-end sprinklers, commonly sold in local garden supply stores, should be determined in advance to optimize survey costs.

Each surveyor can survey about four single-family homes per day during the summer season, provided other staff is assisting with scheduling and reporting. Multifamily surveys take longer, depending on the size of the complex. It is not necessary to visit every unit unless a prearranged retrofitting is planned. To complete the initial surveys within a five-year period, Los Osos would hire sufficient surveyors to survey one-fifth of the participating homes each summer season. Surveys will be repeated every five years to ensure continued savings.

Costs of the marketing strategies are reported to be similar, with surveys by appointments more expensive because of extra driving time plus an uneven workload. Based on these assumptions, total costs to implement the measure, using contracted labor and project management, are shown in Table A-3. Costs for programs done with in-house staff could be less.

TABLE A-3
RESIDENTIAL WATER SURVEYS FIRST-YEAR COSTS

Summary of First-Year Costs (2000$)

Fixed Costs for Marketing	$3,000 to develop two brochures $5,000 to train surveyors
Variable Costs	
Marketing	$1.00 to print and mail brochure to target
Survey by Appointment	$40 per single-family participant $40 per multifamily dwelling unit participant. Assume 6 units per account.
Canvass/Combined Survey	$50 per single-family participant $35 per multifamily dwelling unit participant
Self-Survey/Custom Report	$10-15 per participant
Participant Costs	$0

Water Savings

Water savings for this program are given below.[4]

- Retrofit of service area homes built before 1980 saves approximately 9.6 gcd (presumes a low-flow showerhead installation and leak repair). Retrofit of homes built after end-year 1979 saves about 3.4 gcd. No long-term toilet savings are assumed. Not all homes would achieve savings if existing homes have received retrofits through earlier kit distribution programs.

- Water savings from the retrofit of 1.6 gpf toilets are provided for in the toilet replacement program.

- The outdoor water survey would save an average of 5 to 10 percent of exterior water use for the surveyed homes.

Recent studies using the schedule appointment method by three California water agencies have resulted in savings of 25 to 30 gallons per household per day.[5] The water agencies and their savings were: Contra Costa Water District-31 gpd; City of Pasadena-28 gpd; and Novato (North Marin Water District)-25 gpd. These water savings are assumed to be permanent if follow-up surveys are conducted at least every five years. The average of these savings, 5 percent indoor and 10% outdoor and leakage, is used in this study, for scheduled appointments. Savings from the canvassing could be less because the surveyor may end up spending time at homes that do not have high water use, even though the neighborhood does.

BMP 2 - RESIDENTIAL PLUMBING RETROFIT

Description

Homes built before 1980 generally do not have low flow showerheads, low flush toilets or faucet aerators. Even some homes built after 1980 may not have these devices because of a lack of plumbing code enforcement. The U.S. Energy Policy Act has required 1.6 gallons per flush (gpf) toilets, 2.5 gallons per minute (gpm) showerheads, and 2.5 gpm faucets since January 1994. To promote indoor water conservation, Los Osos would give homeowners retrofit kits with sufficient equipment and instructions to retrofit two bathrooms. Retrofit kits would contain easy-to-install low flow showerheads, faucet aerators, and toilet tank retrofit devices. The kits would be distributed to and, if requested, installed at all single family and multifamily residential homes. This is an alternative program to Residential Water Surveys and seeks to get a high installation rate of retrofit devices for less money than the cost of an survey.

Marketing Strategies

The program would be patterned after the successful San Jose, California retrofit program which delivered kits door-to-door. The water provider would first publicize the program through bill stuffers and news media coverage in the target area, and purchase sufficient retrofit kits to cover the entire service area (pre-1992 homes). As an option, Los Osos may want to coordinate their conservation effort with the local energy utility company.

Delivery

After publicizing the program, Los Osos would contract for delivery of the kits, providing three attempts to contact the owner via phone and door-to-door canvassing with a free installation offer. Installation requests in the canvassing program are in the range of 2-5 percent.

The service area sections built before 1992 would be given kits; newer areas would be omitted. Newer homes built since 1980 but before 1990, as well as older homes, could qualify for a toilet rebate program as described in another program. In areas where it is uncertain what fixtures are in the home a direct installation method may work best. This could be used in areas where home have been built over a number of years, before and after plumbing code changes.

Retrofit kit and an offer of free installation would be advertised as an incentive. The kit delivery is normally contracted to a private company with specialized experience in implementing large scale retrofit programs. In large programs a delivery rate of 5000 homes per week has been achieved.[6] Los Osos program would be planned to deliver a kit to all single family and multifamily residents over a five year period. One-fifth of the service area would be covered each year.

Participation Rates

This program has been implemented extensively and successfully in homes in Arizona, California, Florida, Texas, and Washington. Installation rates of 75 percent are achievable[6,7] According to a study for the Environmental Protection Agency, installation rates range from 59 to 80 percent for showerheads, and one study for the City of Tampa, Florida had an 80 percent installation rate on faucet aerators.[8] The percent retention after one year for those devices installed range from 70 to 90 percent; 85 to 96 percent, and 88 percent respectively. The range is caused by differences in location and distribution technique. Other studies have assumed a penetration rate of 34 percent for aerators not including a natural replacement rate of three to four percent per year.[7] The participation rate assumed for this project is 50 percent.

Costs

The program would require an administrator for the community. The administrator would prepare a request for proposal for contract services and either pre-purchase the retrofit kits or have them provided by the contractor. The administrator would select a contractor (usually on a

low bid basis) and supervise program and contract implementation. The cost of the administrator would be $4,000 per month including overhead while the program is being implemented.

The cost to purchase and deliver the kits through a properly publicized neighborhood canvas program is about $25 per household.[4] This includes about $10 for the retrofit kit and $15 for labor, including fulfilling the offer of free installation which is usually not requested.

Water Savings

The devices in the kit have varying lives. The showerhead lasts at least ten years (when it would most likely be replaced by another low flow model) and is considered permanent. The toilet tank displacement device has a life of about three to five years and is not considered permanent. The faucet aerators last approximately five years when they would be replaced by another low flow model and are thus considered permanent.

Studies have been done on the water savings showing that homes that install the kits save about 10.5 gcd.[6,7] This includes a 0.3 gcd savings for faucet aerators. About 1.3 gcd of the savings are due to the toilet tank displacement device used but these devices have a limited useful life. The remainder of the savings are due to the showerhead. However, in California many homeowners have already replaced their showerhead and only about 2.6 gcd are now expected.[8] Taking these factors into account, a 20 year planning savings of 21 percent savings is a good assumption for shower replacement and is used herein.[8] There would be overlap between this measure and the natural replacement rate resulting from the U.S. Energy Policy Act that would need to be considered in the overall water savings evaluation.

BMP 3 - SYSTEM WATER AUDITS, LEAK DETECTION, AND REPAIR

Description

Some system water losses, or unaccounted-for water (UAW), are authorized. Authorized losses include flushing hydrants by fire departments. The remainder of UAW is caused by leaks or meter inaccuracy. The purpose of this measure is to reduce leaks from older systems and from broken pipes, joints, or valves. Up to 40 percent of all UAW can be attributed to leaks. For example, if the UAW is greater than 10 percent of total production, then the leakage could be 4 percent, and Los Osos may find a leak-detection and repair program beneficial. Lower UAW levels usually indicate that leak-detection and repair would not be cost-effective.

For Los Osos service area, the cost-effectiveness of leak-detection and repair can not be evaluated until a system water audit is accomplished. It appears on a preliminary basis that the unaccounted for water is about 11.0 percent.

The statewide average has been reported to be about 10 percent. According to the AWWA a realistic goal is 10 percent. This goal involves reducing or keeping UAW, as a percentage of below 10 percent. In many cases the easy savings have probably been found.

Marketing Strategies

Every year a system water audit would be completed by Los Osos. The audit would involve the following steps:

1. Determine metered sales
2. Determine other system verifiable uses
3. Determine total supply into system
4. Divide metered sales plus other verifiable uses by total supply into the system. If this quantity is less than 0.9 (more than 10 percent UAW), a full scale audit is needed

When needed Los Osos would complete water audits of their distribution systems using a methodology consistent with that described in AWWA's "Water Audit and Leak Detection Guidebook."[9]

Where the water audit indicates that leak detection and repair would be cost-effective, Los Osos would initiate a leak detection and repair program. In addition, Los Osos would check customer bills for extreme changes that may indicate a leak on the customer's property. This step can be automated by programming the billing system to flag water bills with consumption greater than 25 percent of the previous year's consumption. Los Osos would encourage these customers to look for leaks.

Delivery

Los Osos will need to conduct water distribution piping leak detection surveys and repair leaks discovered during the surveys. The goal of the program should be to begin inspection of the oldest pipes first in older until all the piping has been inspected. The desired time to inspect all water distribution pipes for leaks is on the order of four years. Reinspection of the pipes will begin upon the completion of the first overall survey and subsequent repairs. Leak survey equipment will be used in the initial survey. When a leak is located a crew with a leak corrector would be called in to pinpoint the leak. The leak is then found and fixed by a repair crew.

Most of the work conducted by each leak detection and repair crew is surveying the water distribution lines systematically, however, sometimes a water use customer may call concerned that his/her water bill is unusually high. In this case, an investigator would assess the situation with the leak detection equipment to determine if in fact a leak is present on the property. If a leak is present, then it is the customer's responsibility to have the leak repaired. The only instance that Los Osos would repair the leak is if Los Osos personnel caused the break in the pipe during the investigation.

Participation Rates

Los Osos would participate in the program, but since UAW is currently about10 percent, the activities would mostly just be the annual system water audit.

Costs

The leak detection function can be contracted out or done in-house. It normally involves 2-man crews with a pick-up truck. The repair cost can be estimated based on the umber of leaks found per day. In larger systems, leak pinpointing will keep another 2-man crew busy full-time and repair will keep a 2-man repair crew busy full-time.
The estimated cost components of leak detection and repair, if done in house, could be as follows:

- Leak detection - $50,000 per year per crew
- Pinpointing - $80,000 per year per crew
- Leak repair - $100,000 per year plus
- Administration - $50,000 per year

Water Savings

Since average UAW in Los Osos is expected to be about 11 percent, this BMP will be not activated, until a system water audit is done to confirm the figure. Otherwise water savings would be estimated to save one percent of production used in the retail sector by reducing the UAW to 10 percent over the next 10 years. The lifetime savings depends on whether the service is a one-time project, in which case the savings are not permanent because new leaks would appear; or whether the service is repeated periodically, in which case permanent savings would be assumed. In this study we assume that system water audits and leak repair efforts are continued at present levels and will maintain UAW at or below 10 percent.

BMP 4 - METERING

Description

Los Osos has complied with most of the provisions of this BMP. All connections to the system are metered and are billed based on volume of use. Los Osos does have mixed use meters serving both domestic use and landscape irrigation. Los Osos will undertake a study to assess the merits of a program to provide incentives to customers to switch mixed use accounts to dedicated landscape meters. The cost of the study is estimated at $25,000. The cost to implement the program (and install the meters at a customers request and expense) was not estimated. Water savings are unknown and assumed to be very small, and are ignored.

BMP 5 - LARGE LANDSCAPE WATER CONSERVATION PROGRAMS AND INCENTIVES

Description

This measure is designed to reduce peak demand by improving outdoor irrigation efficiency. All public and private irrigators of landscapes larger than one acre (suggested size cut-off) are candidates for this measure. Los Osos would provide nonresidential customers support and incentives to improve their landscape water use efficiency. The support can vary depending on whether the account has a dedicated landscape meter, which is common for larger sites.

Accounts with Dedicated Irrigation Meters

- Identify irrigation only accounts and provide them with a landscape water budget based on published plant water needs for turf grass
- Provide notices with each water bill that shows the relationship between actual use and the water budget

Accounts with Mixed-Use Meters

- Develop a strategy to market landscape water use surveys to accounts with significant seasonal water use that includes, where cost-effective:

    1. Landscape water use analysis
    2. Voluntary water use budgets
    3. Installation of dedicated landscape meters
    4. Training in landscape and irrigation system maintenance
    5. Financial incentives such as loans and rebates for efficient irrigation systems
    6. Follow-up water use analysis/surveys

- Where appropriate the participants would receive an audit that would instruct landscape site managers to:

    1. Learn the targeted site's current irrigation efficiency,
    2. Be advised of available low-cost hardware improvements,
    3. Receive baseline irrigation schedules,
    4. Receive instructions about how to modify the schedules in according to weather changes, and
    5. Receive water savings information.

General

- Install climate appropriate water efficient landscaping at utility facilities
- Provide customer notices at the beginning and end of the irrigation season advising them to check and adjust irrigation systems and timers

Marketing Strategies

Los Osos would offer this service to all green belts, common areas, schools, business parks, cemeteries, parks, and publicly owned landscapes on or adjacent to roadways involving three or more acres of landscaping. Most of these sites are included in Los Osos billing system as either irrigation meter accounts or municipal/institutional accounts. Participants targeted for an audit would first be screened to determine their savings potential under this service. The screening involves estimating the current water per acre of landscaped area and an overall irrigation efficiency. A telephone interview would be used to determine if the existing system is neither too poorly designed or in too poor a condition to benefit from the audit. The participants would then receive at least a landscape water budget and, if requested a landscape audit according to their need. Follow-up budgets/audits would be provided once every five years. Site building and landscape managers would be responsible for implementing budget/audit findings.

Delivery

This program would have trained auditors and irrigation technicians provide water budgets, audits and system maintenance check-up; baseline irrigation schedules; periodic performance feedback; and follow-up field visits (at least every five years) at no cost to the customer and financial incentives.

All irrigation accounts would receive a landscape water budget that identifies monthly irrigation water needs. Based on the budget analysis (which compares budgeted amounts to prior use), the owners of sites that appear to have water savings potential would be offered a water audit by mail and telephone. Prior to the full audit, technicians would perform an initial site audit to evaluate each irrigation system's design, operating condition, and current overall efficiency. Sites having irrigation systems too poorly designed or maintained to benefit from the service would receive no further attention until the systems are upgraded. All others (with emphasis on mixed-use meters) would be eligible for service. Selected sites would be examined to identify low-cost irrigation improvements such as aligning sprinkler heads; replacing broken heads, or trimming grass that disrupts spray patterns.

After the customer made these irrigation improvements, if required, the irrigation technicians would proceed with a detailed irrigation audit to determine precipitation rate, distribution uniformity, grass type, root depth, and soil type. Audits would be conducted according to methods described in the *Landscape Water Management Handbook* prepared for the California Department of Water Resources.[11] Acquired data would be used to develop a base irrigation schedule showing weekly watering times for every month. The schedule would be provided in a brief written report to the site manager for implementation. Follow-up checking would be done to assess implementation and satisfaction, and to adjust schedules as needed. A five-year duration is expected for this measure's water savings; thus, a follow-up audit would be conducted every five years.

Participation Rates

Water budgets and/or irrigation audits would be offered to all irrigation accounts. All sites would receive a landscape budget, and those that requested an audit would be provided that service.

Costs

The customers would pay for implementing water budget recommendations and audit findings including minor irrigation systems repairs (replacing broken heads, repairing leaks, etc.), and incur the labor cost to reset irrigation controls periodically. Cost categories are given below.

- Administration: marketing and screening, hiring and training technicians;
- Water budget and auditing work; and
- Follow up work: developing water schedules, training users, evaluating performance, preparing reports.

The irrigation audits would require the services of irrigation auditor(s) for the first five years and then part-time thereafter. Landscape water budgets would be prepared for every irrigation account by part-time staff supervised by in-house persons. The cost of each water budget would vary but generally averages $150.[14] The water audit costs be the equivalent to one part-time landscape water auditor plus expenses. This would work out to about $1,000 per site and would apply to 10 percent of the sites, that are assumed to request an audit.

Water Savings

Based on an independent analysis of the North Marin County Water District audits, outdoor water savings for sites receiving irrigation audits was 14 percent.[15] The water savings from one golf course in the City of Houston that followed the schedule provided after a city audit was about 41 percent.[16] The results at two other golf courses was much lower. A value of 15 percent of irrigation use is suggested for Los Osos area initially. These savings apply to the water use at the audited/budgeted sites.

BMP – 6 HIGH-EFFICIENCY APPLIANCE PROMOTION PROGRAMS

Description

Los Osos would encourage customers to purchase high efficiency (tumble action) washing machines. These machines can reduce clothes washer water use by about one-third but they currently cost considerably more to purchase. Promotions could include an in-store appliance labeling program, advertisements, rebates, or other activities.

Such a promotion program is intended to encourage residential customers to purchase water-efficient washing machines and dishwashers. Where cost-effective to Los Osos, and where the energy company is offering a rebate, they shall offer a rebate to customers to help off-set the purchase price differential. The rebate shall be calculated based on the avoided cost of the water saved by the program. Rebates by Los Osos are not required if the maximum cost-effective rebate is less than $50.

Horizontal-axis clothes washers are more water-efficient than conventional vertical-axis top-loading models. Rather than agitate clothes in a tub full of water, as with vertical-axis machines, the horizontal-axis washer lifts clothes up and plunges them down (like a dryer), tumbling clothes in a small amount of water. Horizontal-axis washers can be either top loading or front loading. Although they generally hold up to 50 percent less clothes, the are still 33 percent more water-efficient on the basis of water used per pound of laundry washed.[17] New models are being released all the time. In the spring of 1999 there were 30 models on the market. The Consortium for Energy Efficiency tests and rates the new models and classifies them into one of six categories.[17] Energy companies use these ratings to establish rebate amounts for specific models. The more efficient, the higher the rebate. Manufacturers project their market share to increase from 5 percent in 1999 to 35 percent by 2003.[18]

Dishwashers currently sold use about 12 gallons of water per completed cycle. Older models use about 14 gallons per cycle. Water-efficient, domestic models are available that use 7.5 gallons per cycle. *Consumer Reports* rates several models of these water-efficient dishwashers highly.[19] The water savings also results in energy savings because these water-efficient models use less hot water. Although not specifically included in this BMP, Los Osos may find it advantageous to promote these appliances at the same time as the washing machines, although probably not through the use of a rebate.

Marketing Strategies

Los Osos would work closely with manufacturers and energy utilities to develop the promotion program. Dealers would be trained to use labels, point-of-purchase materials, and how to apply for a rebate.

Point-of-purchase displays would be set up in retail outlets that carry dishwashers and washing machines. Other retail advertisements, such as posters, could also be employed.

A program brochure would be sent to customers in a direct-mail or bill-stuffer campaign. The brochure would describe the advantages of water-efficient appliances and list retailers that sell water-efficient appliances. Similar brochures would be sent to companies that lease washing machines to multifamily residential complexes. These companies, in turn, could develop a shared savings program with the complex owner/management company.

Delivery

Los Osos would work with other utilities to promote this program. Coordination with these entities would be necessary for several reasons. First, joint utility partnerships allow greater economies of scale; the utilities can share a single plan for marketing, advertising, and evaluation. Furthermore, the appliances promoted in this program could reduce the customers' monthly water, wastewater, and energy bills. A multi-utility message would be stronger because the customer would be presented with greater savings potential.

Participation Rates

All residential customers purchasing new appliances would be considered participants. The number of participants in each year is derived by multiplying the number of appliances eligible for retirement by the program penetration rate for that year. The experience of other utilities that offer rebates on high-efficiency appliances has shown that a participation rate of about 20 percent can be achieved after the program is up and running.[20] However for programs that do not offer rebates, the participation rate will be much lower. Also although some horizontal-axis washing machines are currently available, they are not widely accepted, therefore the washing machine component of the program may increase slowly to a 10 percent penetration rate over the next ten years. The program for dishwashers is estimated to increase to 20 percent participation in ten years because water efficient models are more widely available and advertised as such.

Costs

Administration of this program would require coordination with other utilities to market the program, and development of promotion packages. These administrative tasks could be performed in-house or through the use of a contractor hired to handle these responsibilities. Marketing expenditures would be used to develop brochures, bill inserts, direct mailings, mass media advertising, and training seminars to familiarize dealers, vendors, and retailers with the program.

Costs, shown below in Table A-4, assume that a multi-agency (e.g. water, wastewater, and energy utility) consortium implements the measure for Los Osos area. They include the cost of a training seminar, which would be conducted by program staff. For the purposes of this project it is assumed that Los Osos share the cost with the local energy company 50:50. Therefor Los Osos would incur one-half of the costs shown. They can take credit for all the water savings just the way the energy savings will go to the energy company. It is assumed that the rebate amount contributed by Los Osos would be $100.

TABLE A-4

APPLIANCE PROMOTION FIRST YEAR COSTS

Summary of Initial Annual Costs (2000$)

Fixed Costs:

Administration:	$10,000 (0.25 administrator)
Marketing:	$5,000 to develop brochures
	$5,000 general advertising
	$2,000 training seminar

Variable Costs:

Marketing:	$0.15 per brochure for printing - sufficient for providing one copy to estimated 12 percent of single family, condominium households or apartment building owners that purchase a new washing machine or dishwasher per year.

Water Savings

Water savings are based on the AWWARF end use study that showed horizontal axis washing machines saved 4.5 gcd (30 percent of the laundry end use).[8]

Replacing a 12-gallon dishwasher with a 7.5-gallon unit would save 4.5 gallons per cycle. The HUD study indicates that dishwasher use is 0.17 cycles per person per day.[21] Thus 0.8 gallons of water per person per day could be saved by purchasing water-efficient models. These savings can be used in promotions but rebates for dishwashers are not a part of this BMP.

BMP-7 - PUBLIC INFORMATION PROGRAMS

Description

This measure is an extension of Los Osos existing public information efforts. It serves as the 'glue' to tie all the other measures together. It would not only address specific measures, but also cultural/social aspects of establishing or enhancing a water conservation ethic among Los

Osos customers; most importantly, it would convey to the public a understanding of why water conservation is important. Programs include how demand community gardens irrigated with reclaimed water, storefront theatrical productions, poster contests by schoolchildren, T-shirt design contests, speakers to employee and community groups, presentations and tours with hands-on demonstrations; radio and television time, and printed educational material such as bill inserts. Utilities will attempt to put the water use from the same period in the prior year on customer water bills. Public education would continue to be used to raise awareness of other conservation measures available to Los Osos customers.

Marketing Strategies

A public information program needs goals, staff, materials and a theme to be effective. Currently Los Osos has one person spending part-time on these programs (Cal Citie). This program would expand on that effort to increase the market penetration of the existing programs. The program will need an increased annual budget to carry out the program. The following steps could be used to add new programs:

1. Develop a clean and persuasive statement of purpose.
2. Choose an appropriate theme.
3. Identify key target groups.
4. Select members for a water conservation committee.
5. Identify communication paths, resource materials, and volunteers.
6. Design and implement specific campaigns.
7. Ensure effective coordination and follow-through.

This measure targets all customers within Los Osos service area. The coordinator would develop the program following the steps listed above. Once a purpose statement has been created, a water conservation theme would be decided upon. This could be based on the results of this study which will identify where most of the conservation benefits will come from. Examples of possible themes follows.

- Save Water
- Use Water Wisely
- Save Water, Save Money, Save Energy
- Save Water, It's Your Future
- Save Water Today for Tomorrow
- Water is Life, Don't Waste It

A program logo reflecting the theme should then be selected. The image could be realistic, stylized, or a friendly caricature; and it should be given a suitable name. This theme can be retained or modified as needed in the future.

Delivery

A public information specialist would likely devote part his/her time to public education throughout each service area. Additional staff may be involved to help by educating the public

through a speakers bureau, tours, producing bill inserts, creating displays at fairs and nurseries, giving presentations, and creating low water-use gardens. This program will likely be carried out with part-time staff and/or independent contractor. Certain parts of the development could be contracted out, such as graphics and printing. A water conservation committee could be created to receive input from consumers affected by the program, to advise the water conservation coordinator about new programs, materials, and means of communicating with target groups; assist in ideas; and help develop and implement specific education programs. The committee could consist of an elected official as chairperson, representative of interested agencies and parties, and technical personnel.

To convey to the customers the importance of water conservation, the program may seek to explain why construction of water facilities may be necessary if water conservation is not practiced, how much these facilities would cost, and then compare these costs to what benefits can be received from conserving water. Public information would be used to promote the other selected conservation programs as well.

The various media forms including bill inserts, ads, and television and radio spots can be used to instill a conservation ethic in the community. Specific material compliments the other programs such as free audit programs so that the customers are aware of how to take advantage of existing conservation programs. For example, a spring bill insert could publicize the availability of irrigation audits to qualified customers (larger water users) or the availability of free water audit or retrofit kits for homeowners.

Participation Rates

It is assumed that every customer will receive at least one message from the education program yearly--either hear a radio spot, see a poster in a store or on a bus or billboard, or catch a theatrical performance at the local shopping mall put on by school children.

Costs

Costs include design of marketing, printing and distributing public information materials. A cost of $2 per residential account per year is estimated for the administration, marketing and educational programs.

Water Savings

Water savings from public education are difficult to determine because it supports other programs although estimates of two to five percent of residential use have been used.[6] For this report, water savings was estimated to be 3 percent of total consumption for residential customers. This is considered to be achievable over the next five years by continuing existing programs and adding programs such as those mentioned above.

BMP-8 - SCHOOL EDUCATION PROGRAMS

Description

Long-term results to eliminate wasteful water-use habits are best achieved by educating young people. The program will especially target school-age children with presentations, poster contests, printed educational materials, and theatrical presentations. They, in turn, will inform their parents of the importance of water conservation in Los Osos. Teaching children to respect the value of water will help them grow into responsible adults with a conservation ethic. Educational material must meet state education frameworks, and grade appropriate materials should be distributed to grade levels K-3, 4-6, 7-8, and high school.

One other program that should be investigated is the "Learning to be Water Wise and Energy Efficient" produced by the Energy Technology Laboratories of Modesto, California. This program involves a comprehensive retrofit kit with high quality showerheads, faucet aerators, a fluorescent lamp, water/rain gage, shower flow rate test bag, leak detection tablets and other water and energy saving devices. The program is taught to the 4th to 6th grade students and involves a home retrofit project. It accomplishes a dual purpose of retrofitting in the area plus school education. It is currently being used nationwide.

Marketing Strategies

New school programs could be organized as follows:

1. Obtain approval for the new water education programs from the superintendent of schools
2. Organize water utility efforts to obtain relevant materials
3. Coordinate teacher training
4. Estimate the number of participants, including teachers, in the water education program
5. Organize distribution of curriculum materials to teachers
6. Monitor and follow the success of the program making adjustments as necessary to maximize student contact

Delivery

A school education coordinator will serve to administer and follow-through with the program. The coordinator would annually review any new program materials developed by other water utilities and consider introducing the materials into the program. The coordinator will also maintain an adequate supply of material for the program. Teacher training will be offered annually to targeted grade level teachers. The coordinator will also maintain an adequate supply of material for the program. For example Los Osos may decide to extend the program into high schools and modify the program used by the Metropolitan Water District of Southern California that focuses on debating the current water issues that affect the state of California.

Participation Rates

It is assumed that every student (4th to 6th grade) will receive at least one message from the education program yearly. The program will offer presentations, poster contests, printed educational materials, and theatrical presentations. They, in turn, will inform their parents of the importance of water conservation in Los Osos area.

Costs

Costs include design of marketing, printing and distributing school information materials. A cost of $1.00 per 4th - 6th grade student per year is estimated for the administration, marketing and teacher training programs.

Water Savings

Water savings from school education are difficult to determine because it supports other programs although estimates of two to five percent of residential use have been used.[6] For this report, water savings are assumed to be included with the public information savings listed above (3.0 percent of total consumption for residential customers). This is considered to be achievable over the next five years by continuing existing programs and adding programs such as those mentioned above.

BMP-9 - CONSERVATION PROGRAMS FOR COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL CUSTOMERS

Description

Commercial, industrial, and institutional (CII) customers will be ranked according to annual water use. Commercial customers are defined to be any business that provides or distributes a product or service, such as hotels, restaurants, office buildings, commercial businesses or other places of commerce. These do not include multi-family residences. Institutional customers are any water using establishment dedicated to public service. Industrial customers are any water users that are primarily manufacturers or processors of materials as defined by the Standard Industrial Classifications (SIC) Code numbers 2000 through 3999.

Los Osos will achieve a ten percent reduction in annual non-residential water use over a ten year period using water surveys, customer incentives and/or other means. Alternatively, instead of a performance goal, Los Osos could commit to offering water surveys on a repeating basis to at least ten percent of CII customers.

Marketing Strategies

Los Osos would compile a list of nonresidential owners who have indoor water use in the top 10 percent of all accounts in their respective category. After targeting existing high water-use customers, Los Osos would mail indoor water conservation brochures offering a free indoor water survey to the owners. Telephone follow-up would raise the participation rate. Using contractors and equipment manufacturers to market certain water conservation technologies to targeted customers would further increase participation.

Process equipment and fixtures that could qualify for a rebate would be identified for the owner and payback analyses conducted with and without financial assistance from Los Osos. The rebate level could be set at Los Osos avoided costs with a maximum set, depending on the annual Los Osos budget for the program. The participant's actions and water use would be tracked over time.

The incentive portion of the program could be patterned after successful CII programs currently being conducted by MWD as well as the City of Seattle, City of San Jose, East Bay Municipal Utility District, and Los Angeles Department of Water and Power. These programs have been running since 1994 and all pay a rebate based on the amount of water saved, or for commercial facilities a set amount for certain types of fixture replacement. The rebate amount is set at the utility's avoided cost and has been on the order of $0.75-$1.25 per hundred cubic feet saved.[22,23] In the case of San Jose the rebate is based on reduced sewer flow and is set at $2.00 per hundred cubic feet of flow reduction.[24] The volume of water saved is calculated by estimating the water savings rate, in gallons per day, multiplied by an assigned life of the project. Usually two to five years is a sufficient to generate a rebate with an attractive payback to the business for the project. Some utilities have a cap on the rebate amount of $20,000 to $50,000. Each utility has an application procedure and the project is checked out by an engineer before the rebate is granted, since it is paid based on projected water savings.

Delivery

An interior survey, where appropriate and requested by a customer, would be conducted by Los Osos staff or a consultant. The surveyor would perform an on-site interior inspection and produce a customized report that describes fixture inspections, leak tests, retrofit possibilities, cooling tower operation and improvements, process water improvements, and recycling opportunities for each site. The report would include a spreadsheet that compares the existing facility operations with conservation standards and potentials. The participant's actions and water use would be tracked over time. Standards would be based on previous experience and the performance of the latest technology.

The survey report would consider, when appropriate, the following measures:

- Change from water-cooled to air-cooled equipment
- Change from one-pass to recirculating cooling and heating systems
- Improve industrial and commercial washers and rinsers
- Install solenoid and automatic control valves
- Analyze whether recycling industrial water and separating waste streams are feasible
- Determine placement of submeters

The outdoor portion of the water survey is targeted at reducing peak demand by conserving irrigation water. Existing nonresidential building owners, and managers with high summer water use could be offered an irrigation system survey to improve their existing sprinkler systems water-use efficiency. This program would be restricted to sites having less than three acres to avoid overlap with the Large Landscape Conservation Program. Although this program could be run in conjunction with that measure, it is evaluated separately because the target market may be different and the water surveyors would require different training.

All customers receiving an survey would receive an oral and written survey report, including a landscape watering schedule and water saving literature. A five year water savings lifetime is assumed. Los Osos would mail each participant a yearly follow-up letter at the start of the watering season as a reminder to save water, and would spot check a number of businesses to evaluate water savings and implementation of survey findings. Site managers would make the adjustments and operational changes, not the surveyor.

Los Osos staff would be trained, or consultants would be hired to conduct the surveys. Appointments would be set with those owners accepting the survey. Since the surveys would be site-specific, a pre-survey telephone survey would be performed to get general water use information about each site.

Implementing this program would require an information program as well as an incentive program. To implement the information program, Los Osos would promote on-site audits or plan reviews to assess water conservation opportunities. The surveyor would encourage an appropriate company employee to attend the survey, and teach the employee how to read meters and fine tune process control devices to minimize water use. For the incentive program, Los Osos would stimulate interest by providing a customer rebate based on the water saving amount. In addition, Los Osos could motivate other similar businesses to participate by promoting successful case studies demonstrating water savings.

Participation Rates

Business response to an offer of a free indoor commercial/industrial (CII) water survey has traditionally been low because water bills are not usually a significant cost, except to the large water users. The top 10 percent of commercial/industrial/institutional water users in the service area (including restaurants, office buildings, hotels/motels, laundries, research and development firms, manufacturers, and other accounts with significant water use) would be offered a free interior survey. On a districtwide basis the top 20 percent would be about 50 accounts. It is assumed that 50 percent of those contacted or about 25 accounts would agree to participate in the survey program. Completing the project over a five year period would mean that 5 surveys would need to be done each year.

Costs

The costs per customer being surveyed would vary widely, depending on the complexity level of the surveyed site. A study performed in San Jose, California, of 15 large commercial/industrial customers showed that implemented water conservation practices cost the customer about $100,000.[25]

The City of Phoenix estimates that its indoor survey costs range from $1,000 to $7,000 per survey; MWD of Southern California estimates $3,000 to $10,000 per customer.[26] Customer cost to retrofit with water-efficient equipment varies as well. The payback period for most customers should be less than 18 months, a period short enough to encourage participation.

One part-time surveyor could perform the estimated 5 surveys per year. Appropriate follow-up would be provided by trained staff to ensure that the survey savings are permanent. The program would be budgeted to complete the surveys within five years. In-house staff could be trained to do the job. Assuming in-house staff is used, a Los Osos cost of $3,000 per existing site can be assumed for the small and medium size sites. This value reflects costs for Los Osos staff to conduct these surveys as well as a part-time staff person to administer the program.

The surveyor could perform an irrigation survey on two three acre sites per day. One surveyor working for five months per year could handle this program for the community.

For the incentive program, one part-time person could process and accept an estimated 5 or more applications per year. Most of these sites would have participated in the survey program. Additional sites will probably apply but not all projects will meet the criteria for funding. Program marketing (preparation of a flyer mailed to top water users, with telephone follow-up), site visits, application processing would be handled by this individual. An engineering consultant could be retained to check out each application. For the purposes of this report, a Los Osos cost of $3,000 per existing site is assumed.

Water Savings

For commercial/industrial conservation, a 12 percent indoor water savings is assumed for the surveyed sites based on estimates used with the California BMPs.[12] Potential industrial water savings are difficult to determine because industry use is site specific. San Jose and other California Water Agencies/contractors have reported savings of 15 to 50 percent. A 15 percent indoor savings is assumed for the industrial portion of this measure, with bigger projects expected compared to commercial sites Thus, assuming a 50-50 split between commercial/institutional and industrial indoor water uses, a 13.5 percent indoor savings was used for the CII category. A 20-year lifetime is also assumed, since it represents the average lifetime of the equipment used.

BMP-10 - WHOLESALE AGENCY ASSISTANCE PROGRAMS

Los Osos does not supply wholesale water so this BMP does not apply

BMP-11 - NON-PROMOTIONAL WATER PRICING PROGRAMS

Description

Under this measure Los Osos could modify their existing water rate structures with the objective of reducing consumption. Traditional objectives in rate structure design include that the rates be based on the costs to serve, that they provide adequate and stable revenues, that they be fair or equitable among customers classes and volume users, and that they be easy to implement and administer. Non-promotional or conservation rates provide a financial incentive to ratepayers to reduce their water use, usually by applying a surcharge on peak months' usage or by charging a higher unit rate for water as more units are used. These rates are often not based on historical costs to serve each customer group or rate block and therefore are held, by some ratepayers, to be unfair. It is, therefore, essential that new rates be developed through a public process that assures acceptance of the purpose and design of the rate structure. It is important to recognize that, for whatever new type of rate structure selected, greater leverage can be achieved from a combination of price with indoor and outdoor conservation programs than from price alone. Non-promotional water pricing makes the most sense as part of a broad demand management program.

The following is a general discussion of alternative conservation rate structures that Los Osos may wish to consider. Tiered rates (inclining block rates) and seasonal rates are generally considered the basic non-promotion rate types. The District has such a rate structure currently. But there are other rate structures that can have a similar effect. For example, a single unit rate that replaces a declining block rate structure is often touted as a non-promotional rate structure. Another example is a marginal (or incremental) cost rate structure because the rate is tied to the cost of incremental water supplies which are affected by Demand Side Management measures. Four rate structure types are identified below that could be applicable for Los Osos.

A single unit rate structure charges the same unit rate for all volume used, usually for all customer classes, but sometimes with a different rate for each customer class. This rate structure has gained in popularity over the traditional declining-block rate structure because of the intuitive appeal of all customers paying the same price for all water use, and the elimination of the perceived unfairness of large water users paying lower rates for high volume under the declining-block rate structures. The uniform volume rate structure is generally accompanied by a fixed monthly service charge, by meter size, that recovers customer costs unrelated to water volume.

Marginal cost or incremental costs of new supplies or of the next increment of treatment facilities are sometimes used as the basis for seasonal or inclining block rates applied year-round. The rationale is to charge existing customers the unit cost of the next increment of supply so that their decision to use or not use their next increment of water is based on the cost of incremental supply. But if there were no account growth, or increase in usage within the existing number of accounts, there would be no need for the next increment. Therefore, the existing customers of many utilities believe that incremental water supplies should be paid for, in connection or capacity charges, by future customers since they necessitate the requirement. Alternatively, the community could determine the amount of water available from the safe yield of the groundwater basin, and charge the incremental cost of imported water for excess use above the safe yield allocated to customers. Since marginal cost pricing is not based on current costs, excess revenues will accrue that must be applied to reductions in the service charge, to off-season rates, or to funds for financing incremental supply facilities. All of these alternative uses of excess revenues must be evaluated for this alternative in achieving fairness in rate structure design and revenue neutrality.

A seasonal rate structure is implemented for water consumed during a utility's peak-use season, either as a means of recovering the incremental cost of providing water during this period or as an inducement to conserve water because of inadequate or constrained supply. Seasonal rate structures can be constructed to apply either summer surcharges or a tiered rate structure. A summer surcharge can be applied to all summer volume or to summer volume in excess of winter volume. Most water economists prefer using a surcharge on summer use in excess of winter (indoor) use because the incremental cost of supply can be used as a basis for the rate blocks and the difference in rate blocks can be high enough to induce a consumption response without generating major excess revenues.

Inclining block rates, or tiered block rates, use two or more rate blocks with increasing unit rates as consumption increases from one block to the next. This structure can be applied during the summer only or during the entire year. Depending on the volume breakpoints of the blocks and the number of blocks, the upper blocks will rarely be applied in the off-season. Some utilities try to set each block rate at the cost of peaking or at the cost of each new increment of supply. If the rate blocks are mostly judgmental, the rate structure should be viewed simply as a conservation rate structure which does not require a strict cost-of-service justification. Determination of the number of blocks, price break points, and rate differentials between blocks requires careful analysis that addresses the patterns of use by blocks, the desired effect on

consumption, and the impacts on total revenues. Although Los Osos already has this type of rate structure, changing the number of blocks or the break points between blocks could be considered to increase the incentives to conserve water.

Marketing Strategies

Non-promotional rates, especially inclining block rates, are sometimes perceived by ratepayers as being unfair. Public hearings will be required to hear the ratepayers sentiments and to respond to them regarding the purpose of the rates and the design of the rate structure. Non-promotional rates should be presented to the public more as a subtle, but constant, reminder that water is a precious commodity that should not be wasted than as an unyielding deterrent to water use for traditionally acceptable applications. The public should be reminded that they can minimize the effect of rate shock by implementing the various conservation measures that Los Osos endorses, whether or not they are chosen as participants in the programs that are restricted (for budget and practical implementation reasons) to a limited number of participants per year.

Participation Rates

It is anticipated that, in the interest of rate fairness or equity, all government customers would be included in the applicable rates. The amount of rate impact for each customer class and within each customer class (by rate blocks) would depend on a water consumption by class and cost-of-service analysis.

Costs

A one-time system design/rate study/implementation cost of approximately $25,000 would be required to implement non-promotional rates or modify existing rates for Los Osos. It is assumed that no major reprogramming of the billing systems would be required to shift or add blocks and adjust the minimum charges. The above cost estimates include a provision for two public hearings to explain the purpose and basis for the new rates and allow for customer feedback.

Water Savings

Whatever rate structure is selected, assuming a new one is found to be desirable, the rates must be set with an accurate prediction of the customers' response to price so that revenue requirements are met at the lower volumes that result. The demand for water is usually inelastic which means that a percentage increase in rates will evoke a proportionately smaller percentage decrease in the quantity of water used. The response is typically larger in summer (when more discretionary use takes place) than in winter, and the response is usually dependent on the magnitude of the increase and the level of rates. However, if there have been large increases in the recent past, the next rate increase, even if it is a large one, could evoke only a small response because there is little discretionary demand left to be eliminated. At some point water is an essential product irrespective of price.

It should be clear from the above discussion that one cannot generalize on the results of rate increases. The predicted response at Los Osos must result from an integrated analysis of all demand management measures with an analysis of new rate structure impacts. Water savings in the range of 5-10 percent are possible from major changes in rate structures but it is not possible to forecast such a change at this time. When the rate structure change is more modest the water pricing measure can be thought of as a measure which supports other measures and increases customer participation because the customer's payback has improved. In this case the savings can be treated more like public information savings and zero or small savings attributed solely to the water price change.

BMP-12 - WATER CONSERVATION COORDINATOR

Description

Los Osos will need to designate a water conservation coordinator and needed support staff. The District, Cal Cities, and S & T Mutual Water Company should jointly pay for the efforts under the terms of the Los Osos Groundwater Analysis Management Agreement.
Duties of the coordinator shall be:

1. Coordination and oversight of conservation programs and BMP implementation
2. Preparation and submittal of the progress reports to various parties
3. Communication and promotion of water conservation issues to agency senior management; coordination with operations and planning staff; preparation of annual conservation budget; preparation of water conservation plan updates

Delivery

It is not necessary that Los Osos have a full-time staff person in this role. Existing staff of any or all of the water purveyors can be designated. Nevertheless, it is important that each water purveyor have one person who is the point person. The person's name shall be published.

Costs

Los Osos will need to decide staffing levels to support and administer the conservation program.

Water Savings

No water savings are directly assigned to this program, they are covered in estimated savings for the programs the coordinator administers.

BMP-13 - WATER WASTE PROHIBITION

Description

Los Osos will need to enact and enforce measures prohibiting gutter flooding, single pass cooling in new connections, nonrecirculating systems in all new conveyor car wash and commercial laundries, and nonrecycling decorative water fountains.

Delivery

Los Osos shall adopt and enforce such an ordinances covering the above prohibitions. The water conservation coordinator shall be responsible for this process.

Costs

Costs for this program are minimal since exemplary ordinances are widely available and the coordinator salary will cover the cost.

Water Savings

No water savings will be assigned for this measure. Rather it will be used by Los Osos to set an example for their own as well as new CII facilities. Savings for the later are covered under the CII program.

BMP-14 - RESIDENTIAL ULTRA LOW-FLUSH TOILET REPLACEMENT

Description

Ultra Low Flush (ULF) toilets reduce toilet-flushing water to about 1.6 gallons per flush (gpf). This is a significant water savings from an average of 5-7 gpf for regular toilets, and from 3.5 gpf for low-water-use toilets. Since January 1, 1994, the federal Energy Policy Act of 1992 has limited toilets sold for residential use to 1.6 gpf. The standard for commercial toilets was the same but the effective date was January 1, 1995.

Los Osos could implement a toilet replacement program in one several ways:

1. Offering incentives to existing residential customers who replace their high water-use toilets with ultra low-flush (ULF) toilets.
2. Offering free toilets or subsidized installation programs
3. Passing an ordinance that requires toilet retrofit on the resale of a home

This BMP is intended to use the rebate method for replacement, the other methods are described in the next sections as separate alternatives to this BMP.

The specific wording of this BMP from the California Urban Water Conservation Council states that the program should be "at least as effective as a retrofit on resale ordinance." Such an ordinance would require retrofit of homes (replacement of toilets) at the time of resale. Determining the actual rate of resale in the study area is problematical. For the purposes of this analysis it is assumed to be 7 percent.

This program would be applicable to all existing residential dwellings. It would have an overall goal of replacing approximately 90 percent of existing targeted residential toilets with ULF toilets at the rate of 7 percent per year. Thus this program would extend 13 years to reach 90 percent. Los Osos would develop an application procedure for those dwelling owners intending to replace toilets and desiring a rebate. Those who would install the toilets as part of new construction or remodeling requiring a permit would not be eligible since these customers should not be given an incentive for complying with the new laws. Applicants would have to apply before changing toilets, not after the fact.

Marketing Strategies

To promote a rebate program Los Osos would provide bill stuffers describing the rebate offer. Assuming the program applies to all residential dwellings a kick-off news conference would be held, and the rebate offer would be publicized in the local media. Marketing to one segment, such as multifamily building owners would need to be more focused and use direct mail and trade and association publications.

Trade allies involved in selling and installing toilets would be solicited to advertise the program and provide point-of-purchase displays. Los Osos would maintain a list of available plumbing supply houses and plumbing contractors who could install the toilets.

Delivery

Los Osos would target all customers who do not already have ULF toilet models, estimated to be about 90 percent of the total market. Application forms would be available through trade allies or distributed by Los Osos or the contractor in targeted programs. As noted above, no incentives would be provided for new dwelling units or construction involving a building permit. All of the above methods would employ installation verification by mail-in of a form or random inspections for self-installed toilets. Installation verification could be handled by in-house staff or by plumbing contractors. Customers would mail completed rebate forms to Los Osos for processing and payment.

Rebates given in other completed or ongoing programs range from $40-100. The first rebate for one dwelling is often $100, with subsequent rebates of $40-75. Ideally the rebate would be set at Los Osos avoided costs. For the replacement level in this program, the assumed rebate is $75 per toilet to stimulate acceptance.

Participation Rates

The goal for Los Osos is to replace 90 percent of all toilets through the incentive program. Replacing 90% of the toilets through this program would involve 9,000 toilets. Replacing this number of toilets over 13 years would mean replacing 700 toilets per year or 13 toilets per week.

The different programs will have different rates of success, i.e. how many toilets could be replaced in ten years. One of the largest toilet rebate programs is the City of Los Angeles' program which rebated 411,000 toilets and distributed 181,000 toilets through Community Based Organizations (CBO's).[32] The rebate program replaced 20.5 percent of the total residential toilets after 5 1/2 years. The CBO program replaced 9.5 percent of the residential toilets after 3 1/4 years. The City of Los Angeles's goal is to replace all the toilets. The rebate offered is $100 per toilet for single family and $75 for multifamily. All single family customers will save about $35 annually per year on their water bill. Multifamily owners will save an average of $55 per toilet per year. In other words the residential payback for out of pocket costs (for installation costs only since the rebate covers the cost of the toilet) is under 1½ years.

Costs

An estimate of the capital cost, installation cost, operations and maintenance cost, and life expectancy of this measure was obtained by contacting manufacturers, consultants, and vendors who work with ULF toilets. The retail cost of a ULF toilet is about $70 and up.[33] Installation costs vary but can usually be negotiated in the range of $35-50. Costs are shown in Table A-5.

Recycling of toilets costs more than disposing of the toilets in a landfill. All costs in the above are for recycling which includes: storage, stripping, delivery to a recycler, crushing to aggregate, and delivery to a contractor who will use them for road base.

Inspection costs are based on a 10 percent inspection of all installs at $30 per inspection, included with the contract for the distribution. The purpose of the inspection is to deter fraud. If Los Osos were to decide that toilet replacement requires a plumbing permit, then 100 percent inspection will be necessary.

TABLE A-5

ULTRA LOW-FLUSH TOILET REPLACEMENT COST

Program Type	Payment/ Toilet	Inspection	Marketing or CBO	Contract Admin.	Contractor Install	Recycle	Total
Rebate	75	3	15	27		5	125
Voucher	75	3	5	27		5	115
Giveaway	65	3	5	32		5	110
CBO	65	3	25	27		5	125
Direct Install	65	0	5	30	25	5	130

Staff time depends partly depends on the size of the program, i.e. the number of toilet replacements processed each week. Assuming the program is contracted out then a program for Los Osos will require one part-time employee for contract administration for the life of the program (which varies depending on how long it takes to reach the goal).

There will be an initial start-up cost to set up the office in-charge of the above program. The cost can be figured at $10 per toilet replaced in the first year and is only incurred for one year. The rebate cost for Los Osos is figured on $250 per account, assuming two toilets per account.

Water Savings

There is a considerable amount of data on the water savings from toilet replacement. The Metropolitan Water District of Southern California (MWD) recently evaluated toilet replacement programs in the Cities of Los Angeles and Santa Monica. The range in water savings was 30-45 gpd per retrofitted toilet.[34] Expressed on a per-person basis, the saving for multifamily dwellings was considerably higher than for single-family dwellings. This result is counterintuitive. For this reason the decision was made not to use these findings directly, even though they are widely used in conjunction with evaluating BMPs in California.

The AWWARF End Use Study which show an 10.5 gcd savings when replacing an "average" gpf toilet with a ULF toilet.[8] This amounts to a 52 percent saving in the toilet use in a home. For this study a savings of 10.5 gcd (52 percent) is used for toilet replacement with a ULF.

COMMUNITY RETROFIT BY RETROFIT ON RESALE ORDINANCE

This measure is similar to BMP 14 except that implementation would be through an ordinance requiring that bathrooms be retrofitted on the sale of the home. The measure would also be extended beyond toilets and also require low flow showerheads at the time of sale.

This requirement would be applicable to all existing residential dwellings. It would have an overall goal of replacing approximately 90 percent of existing targeted residential toilets with ULF toilets and 90 percent of existing showerheads at the rate of 7 percent per year. Seven percent per year is the assumed housing turnover rate. Thus this program would extend 13 years to reach 90 percent.

Marketing Strategies

Los Osos would pass an ordinance similar to the approach used by the Cities of Morro Bay, Los Angeles and San Diego. In these cities toilets must be replaced with ULFT's when the home is sold. The owner must provide a certificate of compliance, signed by a licensed plumber, certifying that the toilets (and showerheads) have been replaced before escrow closes.

Trade allies involved in selling and installing toilets and showerheads would be solicited to advertise the program and provide point-of-purchase displays. Los Osos would maintain a list of available plumbing supply houses and plumbing contractors who could install toilets and showerheads.

Participation Rates

The goal for Los Osos is to replace 90 percent of all toilets through the incentive program. Replacing 90% of the toilets through this program would involve 9,000 toilets. Replacing this number of toilets over 13 years would mean replacing 700 toilets per year or 13 toilets per week.

Costs

The cost developing a retrofit on resale ordinance is estimated to be $10,000. The cost burden for complying with the ordinance would fall on the customer. No ongoing cost for monitoring compliance with the ordinance is assumed. Los Osos would need to have a copy of the certificate of compliance, signed by a plumber verifying compliance, before the name on the water account would be changed. The additional clerical time is assumed to be negligible.

The compliance cost for the customer in Los Osos is figured on $450 per account, assuming two toilets per account and two showerheads per account.

Water Savings

The AWWARF End Use Study which show an 10.5 gcd savings when replacing an "average" gpf toilet with a ULF toilet.[8] This amounts to a 52 percent saving in the toilet use in a home. For this study a savings of 10.5 gcd (52 percent of toilet end use) is used for toilet replacement with a ULF. This same study shows a savings of 2.6 gcd (21 percent of shower end use) for shower replacement.

COMMUNITY FIXTURE REPLACEMENT

This measure is also similar to BMP 14 and a retrofit on resale program except that implementation would involve subsidized retrofit and a requirement (ordinance) mandating that bathrooms be retrofitted before hook-up to the new sewer system. The measure would also be extended beyond toilets and require low flow showerheads at the time sewer hook-up.

In this measure Los Osos would defray about half of the customer's cost of compliance by providing toilets and showerheads free of charge. Customers could either install the devices themselves or hire a plumber to do it. Customers could also select and purchase a toilet and showerhead at their own expense rather than accept the District models. Customers having to produce a certificate of compliance, the District would inspect the home before hook-up. This inspection would occur at the same time as the septic tank inspection, or when the sewer from the house to the main was inspected, so that there would be minimal added inspection cost on the part of the District.

Marketing Strategies

Los Osos would purchase truckload quantities of toilets and sufficient numbers of low flow showerheads to provide all residential customers with sufficient fixtures to retrofit their homes.

The giveaway programs could be coordinated with suppliers or through a Los Osos warehouse. Customers would have to provide their water account number to receive their free fixture(s). records would be kept to track who has received a toilet and showerhead and made available to inspectors doing the inspection portion of the project.

Alternatively, a Community Based Organization (CBO) could be used to run the program. CBO programs have been successful in areas where funding for the program is secure and the program continues for multiple years. For Los Osos the CBO would administer the program and hire people to canvass door-to-door or market the program to residents. When participants sign up for the program, they receive the toile(s)t and showerhead(s) free of charge and pay for installation. CBO's can arrange for installation or the customer can do it themselves.

Participation Rates

The program would be designed to be finished by mid 2004, and would be spread over the prior two years. Approximately 25 percent of the homes would be covered the fist year (2002), 50 percent in 2003 and the last 25 percent in 2004. Although planned to cover 100 percent of the homes it is estimated that 10-15 percent of the homes already have ULFT's and 20-30 percent of the homes have low flow showerheads. These would just need to be verified by inspection.

Costs

The cost burden for complying with the retrofit before hook up requirement would be split approximately 50:50 with the customer. The compliance cost for the customer in Los Osos is figured on $450 per account, assuming two toilets per account and two showerheads per account. For homes with more or less than two toilets per account costs would be different. Also some homes already have these fixtures and some customers may choose to supply their own fixtures so actual costs to the District will be less. Given the uncertainty about exactly how many toilets will be required, this study assumes that the average cost would be about $225 per account.

Water Savings

The AWWARF End Use Study which show an 10.5 gcd savings when replacing an "average" gpf toilet with a ULF toilet.[8] This amounts to a 52 percent saving in the toilet use in a home. For this study a savings of 10.5 gcd (52 percent of toilet end use) is used for toilet replacement with a ULF. This same study shows a savings of 2.6 gcd (21 percent of shower end use) for shower replacement.

REFERENCES CITED

1. Barakat & Chamberlin, Inc. "Customer Incentives for Water Conservation--A Guide". California Urban Water Agencies, California Urban Water Conservation Council and United States Environmental Protection Agency. February 1994.

2. Nelson, John O., "Water Audit Encourages Residents to Reduce Consumption," JAWWA, October 1992.

3. Personal communication with Barbara Jordan, March 1996.

4. "Assessment of Water Savings from Best Management Practices," Report prepared for Metropolitan Water District of Southern California, May 1991.

5. Bruvold, W.H., and Mitchell, P.R., "Evaluating the Effect of Residential Water Audits," JAWWA, August 1993.

6. Maddaus, William O. "Water Conservation," American Water Works Association. 1986.

7. Brown and Caldwell, "Water Conservation Retrofit Effectiveness" prepared for the Department of Housing and Urban Development, Washington D.C., March 1984.

8. Mayer, P., Opitz, E.,Nelson, J. Residential End Uses of Water, American Water Works Research Foundation, 1999.

9. California Department of Water Resources "Water Audit and Leak Detection Guidebook", Sacramento, California, May 1986.

10. Sunset Magazine, "How Much Water Does Your Lawn Really Need", ER 520C, June 1987.

11. California Department of Water Resources, Office of Water Conservation. "Landscape Water Management Handbook, Version 3.1 September 1987.

12. California Best Management Practices Memorandum of Understanding, September 1991 as amended September 29, 1997.

13. Walker, R.E and Kah, G.F., "Landscape Water Management Handbook", California Department of Water Resources, December 1987

14. Whitcomb, J.B., Kah, G.F, and Willig, W.C., "BMP 5 Handbook: A Guide to Implementing Large Landscape Conservation Programs as Specified in Best Management Practice 5, prepared for California Urban Water Conservation Council, April, 1999.

15. NEOS Corporation, "Evaluation of Energy and Water Savings for North Marin Water District," December 1991.

16. Correspondence with Joe Spann, City of Houston, March 1996

17. *Residential Clothes Washers*, Quarterly Newsletter, published by the Consortium for Energy Efficiency, Boston Massachusetts, May 1999.

18. Personal communication with company representatives of Staber Industries, November 29, 1993.

19. *Consumer Reports*, "Dishwashers," pp. 637-641, October 1993.

20. Ho, Kathleen F., Harold (Skip) Schick, and Iran Burnbaum, "Assessment of North American Utility Experience with Residential Efficiency Programs," ACEEE 1990 Summer Study on Energy Efficiency in Buildings Conference Proceedings, 1990.

21. Brown and Caldwell, "Residential Water Conservation Projects - Summary Report," Report Number HUD-PDR-903, prepared for the Department of Housing and Urban Development, Washington D.C., June 1984.

22. Correspondence with Philip Paschke, Seattle Water Department, March 1996.

23. Correspondence with Mike Hazinski, East Bay Municipal Utility District, March 1996.

24. Correspondence with Everett Wilson, City of San Jose, March 1996.

25. Brown and Caldwell, "Case Studies of Industrial Water Conservation in the San Jose Area," prepared for City of San Jose, February 1990.

26. Correspondence with Jon Sweeten, Metropolitan Water District of Southern California, March 1996.

27. Personal letter from John O. Nelson, regarding Marin Country Club Pilot Study, October 4, 1988.

28. Personal letter from Robert Walker, regarding "Summary of the Desert Water Agency Turf Irrigation Evaluations Conducted by the C.V.R.C.D.'s Mobile Lab 1987-1988," November 14, 1988.

29. Personal letter from Ed Murdock, regarding Livermore Parks and Recreation Pilot Study, July 15, 1991.

30. Conservation Technologies, Inc., "Residential Water Savings with Improved Irrigation Control - A Sense of Magnitude," Glenn Dobbs, August 1991.

31. Lynn Hulme, Virginia Porter, "Large Turf Irrigation Audits - Marin Municipal Water District," Managing Limited Urban Water Supplies, Conference for California Water Agencies Proceedings, Oakland, CA, November 1989.

32. Correspondence with Tom Gackstetter, Los Angeles Department of Water and Power, March 1996.

33. Correspondence with American Standard, August 1991.

34. Chestnutt, T.W. et. al. A & N Technical Services, "Ultra Low Flush Toilet Programs," prepared by Metropolitan Water District of Southern California, November 1994.

35. Abhay Aher, et al "East Bay Utility District Water Conservation Study," Stevens Institute of Technology, October 1991.

36. Thomas Konen and Damann Anderson, "The Impact of Water Conserving Plumbing Fixtures on Residential Water Use Characteristics: A Case Study in Tampa, Florida," Stevens Institute of Technology, February 1993.

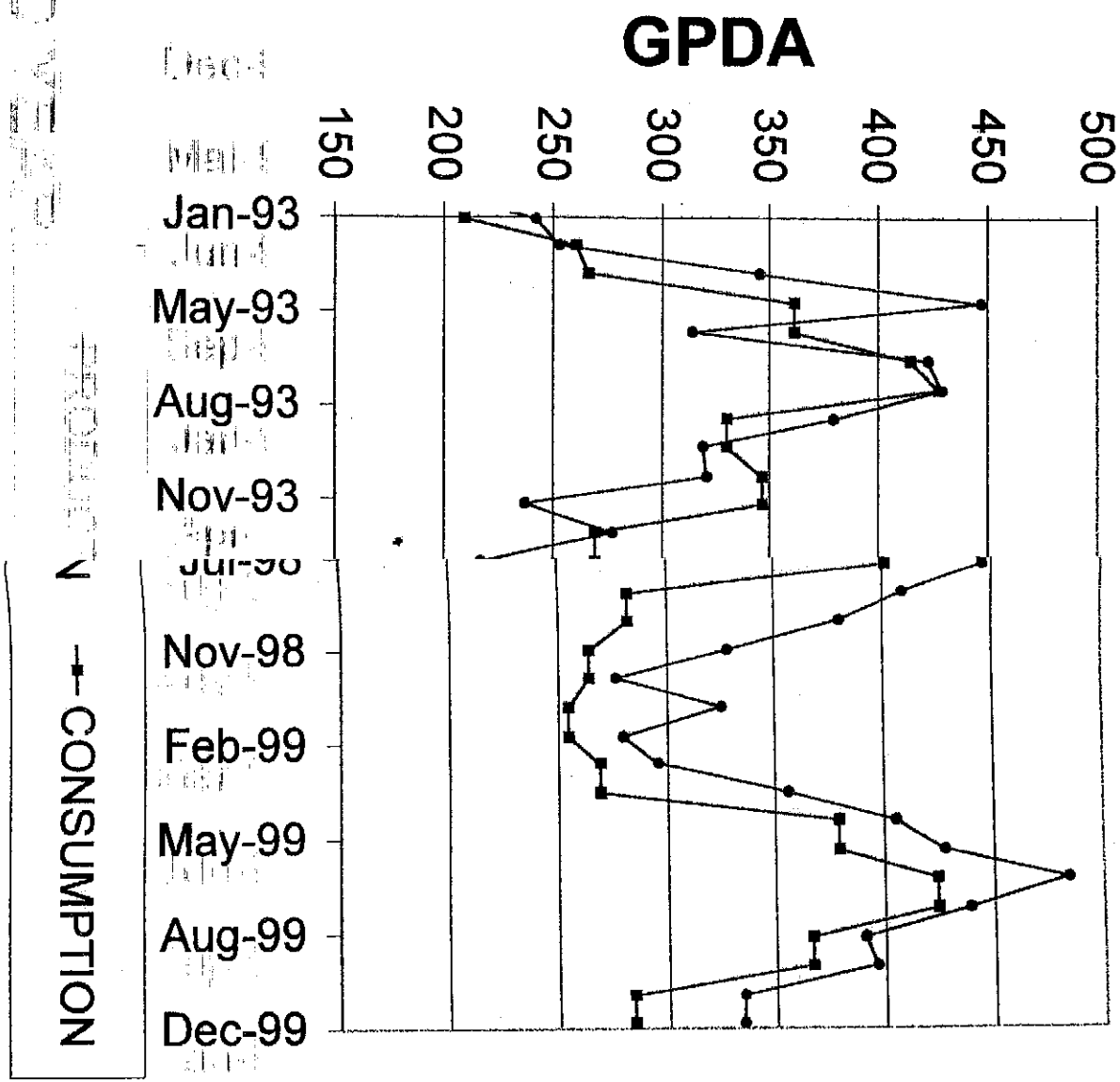
APPENDIX B

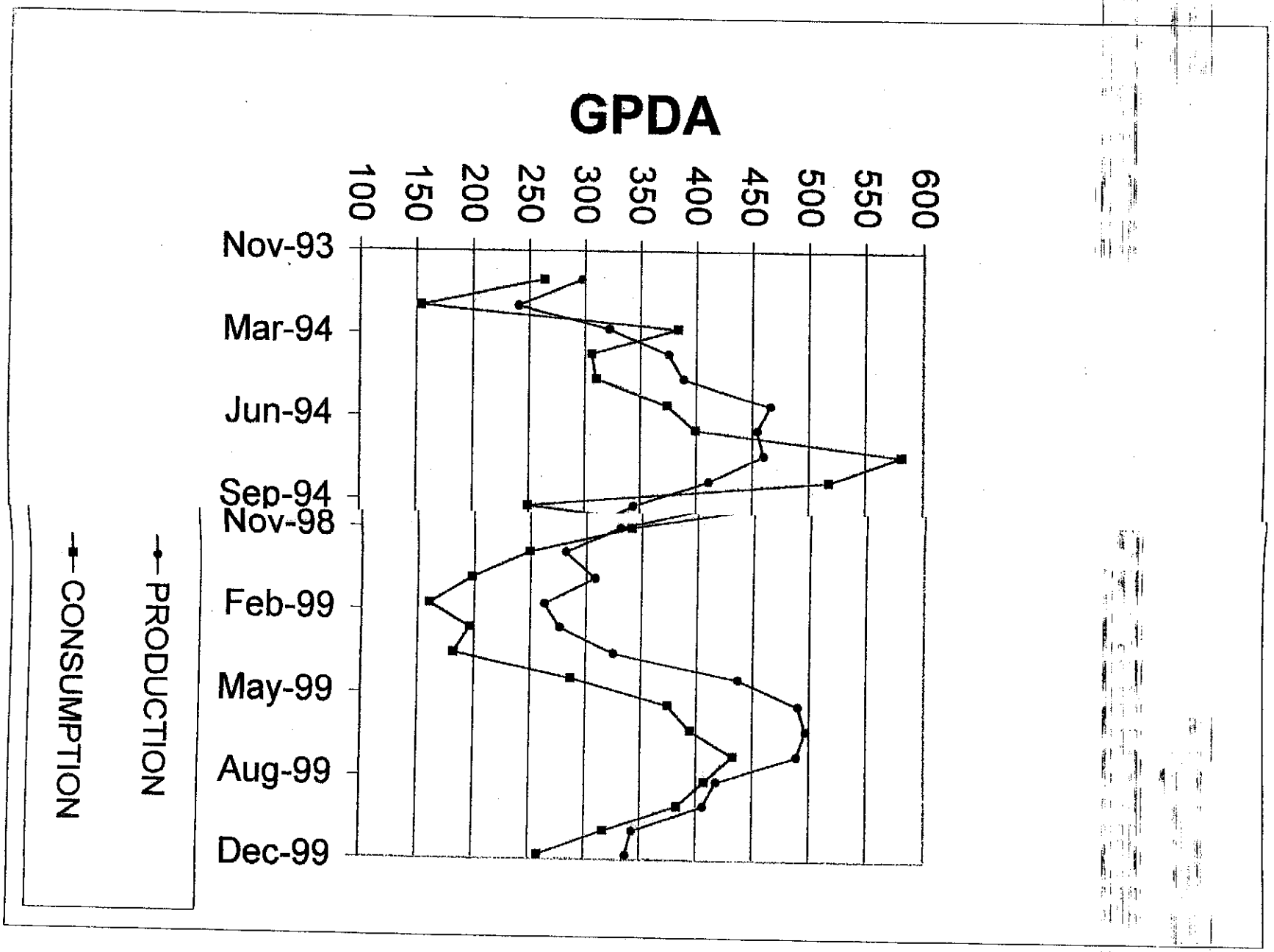
PRODUCTION AND CONSUMPTION DATA FOR LOS OSOS COMMUNITY SERVICES DISTRICT AND CAL CITIES

TABLE OF CONTENTS

DESCRIPTION **PAGE**

1. Figure B-1 LOCSD Production and Consumption B-2
2. Figure B-2 Cal Cities Production and Consumption B-3
3. LOCSD Production and Consumption Tables B-4
4. Cal Cities Production and Consumption Tables B-16


GPDA
500
450
400
350
300
250
200
150
Jan-93
May-93
Aug-93
Nov-93
Nov-98
Feb-99
May-99
Aug-99
Dec-99
CONSUMPTION


600
550
500
450
400
350
300
250
200
150
100
GPDA
Nov-93
Mar-94
Jun-94
Sep-94
Nov-98
Feb-99
May-99
Aug-99
Dec-99
PRODUCTION
CONSUMPTION

LOCSD Production

Number of Accounts	2,792	2,792	2,792	2,792	2,792	2,792	2,792
Period	Jan-93	Feb-93	Mar-93	Apr-93	May-93	Jun-93	Jul-93
Number of Days in Billing Period	31	28	31	30	31	30	31
Total Production (Gallons)	16,768,000	18,932,600	21,859,900	28,894,500	38,662,900	26,275,100	36,560,400
Production/Days (Gallons/Day)	540,903.2	676,164.3	705,158.1	963,150.0	1,247,190.3	875,836.7	1,179,367.7
Production (GPDA)	193.7	242.2	252.6	345.0	446.7	313.7	422.4

LOCSD Consumption

Number of Accounts	2,792	2,792	2,792	2,792	2,792	2,792	2,792
Period	Jan-93	Feb-93	Mar-93	Apr-93	May-93	Jun-93	Jul-93
Number of Days in Billing Period	31	28	31	30	31	30	31
Total Consumption (Gallons)	18,087,014	16,336,657	22,538,287	22,272,822	31,262,269	30,253,608	35,869,875
Consumption/Days (Gallons/Day)	583,452	583,452	727,042	742,427	1,008,460	1,008,454	1,157,093
Consumption (GPDA)	**209.0**	**209.0**	260.4	265.9	361.2	361.2	414.4

LOCSD Production

Number of Accounts	2,792	2,793	2,793	2,792	2,792	2,793	2,793
Period	Aug-93	Sep-93	Oct-93	Nov-93	Dec-93	Jan-94	Feb-94
Number of Days in Billing Period	31	30	31	30	31	31	28
Total Production (Gallons)	37,093,800	31,767,400	27,594,900	26,838,100	20,490,300	23,950,500	16,917,700
Production/Days (Gallons/Day)	1,196,574.2	1,058,913.3	890,158.1	894,603.3	660,977.4	772,597	604,204
Production (GPDA)	428.6	379.1	318.7	320.4	236.7	276.6	216.3

1993 AVE DAILY PRODUCTION (MGD) **0.907**

1993 AVE (GPDA) **325.0**

LOCSD Consumption

Number of Accounts	2,792	2,793	2,793	2,792	2,792	2,793	2,793
Period	Aug-93	Sep-93	Oct-93	Nov-93	Dec-93	Jan-94	Feb-94
Number of Days in Billing Period	31	30	31	30	31	31	28
Total Consumption (Gallons)	36,975,584	27,621,432	28,542,147	29,015,287	29,982,084	23,271,992	21,019,398
Consumption/Days (Gallons/Day)	1,192,761	920,714	920,714	967,176	967,164	750,709	750,693
Consumption (GPDA)	427.2	329.7	329.7	346.4	346.4	268.8	268.8

1993 AVE DAILY CONSUMPTION (MGD) **0.898**

1993 AVE (GPDA) **321.7**

LOCSD Production

Number of Accounts	2,793	2,793	2,793	2,793	2,793	2,772	2,752	2,752
Period	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94
Number of Days in Billing Period	31	30	31	30	31	31	30	31
Total Production (Gallons)	24,490,600	26,489,451	30,589,400	34,140,300	32,709,800	37,641,700	32,184,200	29,364,900
Production/Days (Gallons/Day)	790,019	882,982	986,755	1,138,010	1,055,155	1,214,248	1,072,807	947,255
Production (GPDA)	282.9	316.1	353.3	407.5	377.8	438.0	389.8	344.2

1994 AVE DAILY PRODUCTION (MGD) **0.915**

1994 AVE (GPDA) **328.6**

LOCSD Consumption

Number of Accounts	2,793	2,793	2,793	2,793	2,793	2,793	2,752	2,752
Period	Mar-94	Apr-94	May-94	Jun-94	Jul-94	Aug-94	Sep-94	Oct-94
Number of Days in Billing Period	31	30	31	30	31	31	30	31
Total Consumption (Gallons)	23,271,476	23,240,850	24,015,546	27,420,576	28,334,596	33,781,924	28,261,525	29,203,575
Consumption/Days (Gallons/Day)	750,693	774,695	774,695	914,019	914,019	1,089,739	942,051	942,051
Consumption (GPDA)	268.8	277.4	277.4	327.3	327.3	390.2	342.3	342.3

1994 AVE DAILY CONSUMPTION (MGD) **0.822**

1994 AVE (GPDA) **295.3**

LOCSD Production

Number of Accounts	2,792	2,792	2,793	2,793	2,794	2,794	2,796	2,796
Period	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95	May-95	Jun-95
Number of Days in Billing Period	30	31	31	28	31	30	31	30
Total Production (Gallons)	24,465,600	21,531,800	18,886,400	19,365,200	21,109,100	30,591,000	32,573,000	37,267,000
Production/Days (Gallons/Day)	815,520	694,574	609,239	691,614	680,939	1,019,700	1,050,742	1,242,233
Production (GPDA)	292.1	248.8	218.1	247.6	243.7	365.0	375.8	444.3

LOCSD Consumption

Number of Accounts	2,794	2,794	2,794	2,794	2,794	2,794	2,796	2,796
Period	Nov-94	Dec-94	Jan-95	Feb-95	Mar-95	Apr-95	May-95	Jun-95
Number of Days in Billing Period	30	31	31	28	31	30	31	30
Total Consumption (Gallons)	18,998,955	19,632,253	23,513,811	21,238,281	24,768,585	23,969,599	30,303,675	29,326,137
Consumption/Days (Gallons/Day)	633,298	633,298	758,510	758,510	798,987	798,987	977,538	977,538
Consumption (GPDA)	**226.7**	**226.7**	271.5	271.5	286.0	286.0	349.6	349.6

LOCSD Production

Number of Accounts	2,794	2,794	2,796	2,796	2,796	2,796	2,796	2,796
Period	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96
Number of Days in Billing Period	31	31	30	31	30	31	31	29
Total Production (Gallons)	40,933,000	42,234,000	36,489,000	37,814,000	32,591,000	26,541,000	29,222,000	23,527,400
Production/Days (Gallons/Day)	1,320,419	1,362,387	1,216,300	1,219,806	1,086,367	856,161	942,645	811,290
Production (GPDA)	472.6	487.6	435.0	436.3	388.5	306.2	337.1	290.2

1995 AVE DAILY PRODUCTION (MGD) **1.030**

1995 AVE (GPDA) **368.4**

LOCSD Consumption

Number of Accounts	2,794	2,794	2,796	2,796	2,796	2,796	2,796	2,796
Period	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96
Number of Days in Billing Period	31	31	30	31	30	31	31	29
Total Consumption (Gallons)	32,891,804	32,891,804	31,885,769	32,948,627	22,884,018	23,646,818	23,636,688	22,111,740
Consumption/Days (Gallons/Day)	1,061,026	1,061,026	1,062,859	1,062,859	762,801	762,801	762,474	762,474
Consumption (GPDA)	379.8	379.8	380.1	380.1	272.8	272.8	272.7	272.7

1995 AVE DAILY CONSUMPTION (MGD) **0.904**

1995 AVE (GPDA) **323.3**

LOCSD Production

Number of Accounts	2,796	2,796	2,797	2,797	2,798	2,798	2,799	2,799
Period	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96
Number of Days in Billing Period	31	30	31	30	31	31	30	31
Total Production (Gallons)	26,848,000	31,817,000	36,402,000	30,358,000	34,499,000	30,290,000	37,491,100	32,633,700
Production/Days (Gallons/Day)	866,065	1,060,567	1,174,258	1,011,933	1,112,871	977,097	1,249,703	1,052,700
Production (GPDA)	309.8	379.3	419.8	361.8	397.7	349.2	446.5	376.1

1996 AVE DAILY PRODUCTION (MGD) **0.988**

1996 AVE (GPDA) **353.3**

LOCSD Consumption

Number of Accounts	2,796	2,796	2,797	2,797	2,798	2,798	2,799	2,799
Period	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96
Number of Days in Billing Period	31	30	30	30	31	31	30	32
Total Consumption (Gallons)	25,349,426	24,531,702	34,793,220	34,793,220	33,423,258	33,423,258	31,824,263	33,945,881
Consumption/Days (Gallons/Day)	817,723	817,723	1,159,774	1,159,774	1,078,170	1,078,170	1,060,809	1,060,809
Consumption (GPDA)	292.5	292.5	414.6	414.6	385.3	385.3	379.0	379.0

1996 AVE DAILY CONSUMPTION (MGD) **0.921**

1996 AVE (GPDA) **329.2**

LOCSD Production

Number of Accounts	2,800	2,800	2,800	2,800	2,800	2,800	2,801	2,801
Period	Nov-96	Dec-96	Jan-97	Feb-97	Mar-97	Apr-97	May-97	Jun-97
Number of Days in Billing Period	30	31	31	28	31	30	31	30
Total Production (Gallons)	23,081,800	25,771,100	20,650,100	22,314,300	33,293,700	34,266,400	37,898,300	41,426,700
Production/Days (Gallons/Day)	769,393	831,326	666,132	796,939	1,073,990	1,142,213	1,222,526	1,380,890
Production (GPDA)	274.8	296.9	237.9	284.6	383.6	407.9	436.5	493.0

LOCSD Consumption

Number of Accounts	2,800	2,800	2,800	2,800	2,800	2,800	2,801	2,801
Period	Nov-96	Dec-96	Jan-97	Feb-97	Mar-97	Apr-97	May-97	Jun-97
Number of Days in Billing Period	30	31	31	28	31	30	31	30
Total Consumption (Gallons)	19,395,885	20,042,415	20,589,372	18,596,852	29,550,635	28,597,389	36,031,111	34,868,817
Consumption/Days (Gallons/Day)	646,530	646,530	664,173	664,173	953,246	953,246	1,162,294	1,162,294
Consumption (GPDA)	230.9	230.9	237.2	237.2	340.4	340.4	415.0	415.0

LOCSD Production

Number of Accounts	2,769	2,769	2,769	2,769	2,789	2,789	2,804	2,804
Period	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	Jan-98	Feb-98
Number of Days in Billing Period	31	31	30	31	30	31	31	28
Total Production (Gallons)	38,975,000	36,948,200	39,347,200	37,523,200	22,266,600	21,424,200	20,201,100	17,847,600
Production/Days (Gallons/Day)	1,257,258	1,191,877	1,311,573	1,210,426	742,220	691,103	651,648	637,414
Production (GPDA)	454.0	430.4	473.7	437.1	266.1	247.8	232.4	227.3

1997 AVE DAILY PRODUCTION (MGD) **1.057**

1997 AVE (GPDA) **379.4**

LOCSD Consumption

Number of Accounts	2,769	2,769	2,769	2,769	2,789	2,789	2,804	2,804
Period	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	Jan-98	Feb-98
Number of Days in Billing Period	31	31	30	31	30	31	31	28
Total Consumption (Gallons)	36,245,836	36,245,836	33,579,805	34,699,131	23,582,233	24,368,307	13,906,512	12,560,720
Consumption/Days (Gallons/Day)	1,169,221	1,169,221	1,119,327	1,119,327	786,074	786,074	448,597	448,597
Consumption (GPDA)	422.3	422.3	404.2	404.2	281.8	281.8	160.0	160.0

1997 AVE DAILY CONSUMPTION (MGD) **0.976**

1997 AVE (GPDA) **350.2**

LOCSD Production

Number of Accounts	2,811	2,811	2,821	2,821	2,831	2,831	2,822	2,822
Period	Mar-98	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98
Number of Days in Billing Period	31	30	31	30	31	31	30	31
Total Production (Gallons)	23,701,900	24,773,600	29,058,400	37,268,100	38,302,200	39,093,800	34,572,000	33,214,800
Production/Days (Gallons/Day)	764,577	825,787	937,368	1,242,270	1,235,555	1,261,090	1,152,400	1,071,445
Production (GPDA)	272.0	293.8	332.3	440.4	436.4	445.5	408.4	379.7

LOCSD Consumption

Number of Accounts	2,811	2,811	2,821	2,821	2,831	2,831	2,822	2,822
Period	Mar-98	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98
Number of Days in Billing Period	31	30	31	30	32	31	30	31
Total Consumption (Gallons)	24,106,777	23,329,139	26,612,982	25,754,498	36,303,313	35,168,835	23,820,980	24,615,012
Consumption/Days (Gallons/Day)	777,638	777,638	858,483	858,483	1,134,479	1,134,479	794,033	794,033
Consumption (GPDA)	276.6	276.6	304.3	304.3	400.7	400.7	281.4	281.4

Discard due to El Nino Weather

Lowest two month period = Jan/Feb

LOCSD Production

Number of Accounts	2,815	2,815	2,748	2,748	2,807	2,807	2,813	2,813
Period	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Number of Days in Billing Period	30	31	31	28	31	30	31	30
Total Production (Gallons)	27,662,400	24,069,200	27,660,000	21,480,000	25,710,000	29,950,000	35,310,000	36,030,000
Production/Days (Gallons/Day)	922,080	776,426	892,258	767,143	829,355	998,333	1,139,032	1,201,000
Production (GPDA)	327.6	275.8	324.7	279.2	295.5	355.7	404.9	426.9

1998 AVE DAILY PRODUCTION (MGD) **0.957**

1998 AVE (GPDA) **339.3**

LOCSD Consumption

Number of Accounts	2,815	2,815	2,748	2,748	2,807	2,807	2,813	2,813
Period	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Number of Days in Billing Period	30	31	31	28	31	30	31	30
Total Consumption (Gallons)	22,259,376	23,001,356	21,656,413	19,560,631	23,377,685	22,623,567	33,030,736	31,965,228
Consumption/Days (Gallons/Day)	741,979	741,979	698,594	698,594	754,119	754,119	1,065,508	1,065,508
Consumption (GPDA)	263.6	263.6	254.2	254.2	268.7	268.7	378.8	378.8

1998 AVE DAILY CONSUMPTION (MGD) **0.793**

1998 AVE (GPDA) **281.1**

LOCSD Production

Number of Accounts	2,794	2,794	2,789	2,789	2,736	2,736
Period	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99
Number of Days in Billing Period	31	31	30	31	30	31
Total Production (Gallons)	41,910,000	37,960,000	32,670,000	34,220,000	27,460,000	28,370,000
Production/Days (Gallons/Day)	1,351,935	1,224,516	1,089,000	1,103,871	915,333	915,161
Production (GPDA)	483.9	438.3	390.5	395.8	334.6	334.5

1999 AVE DAILY PRODUCTION (MGD) **1.036**

1998 AVE (GPDA) **372.0**

LOCSD Consumption

Number of Accounts	2,794	2,794	2,789	2,789	2,736	2,736
Period	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99
Number of Days in Billing Period	31	31	30	31	30	31
Total Consumption (Gallons)	36,694,636	36,694,636	30,672,905	31,695,335	23,284,259	24,060,401
Consumption/Days (Gallons/Day)	1,183,698	1,183,698	1,022,430	1,022,430	776,142	776,142
Consumption (GPDA)	423.7	423.7	366.6	366.6	283.7	283.7

1999 AVE DAILY CONSUMPTION (MGD) **0.917**

1999 AVE (GPDA) **329.3**

LOCSD Totally Daily Production and Consumption from 1993-1999

Total Ave Daily Production (MGD)	0.984

Total Ave Daily Production (GPDA)	352.3

Total Ave Daily Consumption (MGD)	0.890

Total Ave Daily Consumption (GPDA)	318.6

LOCSD Overal Comsumption from 1993-1999

Overall Ave Consumption (MGD)	0.890	mgd
Overall Ave Consumption (gpda)	318.6	gpda
Overall Ave UAW (%)	9.57%	
Indoor Use*	217.8	gpda
Overall Indoor Use (%)	68.37%	

*AVERAGE OF JAN/FEB 93 AND NOV/DEC 94

Cal Cities Production

Number of Accounts	2,468	2,468	2,468	2,468	2,468	2,468	2,468
Period	Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94
Number of Days in Billing Period	31	28	31	30	31	30	31
Total Production (Gallons)	22,712,272	16,580,168	24,588,256	27,727,612	29,668,672	34,461,108	34,719,168
Production/Days (Gallons/Day)	732,653.9	592,148.9	793,169.5	924,253.7	957,053.9	1,148,703.6	1,119,973.2
Production (GPDA)	296.9	239.9	321.4	374.5	387.8	465.4	453.8

Cal Cities Consumption

Number of Accounts	2,468	2,468	2,468	2,468	2,468	2,468	2,468
Period	Jan-94	Feb-94	Mar-94	Apr-94	May-94	Jun-94	Jul-94
Number of Days in Billing Period	31	28	31	30	31	30	31
Total Consumption (Gallons)	20,126,436	10,600,656	29,290,184	22,635,228	23,701,128	27,629,624	30,508,676
Consumption/Days (Gallons/Day)	649,239.9	378,594.9	944,844.6	754,507.6	764,552.5	920,987.5	984,150.8
Consumption (GPDA)	263.1	153.4	382.8	305.7	309.8	373.2	398.8

Cal Cities Production

Number of Accounts	2,468	2,468	2,468	2,468	2,468	2,470	2,470
Period	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95
Number of Days in Billing Period	31	30	31	30	31	31	28
Total Production (Gallons)	35,126,080	30,427,892	26,277,988	21,889,472	20,057,620	16,404,388	16,635,520
Production/Days (Gallons/Day)	1,133,099.4	1,014,263.1	847,677.0	729,649.1	647,020.0	529,173.8	594,125.7
Production (GPDA)	459.1	411.0	343.5	295.6	262.2	214.2	240.5

1994 AVE DAILY PRODUCTION (MGD) **0.887**

1994 AVE (GPDA) **359.3**

Cal Cities Consumption

Number of Accounts	2,468	2,468	2,468	2,468	2,468	2,470	2,470
Period	Aug-94	Sep-94	Oct-94	Nov-94	Dec-94	Jan-95	Feb-95
Number of Days in Billing Period	31	30	31	30	31	31	28
Total Consumption (Gallons)	44,431,200	38,287,128	19,035,104	33,260,568	9,220,596	18,973,768	8,592,276
Consumption/Days (Gallons/Day)	1,433,264.5	1,276,237.6	614,035.6	1,108,685.6	297,438.6	612,057.0	306,867.0
Consumption (GPDA)	580.7	517.1	248.8	449.2	120.5	247.8	124.2

1994 AVE DAILY CONSUMPTION (MGD) **0.844**

1994 AVE (GPDA) **341.9**

Cal Cities Production

Number of Accounts	2,470	2,470	2,470	2,470	2,470	2,470	2,470
Period	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95
Number of Days in Billing Period	31	30	31	30	31	31	30
Total Production (Gallons)	17,560,796	26,058,824	27,714,148	31,018,064	37,108,280	35,359,456	32,975,580
Production/Days (Gallons/Day)	566,477.3	868,627.5	894,004.8	1,033,935.5	1,197,041.3	1,140,627.6	1,099,186.0
Production (GPDA)	229.3	351.7	361.9	418.6	484.6	461.8	445.0

Cal Cities Consumption

Number of Accounts	2,470	2,470	2,470	2,470	2,470	2,470	2,470
Period	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95
Number of Days in Billing Period	31	30	31	30	31	31	30
Total Consumption (Gallons)	25,450,700	19,571,420	19,401,624	20,733,064	28,884,020	42,719,028	30,849,764
Consumption/Days (Gallons/Day)	820,990.3	652,380.7	625,858.8	691,102.1	931,742.6	1,378,033.2	1,028,325.5
Consumption (GPDA)	332.4	264.1	253.4	279.8	377.2	557.9	416.3

Cal Cities Production

Number of Accounts	2,470	2,470	2,470	2,479	2,479	2,479	2,479
Period	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96
Number of Days in Billing Period	31	30	31	31	29	31	30
Total Production (Gallons)	33,481,228	25,791,040	22,045,056	20,108,484	16,022,908	21,058,444	28,923,664
Production/Days (Gallons/Day)	1,080,039.6	859,701.3	711,130.8	648,660.8	552,514.1	679,304.6	964,122.1
Production (GPDA)	437.3	348.1	287.9	261.7	222.9	274.0	388.9

1995 AVE DAILY PRODUCTION (MGD) **0.881**

1995 AVE (GPI **356.8**

Cal Cities Consumption

Number of Accounts	2,470	2,470	2,470	2,479	2,479	2,479	2,479
Period	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96
Number of Days in Billing Period	31	30	31	31	29	31	30
Total Consumption (Gallons)	41,218,540	19,036,600	25,353,460	33,130,416	8,838,368	23,374,252	11,268,620
Consumption/Days (Gallons/Day)	1,329,630.3	634,553.3	817,853.5	1,068,723.1	304,771.3	754,008.1	375,620.7
Consumption (GPDA)	538.3	256.9	331.1	431.1	122.9	304.2	151.5

1995 AVE DAILY CONSUMPTION (MGD) **0.819**

1995 AVE (GPDA) **331.6**

Cal Cities Production

Number of Accounts	2,479	2,479	2,479	2,479	2,479	2,479	2,479
Period	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96
Number of Days in Billing Period	31	30	31	31	30	31	30
Total Production (Gallons)	36,287,724	35,092,420	35,449,216	35,883,056	33,580,712	32,734,724	21,746,604
Production/Days (Gallons/Day)	1,170,571.7	1,169,747.3	1,143,523.1	1,157,517.9	1,119,357.1	1,055,958.8	724,886.8
Production (GPDA)	472.2	471.9	461.3	466.9	451.5	426.0	292.4

1996 AVE DAILY PRODUCTION (MGD) **0.918**

1996 AVE (GPDA) **370.3**

Cal Cities Consumption

Number of Accounts	2,479	2,479	2,479	2,479	2,479	2,479	2,479
Period	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96
Number of Days in Billing Period	31	30	31	31	30	31	30
Total Consumption (Gallons)	20,866,956	31,285,848	30,259,592	44,368,368	27,633,364	41,434,712	19,460,716
Consumption/Days (Gallons/Day)	673,127.6	1,042,861.6	976,115.9	1,431,237.7	921,112.1	1,336,603.6	648,690.5
Consumption (GPDA)	271.5	420.7	393.8	577.3	371.6	539.2	261.7

1996 AVE DAILY CONSUMPTION (MGD) **0.881**

1996 AVE (GPDA) **355.5**

Cal Cities Production

Number of Accounts	2,479	2,502	2,502	2,502	2,502	2,502	2,502
Period	Dec-96	Jan-97	Feb-97	Mar-97	Apr-97	May-97	Jun-97
Number of Days in Billing Period	31	31	28	31	30	31	30
Total Production (Gallons)	19,537,760	16,343,052	19,884,832	29,581,156	32,650,200	37,101,548	37,812,148
Production/Days (Gallons/Day)	630,250.3	527,195.2	710,172.6	954,230.8	1,088,340.0	1,196,824.1	1,260,404.9
Production (GPDA)	254.2	210.7	283.8	381.4	435.0	478.3	503.8

Cal Cities Consumption

Number of Accounts	2,479	2,502	2,502	2,502	2,502	2,502	2,502
Period	Dec-96	Jan-97	Feb-97	Mar-97	Apr-97	May-97	Jun-97
Number of Days in Billing Period	31	31	28	31	30	31	30
Total Consumption (Gallons)	32,339,032	12,518,528	24,149,928	10,106,976	32,481,152	29,180,228	31,621,700
Consumption/Days (Gallons/Day)	1,043,194.6	403,823.5	862,497.4	326,031.5	1,082,705.1	941,297.7	1,054,056.7
Consumption (GPDA)	420.8	161.4	344.7	130.3	432.7	376.2	421.3

Cal Cities Production

Number of Accounts	2,502	2,502	2,502	2,502	2,502	2,502
Period	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97
Number of Days in Billing Period	31	31	30	31	30	31
Total Production (Gallons)	36,947,460	36,926,516	36,751,484	35,569,644	23,792,384	17,438,124
Production/Days (Gallons/Day)	1,191,853.5	1,191,177.9	1,225,049.5	1,147,407.9	793,079.5	562,520.1
Production (GPDA)	476.4	476.1	489.6	458.6	317.0	224.8

1997 AVE DAILY PRODUCTION (MGD) **0.987**

1997 AVE (GPDA) **394.6**

Cal Cities Consumption

Number of Accounts	2,502	2,502	2,502	2,502	2,502	2,502
Period	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97
Number of Days in Billing Period	31	31	30	31	30	31
Total Consumption (Gallons)	31,770,552	34,071,400	31,678,548	32,355,488	30,282,780	19,842,196
Consumption/Days (Gallons/Day)	1,024,856.5	1,099,077.4	1,055,951.6	1,043,725.4	1,009,426.0	640,070.8
Consumption (GPDA)	409.6	439.3	422.0	417.2	403.4	255.8

1997 AVE DAILY CONSUMPTION (MGD) **0.879**

1997 AVE (GPDA) **351.2**

Cal Cities Production

Number of Accounts	2,524	2,524	2,524	2,524	2,524	2,524
Period	Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98
Number of Days in Billing Period	31	28	31	30	31	30
Total Production (Gallons)	18,605,752	15,048,264	19,792,828	19,891,564	26,934,732	31,883,500
Production/Days (Gallons/Day)	600,185.5	537,438.0	638,478.3	663,052.1	868,862.3	1,062,783.3
Production (GPDA)	237.8	212.9	253.0	262.7	344.2	421.1

Cal Cities Consumption

Number of Accounts	2,524	2,524	2,524	2,524	2,524	2,524
Period	Jan-98	Feb-98	Mar-98	Apr-98	May-98	Jun-98
Number of Days in Billing Period	31	28	31	30	31	30
Total Consumption (Gallons)	15,675,836	11,844,580	13,752,728	11,150,436	18,025,304	19,606,576
Consumption/Days (Gallons/Day)	505,672.1	423,020.7	443,636.4	371,681.2	581,461.4	653,552.5
Consumption (GPDA)	200.3	167.6	**175.8**	**147.3**	230.4	258.9

Lowest two month period = mar/apr 98

Cal Cities Production

Number of Accounts	2,524	2,524	2,524	2,524	2,524	2,524
Period	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98
Number of Days in Billing Period	31	31	30	31	30	31
Total Production (Gallons)	36,718,572	39,136,108	35,669,128	33,051,876	25,003,396	21,967,264
Production/Days (Gallons/Day)	1,184,470.1	1,262,455.1	1,188,970.9	1,066,189.5	833,446.5	708,621.4
Production (GPDA)	469.3	500.2	471.1	422.4	330.2	280.8

1998 AVE DAILY PRODUCTION (MGD) **0.885**

1998 AVE (GPDA) **350.5**

Cal Cities Consumption

Number of Accounts	2,524	2,524	2,524	2,524	2,524	2,524
Period	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98
Number of Days in Billing Period	31	31	30	31	30	31
Total Consumption (Gallons)	28,429,984	34,966,756	33,153,604	36,935,492	25,769,348	19,462,212
Consumption/Days (Gallons/Day)	917,096.3	1,127,959.9	1,105,120.1	1,191,467.5	858,978.3	627,813.3
Consumption (GPDA)	363.4	446.9	437.8	472.1	340.3	248.7

1998 AVE DAILY CONSUMPTION (MGD) **0.734**

1998 AVE (GPDA) **290.8**

Cal Cities Production

Number of Accounts	2,567	2,567	2,567	2,567	2,567	2,567
Period	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Number of Days in Billing Period	31	29	31	30	31	30
Total Production (Gallons)	24,466,332	19,507,092	21,962,776	24,968,240	34,728,892	37,701,444
Production/Days (Gallons/Day)	789,236.5	672,658.3	708,476.6	832,274.7	1,120,286.8	1,256,714.8
Production (GPDA)	307.5	262.0	276.0	324.2	436.4	489.6

Cal Cities Consumption

Number of Accounts	2,567	2,567	2,567	2,567	2,567	2,567
Period	Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99
Number of Days in Billing Period	31	29	31	30	31	30
Total Consumption (Gallons)	15,675,836	11,844,580	15,582,336	13,955,436	22,765,380	28,729,184
Consumption/Days (Gallons/Day)	505,672.1	408,433.8	502,656.0	465,181.2	734,367.1	957,639.5
Consumption (GPDA)	197.0	159.1	195.8	181.2	286.1	373.1

Cal Cities Production

Number of Accounts	2,567	2,567	2,567	2,567	2,567	2,567
Period	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99
Number of Days in Billing Period	31	31	30	31	30	31
Total Production (Gallons)	39,486,920	38,872,812	32,163,252	32,240,296	26,371,488	26,821,036
Production/Days (Gallons/Day)	1,273,771.6	1,253,961.7	1,072,108.4	1,040,009.5	879,049.6	865,194.7
Production (GPDA)	496.2	488.5	417.7	405.1	342.4	337.0

1999 AVE DAILY PRODUCTION (MGD)	**0.980**
1999 AVE (GPDA)	**381.9**

Cal Cities Consumption

Number of Accounts	2,567	2,567	2,567	2,567	2,567	2,567
Period	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99
Number of Days in Billing Period	31	31	30	31	30	31
Total Consumption (Gallons)	31,316,516	34,380,324	31,326,240	30,409,192	24,360,864	20,521,380
Consumption/Days (Gallons/Day)	1,010,210.2	1,109,042.7	1,044,208.0	980,941.7	812,028.8	661,980.0
Consumption (GPDA)	393.5	432.0	406.8	382.1	316.3	257.9

1999 AVE DAILY CONSUMPTION (MGD)	**0.766**
1999 AVE (GPDA)	**298.4**

Cal Cities Total Daily Production and Consumption from 1994 -1999

Total Ave Daily Production (MGD)			0.923

Cal Cities

Total Ave Daily Production (GPDA)			368.9

Cal Cities

Total Ave Daily Consumption (MGD)			0.820

Cal Cities

Total Ave Daily Consumption (GPDA)			328.2

Cal Cities Overall Consumption from 1994 -1999

Overall Ave Consumption (MGD)	0.820 mgd
Overall Ave Consumption (gpda)	328.2 gpda
Overall Ave UAW (%)	11.02%
Indoor Use (Mar/Apr 98)	188.5 gpda
Overall Indoor Use (%)	57.43%

APPENDIX C

PUBLIC UTILITIES COMMISSION
RULE 14.1
MANDATORY WATER CONSERVATION AND RATIONING PLAN

RULE NO. 14.1

MANDATORY WATER CONSERVATION AND RATIONING PLAN

GENERAL INFORMATION

If water supplies are projected to be insufficient to meet normal customer demand, the utility may elect to implement voluntary conservation using the portion of this plan set forth in Section A of this Rule after notifying the Commission's Water Utilities Branch of its intent. If in the opinion of the utility more stringent water conservation measures are required, the utility shall request Commission authorization to implement the mandatory conservation and rationing measures set forth in Section B.

The Commission shall authorize mandatory conservation and rationing by approving Tariff SCHEDULE NO. 14.1, MANDATORY WATER CONSERVATION AND RATIONING. When Tariff Schedule No. 14.1 has expired or is not in effect, mandatory conservation and rationing measures will not be in force. Tariff Schedule No. 14.1 will set forth water use allocations, excess water use penalties, charges for removal of flow restrictors, and the period during which mandatory conservation and rationing measures will be in effect.

When Tariff Schedule No. 14.1 is in effect and the utility determines that water supplies are again sufficient to meet normal demands and mandatory conservation and rationing measures are no longer necessary, the utility shall seek Commission approval to rescind Tariff Schedule No. 14.1 to discontinue rationing.

In the event of a water supply shortage requiring a voluntary or mandatory program, the utility shall make available to its customers water conservation kits as required by Rule No. 20. The utility shall notify all customers of the availability of conservation kits.

(continued)

RULE NO. 14.1
(continued)

A. CONSERVATION - NONESSENTIAL OR UNAUTHORIZED WATER USE

No customer shall use utility-supplied water for nonessential or unauthorized uses as defined below:

1. Use of water through any connection when the utility has notified the customer in writing to repair a broken or defective plumbing, sprinkler, watering or irrigation system and the customer has failed to make such repairs within 5 days after receipt of such notice.

2. Use of water which results in flooding or run-off in gutters, waterways, patios, driveways, or streets.

3. Use of water for washing aircraft, cars, buses, boats, trailers or other vehicles without a positive shutoff nozzle on the outlet end of the hose, except for the washing of vehicles at commercial or fleet vehicle washing facilities operated at fixed locations where equipment using water is properly maintained to avoid wasteful use.

4. Use of water through a hose for washing buildings, structures, sidewalks, walkways, driveways, patios, parking lots, tennis courts, or other hard-surfaced areas in a manner which results in excessive run-off or waste.

5. Use of water for watering streets with trucks, except for initial wash-down for construction purposes (if street sweeping is not feasible), or to protect the health and safety of the public.

6. Use of water for construction purposes, such as consolidation of backfill, dust control, or other uses unless no other source of water or other method can be used.

7. Use of water for more than minimal landscaping in connection with any new construction.

(continued)

A. 8. Use of water for outside plants, lawn, landscape and turf areas more often than every other day, with even numbered addresses watering on even numbered days of the month and odd numbered addresses watering on the odd numbered days of the month, except that this provision shall not apply to commercial nurseries, golf courses and other water-dependent industries.

9. Use of water for outside plants, lawn, landscape and turf areas during certain hours if and when specified in Tariff Schedule No. 14.1 when the schedule is in effect.

10. Use of water for watering outside plants and turf areas using a hand held hose without a positive shut-off valve.

11. Use of water for decorative fountains or the filling or topping off of decorative lakes or ponds. Exceptions are made for those decorative fountains, lakes, or ponds which utilize recycled water.

12. Use of water for the filling or refilling of swimming pools.

13. Service of water by any restaurant except upon the request of a patron.

B. RATIONING OF WATER USAGE

In the event the conservation measures required by Section A are insufficient to control the water shortage, the utility shall, upon Commission approval, impose mandatory conservation and rationing. The water allocated for each customer, the time period during which rationing shall be in effect, and any additional conditions, will be set forth in Tariff Schedule No. 14.1, which shall be filed for this purpose at the time such rationing is approved by the Commission.

Before rationing is authorized by the Commission the utility shall hold public meetings and take all other applicable steps required by Sections 350 through 358 of the California Water Code.

(continued)

C. ENFORCEMENT OF MANDATORY CONSERVATION AND RATIONING

1. The water use restrictions of the conservation program in Section A of this rule become mandatory when the rationing program goes into effect. These restrictions are applicable whether or not the customer exceeds the monthly water allocation.

2. Upon inception of the mandatory provisions of this Rule the utility may, after one verbal and two written warnings, install a flow-restricting device on the service line of any premises where utility personnel observe water being used for any nonessential or unauthorized use as defined in Section A.

3. A flow restrictor shall not restrict water delivery by greater than 50% of normal flow and shall provide the premises with a minimum of 6 Ccf/month. The restrictor may be removed only by the utility, after a three-day period has elapsed, and upon payment of the appropriate removal charge as set forth in Tariff Schedule No. 14.1.

4. After the removal of a restricting device, if any nonessential or unauthorized use of water continues, the utility may install another flow-restricting device. This device shall remain in place until rationing is no longer in effect and until the appropriate charge for removal has been paid to the utility.

5. Each customer's water allocation shall be shown on the water bill. Water allocations may be appealed in writing as provided in Section D of this Rule. If a customer uses water in excess of the allocated amount, the utility may charge the excess usage penalty shown in Tariff Schedule No. 14.1.

6. Any monies collected by the utility through excess usage penalties shall not be accounted for as income, but shall be accumulated by the utility in a separate account for disposition as directed or authorized from time to time by the Commission.

7. The charge for removal of a flow-restricting device shall be in accordance with Tariff Schedule No. 14.1.

(continued)

D. APPEAL PROCEDURE

Any customer who seeks a variance from any of the provisions of this mandatory water conservation and rationing plan or a change in water allocation shall notify the utility in writing, explaining in detail the reasons for such a variation. The utility shall respond to each such request.

Any customer not satisfied with the utility's response may file an appeal with the staff of the Commission. The customer and the utility will be notified of the disposition of such appeal by letter from the Executive Director of the Commission.

If the customer disagrees with such disposition, the customer shall have the right to file a formal complaint with the Commission. Except as set forth in this Section, no person shall have any right or claim in law or in equity, against the utility because of, or as a result of, any matter or thing done or threatened to be done pursuant to the provisions of this mandatory water conservation and rationing plan.

E. PUBLICITY

In the event the utility finds it necessary to implement this plan, it shall notify customers and hold public hearings concerning the water supply situation, in accordance with Chapter 3, Water Shortage Emergencies, Sections 350 through 358, of the California Water Code. The utility shall also provide each customer with a copy of this plan by means of billing inserts or special mailings; notifications shall take place prior to imposing any fines associated with this plan. In addition, the utility shall provide customers with periodic updates regarding its water supply status and the results of customers' conservation efforts. Updates may be by bill insert, special mailing, poster, flyer, newspaper, television or radio spot/ advertisement, community bulletin board, or other appropriate method(s).