VI. APPENDICES

1 INTRODUCTION

This report updates the Urban Water Management Plan for the Visalia District of California Water Service Company (Cal Water). The California Public Utilities Commission's (CPUC) Decision 92-09-084 requires that water management plans be updated and reviewed as part of general rate cases filed after January 1, 1994.

1.1 URBAN WATER MANAGEMENT PLANNING ACT

The Urban Water Management Planning Act became part of the California Water Code with passage of Assembly Bill 797 (AB 797) during the legislature's 1983-84 regular session. The Act requires every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually to adopt and submit an urban water management plan at least once every five years to the Department of Water Resources (DWR). In 1993, AB 892 amended the Act to allow urban water suppliers who submit reports to the California Urban Water Conservation Council to submit the same report to DWR. A copy of Cal Water's most recent report is available on the Council's web site.

1.2 BEST MANAGEMENT PRACTICES

In 1991, Cal Water renewed its commitment to water conservation by signing the *Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU). The MOU provides the framework for better estimating the impact of urban water conservation practices through Best Management Practices (BMPs). BMPs are established and generally accepted practices that result in more efficient use of water. See Section 6, *Water Conservation Best Management Practices* for further discussion of the BMPs.

2 NARRATIVE DESCRIPTION OF UTILITY AND SERVICE AREA

California Water Service Company is an investor-owned public utility supplying water service to 1.7 million Californians through 435,000 connections. Its 25 separate water systems serve 63 communities from Chico in the North to the Palos Verdes Peninsula in Southern California. In 2000, Cal Water merged with the Dominguez Services Corporation incorporating several northern and southern California water systems. California Water Service Group, Cal Water's parent company, is also serving communities in Washington, New Mexico and Hawaii. Rates and operations for districts located in California are regulated by the California Public Utilities Commission (CPUC) and are set separately for each of the systems. Cal Water incorporated in 1926 and has provided water service to the Visalia community since 1927.

2.1 GEOGRAPHICAL LOCATION

The Visalia District is located in Tulare County, serving the City of Visalia and segments of unincorporated Tulare County including the community of Goshen. It is situated in the Tulare Lake hydrologic region, within the King-Kaweah-Tule Rivers sub-area. The service area is built upon the alluvium of the Kaweah River. The district lies approximately 42 miles southeast of the City of Fresno and 75 miles north of the City of Bakersfield. The area's climate is mild with an average temperature of 63 degrees and average rainfall of 10.8 inches. The summers are warm and dry and winters are mild with low humidity.

Major transportation links in the District include the Golden State Highway (State Route 99), State Route 63 and State Route 198. The Southern Pacific and the Atchison, Topeka and Santa Fe Railroads provide rail service to the region.

No major geologic features are located in the Visalia region. However, the San Andreas Fault Zone lies approximately 75 miles to the west-southwest; the Garlock Fault Zone lies 125 miles to the south-southeast. In combination, these faults are responsible for the uplift of base rock that forms the Transverse Mountain Range that separates the Tulare Lake basin from the Los Angeles basin.

The Kaweah River provides drainage for the southern Sierra Nevada Mountains. This river splits east of Visalia forming the St. Johns River that flows just north of Visalia while the Kaweah River continues south. Lake Kaweah is located on the Kaweah River about twenty miles up stream from the city. This 143,000 AF reservoir operated by the U.S. Army Corps of Engineers provides both flood control and water storage. The Kaweah River flows intermittently into the Tulare Lake Bed.

2.2 CUSTOMER DESCRIPTION

The dominant land use in the Visalia District is for residential and commercial purposes. This dominance can be seen in the service count of the District. Single-family residential services account for 87.8 percent of all services; multifamily residential services represent 0.6 percent and commercial services 9.8 percent. Thus, 98 percent of all services are for residential and commercial facilities. The remaining two percent include industrial, governmental uses, and other functions such as temporary construction meters.

See Section 3.1 for a further description of the Visalia District's customer base and service growth.

2.3 SOURCES OF SUPPLY

Groundwater is the sole source of water furnished to customers in the Visalia District. Table - *Historical Annual Supply by Source* and Figure - *Projected Annual Supply by Source* (see Appendix A) present the historical distribution of supply by source.

Please refer to Section 3.4, *Existing Water Supply*, for detailed information on the district's water supply. The groundwater basin description is located in Appendix F.

2.4 MAJOR PLANT IMPROVEMENTS EXPECTED

Cal Water will continue its annual main replacement program to upgrade and improve the distribution system of the Visalia District. Storage facilities and new wells will be added as needed to meet the average day and maximum day requirements of our customers. In order

to address the issue of aging infrastructure, Cal Water is developing a company-wide well and panelboard replacement program.

The Kaweah Delta Water Conservation District is developing a groundwater recharge facility to the east of the Visalia service area. As the facility becomes effective, new wells will be drilled in that vicinity which will require improvements to the transmission main network.

Cal Water is in the process of finalizing a Water Supply and Facilities Master Plan. This plan recommends replacing certain mains to improve distribution in order to eliminate low pressure conditions in portions of the system. In addition, the plan recommends the continued use of groundwater as the sole source of supply for the District. To this end, the plan recommends constructing groundwater wells as growth dictates. The plan also suggests that Cal Water support any future modification to the local waste water system that can enhance the use of recycled water for landscape irrigation within the City.

3 WATER SOURCES AND SUPPLY OUTLOOK

This section discusses current and historic service growth and demand. Future demands forecasted using three demand scenarios are also discussed. All tables referenced in this section are included in Appendix A, *Water Supply and Demand Forecasts*.

3.1 GROWTH IN SERVICE

This district is growing at a relatively constant, rapid rate. Total services increased an average of 3.41% in the past five years. In 16 of the past 20 years, the growth rate was 2.0% or higher.

The Visalia system is surrounded by and includes large parcels of land used for agricultural functions. Urban development encroaches on these parcels. Large tracts in the western area are used for industry. The rate of growth for industrial services artificially reflects rapid growth due to the acquisition of a city-owned industrial water service system. However, the county recently authorized capital expenditures for installation of sewer systems in Goshen where the industrial activity is concentrated. This sewer construction is intended to stimulate additional industrial development. For projection purposes, the growth in industrial services has been set at a rate equal to overall anticipated growth in the District.

Based on US Census data, the Visalia District population was approximately 78,600 in 1990. Adding actual increases in service connections and assuming that density has remained unchanged, Cal Water estimates that, as of December 2003, the population has increased to approximately 104,030. A density of 3.24 persons per residential service (single-family service plus multifamily units) was used for this estimate. The City of Visalia estimated the city population at 91,565 in 2000, which is consistent with Cal Water's estimate that year.

Average annual services for 2003 numbered 32,267. The distribution of services by type and relative growth for the past five and ten years are presented in Table - Average Annual Services. This information is graphically illustrated in both Figure - Historical Services and Figure - Distribution of Services.

The two growth rates considered in preparing this management plan were the continuation of the ten-year average growth pattern of 2.61% and the five-year average growth rate of 3.41%. Both growth patterns are stated in Table - Projected Annual Average Services and Figure - Historical & Projected Services. The demand forecast uses the ten-year average growth rate calculated from 1994 to 2003.

3.2 CUSTOMER DEMAND

Projected demand is the mathematical product of total projected services and demand per service. Historical values are provided in Table - *Sales* and Table - *Demand per Service*, which are illustrated in Figures - *Historical Sales*, Figure - *Historical Demand per Service*, and Figure - *Percent of Total Demand by Type of Use*. Recorded sales for each customer class along with the annual average service count for that class determined demand per service.

Sixty-three percent of the residential services in the Visalia District are unmetered. In order to estimate demand by the residential sector, unaccounted for water was fixed at 8% of total production. This amount along with all metered sales was subtracted from total production to estimate deliveries to flat rate residential customers. The resulting combined demand per service for all services fluctuated between 270,000 and 332,000 gallons per service per year.

Since 1991, the Visalia District has responded to statewide drought conditions by reducing demand per service from the pre-drought 332,000 gallons per service per year to 270,000 gallons per service per year. Now that the drought has ended, demand per service has gradually increased toward pre-drought levels, stabilizing in recent years at the 310,000 gallons per service level. To curb any further increase will require the implementation of conservation activities. The Company's goal is a 10% reduction in demand (based on pre-drought levels), which for the Visalia District would mean keeping the demand per service at 300,000 gallons per service per year. Best Management Practices will assist in achieving this goal.

3.3 TOTAL SYSTEM DEMAND

For projecting total system demand, the projected number of services for each customer class was multiplied by the demand per service for that classification. This process was employed because of the significant difference between the demand per service associated with certain uses and the combined or average demand per service.

Single-family residential water use represents the smallest demand per service segment in the district at 200,000 to 257,000 gallons per service per year, yet this category uses 62.7% of the total demand. Multifamily residential use was 3.08% of the total with a demand of 1,629,403 gallons per service per year. The combined residential component equals 65% of total demand.

3.3.1 Per-Capita Water Use

The district's water use in 2003 averaged 265 gallons per capita per day; based on the total demand of 10,039.5 million gallons and the Visalia District's population of 104,030. In comparison, the statewide average was 190 gallons per capita per day, while the Tulare Lake Hydrological Region average was 301 gallons per capita per day. Visalia's per-capita use is higher than statewide averages because of its hotter, drier climate. Within the region, however, Visalia is somewhat cooler and damper than other segments, particularly the Kern Valley Floor where per-capita demand reaches 374 gallons per capita per day.

3.3.2 Demand Forecast

The previously discussed growth pattern based on the ten-year average growth rate was applied to three scenarios to project demand for the Visalia District. Comparative demand data for the three scenarios is presented in Table - *Projected Demand in Acre-Feet* and is illustrated in Figure - *Historical and Projected Demand.* The starting point for each projection was the actual annual average number of services in 1991. This compares projected values to actual values over twelve years.

Scenario #1

The Company's ten-year annual growth pattern was applied to the lowest recorded (since 1980) demand per service values from each customer class. This demand was noticeably influenced by the extended drought conditions that year. Scenario #1 projects total demand for the year 2030 at 45,799 AF. This scenario provides a valid bottom end for the projected demand range, which illustrates the level to which demand could be reduced without impacting public health and safety.

Scenario #2

The Company's ten-year annual growth pattern was combined with the average recorded (since 1980) demand per service value from each category of use. This scenario projects total demand for the year 2030 at 54,648 AF. This scenario represents the normal position of the demand range, which should most likely occur provided the 10% conservation goal established by the Company is achieved and maintained. To accomplish this level of demand it will be essential to effectively promote and implement appropriate conservation programs.

Scenario #3

The Company's ten-year annual growth pattern was combined with the highest demand per service. Scenario #3 forecasts demand for the year 2030 at 65,857 AF. This scenario provides a valid top end for the projected demand range.

The Water Supply and Facilities Master Plan, prepared for the Visalia District by Boyle Engineering Corporation, used a land use based process to evaluate future demands. This evaluation used the forecasted land uses of the City of Visalia's General Plan for both 2010 and 2020 and applied water demand coefficients per acre of land use to calculate future demand. The future demand is reported in terms of demand per minute production. The evaluation forecasts demand in 2010 at 22,169 GPM and in 2020 at 25,438 GPM. Scenario

#2, described above, produces consistent results with 2010 demand of 21,000 GPM and 2020 demand of 26,624 GPM.

3.3.3 Average Day and Maximum Day Demand

An estimated average day demand in the Visalia District for the year 2030 was based on projected demand and anticipated service connections for each of the three scenarios. The maximum day demand was also calculated on the historical ratio between maximum day demand and average day demand, which is 1.75:1. This ratio is valid for the ten-year and five-year averages.

Using Scenario #2, the 2030 average day demand was projected at 48.79 MGD and maximum day demand at 85.19 MGD. These values are substantially more than the five and ten-year averages for these parameters. The average day demand for only Scenario #1 is within the range of historical values for maximum day demand; thus, each scenario represents demand conditions that are greater than the capacity of the system to deliver. It is clear that the existing distribution system will need to be improved in order to deliver the projected average day and maximum day demand.

3.4 EXISTING WATER SUPPLY

The Visalia District extracts groundwater from the aquifers of the Kaweah Delta using 73 active wells located throughout the district's service area.

Current design production capacity of these wells is 52,515 GPM or 75.62 MGD. The production capacity represents 184% of the ten-year average maximum day demand and 322% of the ten-year average day demand. Because of surface storage capacity limitations and distribution system restrictions, operation of these groundwater production facilities at design parameters is not always feasible. The City of Visalia has had a widely dispersed nature to its development. Capacity limitations of the distribution system prevent wide dispersement of the water from a single well source. As a result, although total well capacity may greatly exceed the actual or projected total system-wide demand, small regional zones may not have sufficient production capacity to meet demand. This condition results in

pockets or zones of reduced system pressure; pressure which may meet CPUC General Order 104, but is below optimal system pressure standards.

Boyle Engineers examined this issue in depth in the Water Supply and Facilities Master Plan. This evaluation recommended the construction of 17 additional wells throughout the system to address existing demand. While these wells are intended to address existing demand, they will also assist in meeting future demand, since most of the growth will occur as in-fill and on property adjacent to the existing system. Nevertheless, the Master Plan recommends the development of nine additional wells to meet the anticipated demand of 2020.

Average static groundwater elevations in the district have declined nearly eighty feet over the past fifty years. Short periods of elevation recovery have ranged from 20 to 30 feet over five to ten-year periods of bountiful precipitation. The recent multi-year drought coupled with the high growth rate caused a 40-foot decline in static groundwater elevation. Managing the quantity of water stored in groundwater aquifers will help perpetuate the availability of this resource. However, with increasing demand comes a greater reliance on groundwater resources.

3.4.1 Emergency Supplies

Cal Water has an Emergency Response Plan in place that coordinates local and overall company response to a disaster in any or all of its districts.

The district's existing wells will provide emergency supplies.

3.4.2 Water Quality

The drinking water delivered to customers in the Visalia District meets or surpasses all federal and state regulations. The U.S. Environmental Protection Agency as authorized by the Federal Safe Drinking Water Act of 1974 sets drinking water standards. A state can either adopt the USEPA standard or set state standards that are more stringent than those set by the federal government.

There are two types of drinking water standards, Primary and Secondary. Primary Standards are designed to protect public health by establishing Maximum Contamination Levels (MCL) for substances in water that may be harmful to humans. MCLs are established very conservatively for each contaminant and are generally based on health effects which may occur if a person were to drink three liters of the water per day for 70 years. Secondary Standards are based on the aesthetic qualities of the water such as taste, odor, color, and certain mineral content. These standards, established by the State of California, specify limits for substances that may affect consumer acceptance of the water.

The quality of groundwater produced by the district's active wells can vary depending on location. Several wells have been tested to produce water that exceeds the Secondary Standard for manganese; however, these wells have either been taken out of service or treated to reduce the contaminant level in the water delivered. Other issues of concern in the district are arsenic, nitrate and salt. The presence of these contaminants puts into question the potential availability of these facilities if the concentrations were to increase above the existing treatment capacity. Also of concern is the potential loss of other wells due to contaminate migration

Additionally, some wells have been tested showing concentrations of volatile organic compounds (VOCs), particularly trichloroethylene (TCE), tetrachloroethylene (PCE) and carbon tetrachloride (CTC), which have, on occasion, exceeded the MCL for these substances. A number of wells contain detectable concentrations of the inorganic compound nitrate. The District is increasing its monitoring of pesticides, radiologicals, nitrate, arsenic and perchlorate. In all cases if the concentration of these compounds exceeds the MCL, the wells are taken out of service.

3.5 FUTURE WATER SUPPLIES

The Company will develop new wells in the district, as they are needed. Based on the projected 2030 high annual demand, an average daily demand of 58.79 MGD could exist and could be supplied with existing groundwater production facilities. The projected maximum daily demand, however, for that high range is 102.66 MGD. As discussed in Section 3.4, the existing groundwater production facilities will not be able to meet this maximum daily demand, or the peak hour daily demand. An analysis contained in the Water Supply and Facilities Master Plan indicates that the peak hour flow conditions projected for 2020 would necessitate an additional nine average sized wells to deliver the demand. This is in addition to the need for 17 additional wells to address existing reduced pressure conditions.

Cal Water worked with the Kaweah Delta Water Conservation District to develop a Groundwater Management Plan under the provisions of Assembly Bill 3030. The Kaweah Delta Water Conservation District (KDWCD) is the lead agency in this effort. KDWCD has historically focused on the conservation of flood flows of the Kaweah River for groundwater recharge. While KDWCD is not a water supply contractor from the federally funded Friant-Kern Canal, it has historically obtained some water from that facility under surplus conditions.

4 FUTURE DEMAND SIDE MANAGEMENT PROGRAMS

4.1 PREVIOUS WATER MANAGEMENT PROGRAM ACCOMPLISHMENTS

Cal Water has conducted conservation programs in the Visalia District for several years. The Company believes that managing demand is an important element in the overall management of water supply and has made efforts to promote conservation through educational, informational, and customer assistance activities.

4.2 EXTERNAL MEASURES TO ACHIEVE PUBLIC SUPPORT

Cal Water participates in cooperative conservation activities with area water suppliers and the City of Visalia. Table 4A indicates implementation levels in the Cal Water Visalia service area.

-TABLE 4A-

Conservation Measure	Date Implemented	Program End Date
Public Information	1988	Ongoing
School Programs	1990	Ongoing
Showerhead Program	1992	1994

4.3 INTERNAL MEASURES TO ACHIEVE EFFICIENT WATER MANAGEMENT

1. Distribution System Water Audit and Leak Detection Program

Annually, Cal Water completes a prescreening system audit to determine the level of unaccounted for water in each system and to evaluate whether a full-scale system audit is needed. Cal Water uses a simple method to calculate unaccounted for water, subtracting total sales from total water production, and then dividing the result by the total production amount to obtain the percentage of production that is lost. To account for the flat rate (unmetered) residential services, unaccounted for water was set at 8% of demand.

In the event that the calculated sales to flat-rate residential services dramatically increases, Cal Water is prepared to conduct a full-scale system water audit, provided that a full-scale system audit is cost-effective to implement. If cost-effective, a full-scale audit will be implemented using methodology consistent with that described in AWWA's *Water Audit and Leak Detection Guidebook.*

2. Water Efficient Landscape Guidelines

In 1992, water efficient landscape guidelines were developed (See Appendix B). These guidelines apply to all landscapes designed for Cal Water properties including renovations. For ease of adoption by districts with a multitude of climates and microclimates, the guidelines are generic and adhere to water efficient landscape (Xeriscape) principles.

4.4 OVERALL DISTRICT GOALS

Cal Water recognizes the importance of conservation in managing its own water resources. While economic and regulatory constraints of integrating conservation into supply management have proven challenging, Cal Water is participating in efforts to develop demand management strategies, standards, and criteria by working with the California Urban Water Conservation Council. This Council was formed as part of the MOU primarily to oversee the implementation of the BMPs and to improve water conservation practices and analyses. Cal Water is committed to this process and the development of an integrated resource plan.

Cal Water's conservation programs are intended to assist customers in their efforts to use water efficiently as well as to educate them about their water supply. This will lead them to make informed decisions concerning the efficient use of water and enable them to better respond to required reductions in water use should a water shortage or emergency occur. During periods of water shortages, the Company's conservation programs can be expanded and may include more restrictive measures such as mandatory reductions, rationing, and penalties.

4.5 PROPOSED CONSERVATION PROGRAMS

Cal Water proposes to run four conservation programs in the Visalia District at an annual cost of $56,343.87. Before implementing any conservation program, Cal Water must receive approval from the CPUC.

Program	2004	2005	2006	Total
BMP 02 Plumbing Retrofit	$6,038.58	$6,038.58	$6,038.58	$18,115.74
BMP 05 Large Landscape Program (ET Controller)	$43,241.25	$43,241.25	$43,241.25	$129,723.75
BMP 07 Public Education	$5,264.04	$5,264.04	$5,264.04	$15,792.12
BMP 08 School Education	$1,800.00	$1,800.00	$1,800.00	$5,400.00
Total Per Year	$56,343.87	$56,343.87	$56,343.87	$169,031.61

5 RECYCLED WATER

This chapter provides information on recycled water and its potential for use as a water resource within Cal Water's Visalia service area. The information includes (1) the quantity of wastewater generated in the service area, (2) description of the collection, treatment, and reuse of that wastewater; (3) the current plans for water recycling; and (4) the potential for water recycling in the Visalia service area.

5.1 WASTEWATER GENERATION

Municipal wastewater is generated in the Visalia service area by residential, commercial, and industrial sources. The quantity of wastewater generated is proportional to the population and the water use in the service area. Estimates of the wastewater flows for future conditions are presented in Table 5-1. The estimates were obtained by calculating the amount of indoor water use in Cal Water's service area as 90 percent of January water use in 1997. The percentage of indoor water use was calculated by comparing the estimated yearly indoor water use to total annual use for 1997. Assuming all indoor water use results in wastewater generation, projected wastewater flows were calculated using the percentage of indoor water use and Cal Water's water demand projections.

TABLE 5-1
ESTIMATED WASTEWATER GENERATION IN CAL WATER'S VISALIA SERVICE AREA

Year	Wastewater flow, mgd	Wastewater flow, acre-feet/year
2000	11.4	12,850
2005	12.4	13,900
2010	13.4	15,050
2015	14.6	16,300
2020	15.8	17,650

5.2 WASTEWATER COLLECTION

The City of Visalia operates and maintains the sewer system consisting of gravity sewers less than 48 inches in diameter, pumping stations, and force mains to collect wastewater from

residential, commercial, and industrial customers. The collected wastewater is discharged to trunk sewers and interceptors owned and operated by the City of Visalia and conveyed to the Visalia Wastewater Treatment Plant for treatment.

5.3 WASTEWATER TREATMENT AND RECYCLING

The City of Visalia's main water purveyor is Cal Water. The Visalia Wastewater Treatment Plant provides the wastewater service for the Visalia service area. The wastewater at the treatment plant undergoes secondary treatment with trickling filters, activated sludge, and chlorination. The treated effluent is either discharged to percolation ponds for recharge, Mill Creek, or walnut orchards for irrigation. The Visalia Wastewater Treatment Plant has a capacity to treat 16.5 MGD but currently receives 12 MGD from residential, commercial, and industrial customers in the City of Visalia. A limited amount of recycling is occurring in the City of Visalia. For the last 5 to 6 years, there has been approximately one irrigation event per month during the summer months on walnut orchards near the treatment plant. An irrigation event typically utilizes 4 MGD of treated wastewater for 4 to 7 days. The approximate recycled water use in the City of Visalia has been 68 acre-feet per year. Currently, the wastewater discharged to Mill Creek is diluted and utilized for agricultural irrigation of alfalfa, cotton, and walnuts.

5.4 POTENTIAL WATER RECYCLING IN CAL WATER'S VISALIA SERVICE AREA

There are no current plans to provide recycled water in Cal Water's Visalia service area in the near future, because the City of Visalia is approximately four miles east of the treatment plant. The cost of transmission and distribution of recycled water could not be justified based on current and anticipated costs of water and of wastewater disposal. Therefore, the projected recycled water supply for Cal Water's Visalia service area through the year 2020 is 0 acre-feet per year. There is potential to irrigate the Valley Oaks golf course near the treatment plant with treated water. The golf course utilizes private well water for irrigation and is not a customer of Cal Water.

The treated wastewater discharged to Mill Creek is eventually utilized for agricultural irrigation downstream. The treated wastewater supply minimizes the amount of groundwater pumping in the area and offsets part of the regional demand for surface water and groundwater supplies. Cal Water has not implemented any incentive programs to encourage recycled water use because they do not own and operate the wastewater system.

6 WATER CONSERVATION BEST MANAGEMENT PRACTICES

Water conservation is a method available to reduce water demands, thereby reducing water supply needs for the Visalia District. This chapter presents an analysis of water conservation best management practices (BMPs) and a description of the methods and assumptions used to conduct the analysis.

The unpredictable water supply and ever increasing demand on California's complex water resources have resulted in a coordinated effort by the Department of Water Resources (DWR), water utilities, environmental organizations, and other interested groups to develop a list of urban BMPs for conserving water. This consensus-building effort resulted in a Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), as amended September 16, 1999, among parties, which formalizes an agreement to implement these BMPs and makes a cooperative effort to reduce the consumption of California's water resources. Table 6A presents the BMPs as defined by the MOU. The MOU is administered by the California Urban Water Conservation Council (CUWCC).

The MOU requires that a water utility implement only the BMPs that are economically feasible. If a BMP is not economically feasible, the water utility may request an economic exemption for that BMP. The BMPs as defined in the MOU are generally recognized as standard definitions of water conservation measures. California Water Service Company (Cal Water) is a signatory of the MOU. As a signatory of the MOU, Cal Water has agreed to implement the BMPs as defined in Exhibit 1 of the MOU that are cost beneficial and complete such implementation in accordance with the schedule assigned each BMP. Cal Water must submit to the CUWCC a report every two years describing BMP implementation.

TABLE 6A WATER CONSERVATION BEST MANAGEMENT PRACTICES	
No.	BMP Name
1.	Water survey programs for single-family residential and multi-family residential connections.
2.	Residential plumbing retrofit.
3.	System water audits, leak detection and repair.
4.	Metering with commodity rates for all new connections and retrofit of existing connections.
5.	Large landscape conservation programs and incentives.
6.	High-efficiency washing machine rebate programs.
7.	Public information programs.
8.	School education programs.
9.	Conservation programs for commercial, industrial, and institutional accounts.
10.	Wholesale agency assistance programs.
11.	Conservation pricing.
12.	Conservation coordinator.
13.	Water waste prohibition.
14.	Residential ULFT replacement programs.

6.1 ECONOMIC ANALYSIS METHODOLOGY AND ASSUMPTIONS

An economic analysis was conducted for seven of the 14 BMPs that are described in the MOU (i.e. BMP nos. 1, 2, 4, 5, 6, 9, and 14). Economic analyses were not done for BMPs 3, 7, 8, 10, 11, 12, and 13 because they are essentially non-quantifiable, but essential to the success of those BMPs that are quantifiable.

Assumptions used in the economic analysis for each BMP are described in Table E-1 (Appendix E). Directly beneath each assumption is a brief description of the rationale and/or supporting evidence for that assumption. Common assumptions for all BMPs are the value of conserved water ($200/ac-ft), the real discount rate (6.15%), and the overhead rate (13%). The real discount rate is calculated from the assumed real cost of money (8.82%) and the assumed long-term inflation rate (2.52%) using the precise conversion method (A&N Technical Services 2000, pg A-2). Housing information and a breakdown of the number of connections for each connection category used for the economic analysis are presented in Tables 6B and 6C.

TABLE 6B
HOUSING ESTIMATES AND PROJECTIONS

Year	Single family dwelling units	Multi-family dwelling units
1991	20,092	2,837
1997	23,389	2,901
2000	23,583	2,918
2005	25,778	--
2010	28,178	--
2015	30,801	--
2020	33,668	--

Source: California Water Service Company.

TABLE 6C
CONNECTIONS BY CLASSIFICATION, YEAR 1997

Classification	Connections
Single family	23,389
Multi-family	175
Commercial	3,050
Industrial	57
Institutional	228
Irrigation/landscaping	0
Total	26,899

Source: California Water Service Company

The economic analysis was performed using Microsoft® Excel 97, a spreadsheet program. A separate, customized worksheet for each BMP is presented in Appendix E. Each BMP economic analysis spreadsheet projects, on an annual basis, the number of interventions and the dollar values of the benefits and costs that would result from implementing a particular BMP. Terms and formulas that are common to all the worksheets are defined in Table 6D.

6.2 ECONOMIC ANALYSIS RESULTS

Table 6E summarizes the results of the economic analysis in terms of the benefit/cost (B/C) ratio, the simple pay-back period, the discounted cost per ac-ft of water saved, and the net present value (NPV) per ac-ft of water saved for each BMP.

TABLE 6D
DEFINITION OF TERMS USED IN THE ECONOMIC ANALYSIS

Term	Definition	Comments
BENEFITS:		
Avoided Capital Costs	Capital costs that are avoided by implementing the BMP.	An example is the cost of a well that would not have to be installed due to implementation of the BMP.
Avoided Variable Costs	Variable costs that are avoided by implementing the BMP.	An example is the cost of electricity that would be saved if the BMP were implemented.
Avoided Purchase Costs	Purchase costs that are avoided by implementing the BMP.	An example is the cost of purchasing water that would not be needed due to implementation of the BMP.
Total Undiscounted Benefits	The sum of avoided capital costs, avoided variable costs and avoided purchase costs.	
Total Discounted Benefits	The present value of the sum of avoided capital costs, avoided variable costs and avoided purchase costs.	An annual percentage rate consisting of the cost of borrowing money minus the inflation rate.
COSTS:		
Capital Costs	Capital costs incurred by implementing the BMP.	For example, the cost to purchase and install meters for BMP 4.
Financial Incentives	The cost of financial incentives paid to connections.	Copay or distribution for purchasing low-flow plumbing devices or washing machines are examples of financial incentives.
Operating Expenses	Operational expenses incurred during implementation of the BMP.	
Total Undiscounted Costs	The sum of capital costs, financial incentives, and operating expenses.	
Total Discounted Costs	The present value of the sum of capital costs, financial incentives, and operating expenses.	The discount rate is used to calculate discounted costs from undiscounted costs.
NET PRESENT VALUE	Total discounted benefits minus total discounted costs.	A value greater than zero indicates an economically justifiable BMP.
RESULTS:		
Benefit / Cost Ratio	The sum of the total discounted benefits divided by the sum of the total discounted costs.	A ratio greater than one indicates an economically justifiable BMP.
Simple Pay-Back Period	The number of years required for the benefits to pay back the costs of the BMP, calculated as the sum of the total discounted costs divided by the average annual total discounted benefits.	A low value is considered economically attractive.
Discounted Cost / Water Saved	The present-value cost to save one acre-foot of water, calculated as the sum of the total discounted costs divided by the total acre-feet of water saved over the study period.	A low value is considered economically attractive because it indicates a low implementation cost. Value must be less than the marginal cost of new water to be cost effective.
Net Present Value / Water Saved	The net value of saving one acre-foot of water, calculated as the sum of the net present value divided by the total acre-feet of water saved over the study period.	A high value is considered economically attractive.

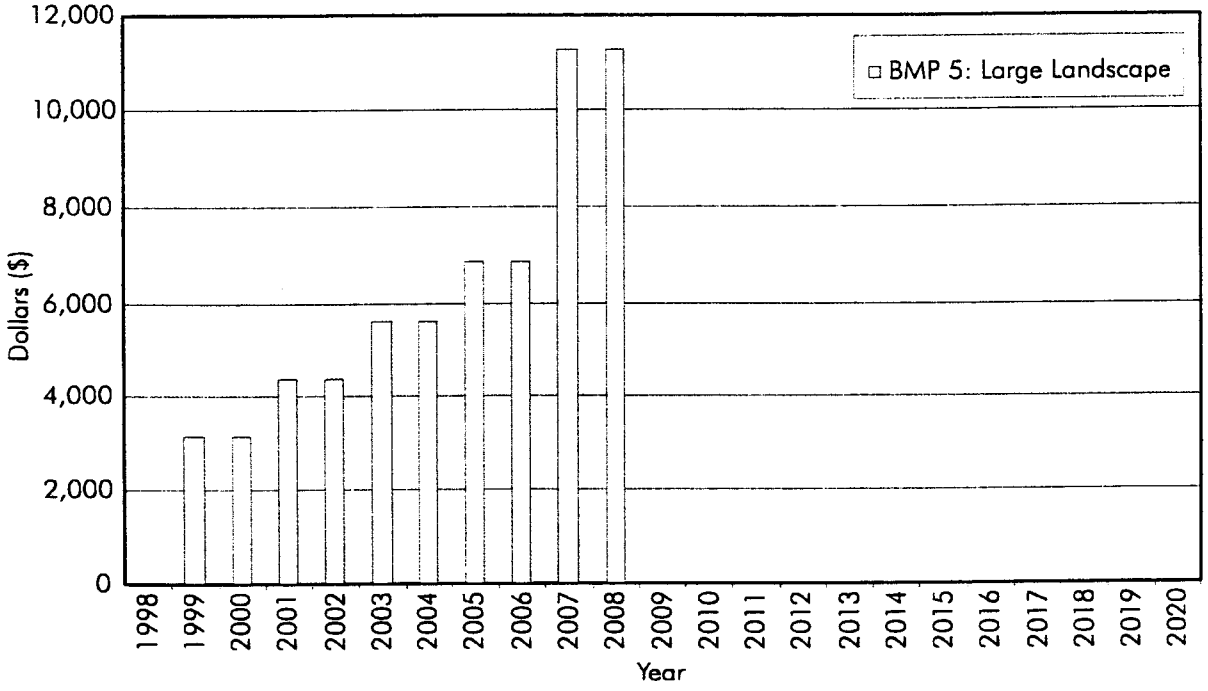
TABLE 6E
RESULTS OF ECONOMIC ANALYSIS

BMP No.	BMP Name	Total discounted cost over study period ($)	Total water saved[a] (ac-ft)	Benefit / cost ratio	Simple payback period (years)	Discounted cost / water saved ($/ac-ft)	Net present value / water saved ($/ac-ft)
1	Water survey programs for single-family residential and multi-family residential connections.	170,180	613	0.6	23	277	-119
2	Residential plumbing retrofits.	460,459	674	0.2	68	683	-543
4	Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	1,680,242	5,557	0.4	62	302	-194
5	Large landscape conservation programs and incentives.	50,843	765	2.2	6	66	83
6	High-efficiency washing machine rebate programs.	249,171	746	0.3	66	334	-233
9	Conservation programs for commercial, industrial, and institutional (CII) accounts.	332,533	1,729	0.8	17	192	-48
14	Residential ULFT replacement programs.	511,312	2,146	0.5	40	238	-119

[a]Total water saved over study period.

Annual water costs and savings for each of the BMPs with a B/C ratio equal to or greater than one are presented graphically on Figures 6A and 6B and summarized in Table 6F. Table 6F also presents the number of annual interventions required for each BMP for the water system to be in compliance with the MOU for all cost effective BMPs. Interventions and costs shown for BMPs for prior year of 1998, 1999, and 2000, if not yet completed, would have to be implemented in future years.

Figures 6A and 6B and Table 6F do not include the water savings and costs associated with BMPs 3, 7, 8, 10, 11, 12, and 13 since no specific level of effort is defined in the MOU for these BMPs. BMP 11 is already implemented and, therefore, has no cost associated with it. BMP 13 is covered by CPUC General Order 103, and has no cost unless triggered by a water shortage condition.



Note: Costs are undiscounted costs.

Figure 6A. Visalia BMP Implementation Costs

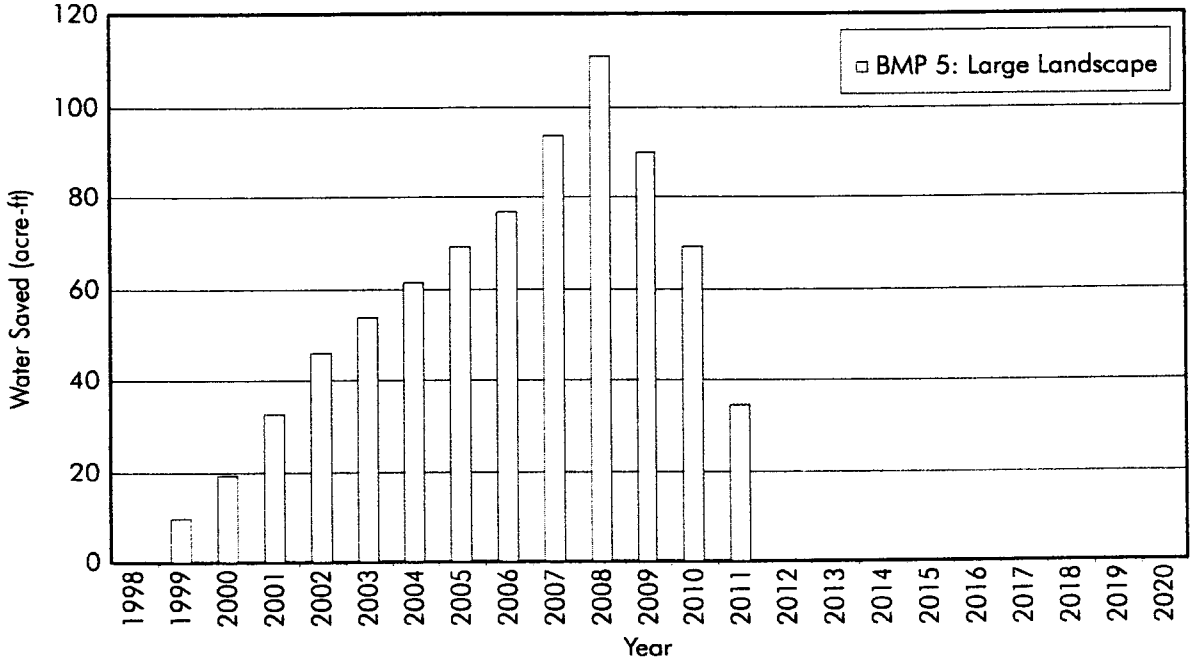


Figure 6B. Visalia BMP Water Savings

Note: Water costs and water savings from BMPs 7, 8, 10, 11, 12, and 13 not included. See text.

TABLE 6F
SUMMARY OF BMP ANNUAL INTERVENTIONS, WATER SAVED, COST

	BMP 1: Residential water surveys			BMP 2: Residential plumbing			BMP 4: Install meters			BMP 5: Large landscapes		
Year	Interventions	Water saved (ac-ft/yr)	Cost ($/yr)	Interventions	Water saved (ac-ft/yr)	Cost ($/yr)	Interventions	Water saved (ac-ft/yr)	Cost ($/yr)	Interventions	Water saved (ac-ft/yr)	Cost ($/yr)
1998	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	0	0	0
1999										25	10	3,127
2000										25	19	3,127
2001										35	33	4,377
2002										35	46	4,377
2003										45	54	5,628
2004										45	61	5,628
2005										55	69	6,878
2006										55	77	6,878
2007										90	94	11,256
2008										90	111	11,256
2009										0	90	0
2010										0	69	0
2011										0	34	0
2012										0	0	0
2013										0	0	0
2014										0	0	0
2015										0	0	0
2016										0	0	0
2017										0	0	0
2018										0	0	0
2019										0	0	0
2020										0	0	0
Total	0	0	0	0	0	0	0	0	0	500	765	62,531

Note: B/C<1 indicates a benefit to cost ratio less than one.

TABLE 6F- (CONTINUED)
SUMMARY OF BMP ANNUAL INTERVENTIONS, WATER SAVED, COST

	BMP 6: Washing machine rebates			BMP 9: CII conservation			BMP 14: Residential ULFT			Total		
Year	Interventions	Water saved (ac-ft/yr)	Cost ($/yr)	Interventions	Water saved (ac-ft/yr)	Cost ($/yr)	Interventions	Water saved (ac-ft/yr)	Cost ($/yr)	Interventions	Water saved (ac-ft/yr)	Cost ($/yr)
1998	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	B/C<1	0	0	0
1999										25	10	3,127
2000										25	19	3,127
2001										35	33	4,377
2002										35	46	4,377
2003										45	54	5,628
2004										45	61	5,628
2005										55	69	6,878
2006										55	77	6,878
2007										90	94	11,256
2008										90	111	11,256
2009										0	90	0
2010										0	69	0
2011										0	34	0
2012										0	0	0
2013										0	0	0
2014										0	0	0
2015										0	0	0
2016										0	0	0
2017										0	0	0
2018										0	0	0
2019										0	0	0
2020										0	0	0
Total	0	0	0	0	0	0	0	0	0	500	765	62,531

Note: B/C<1 indicates a benefit to cost ratio less than one.

6.3 ADDITIONAL ISSUES

This section describes additional issues required to be addressed by the Urban Water Management Planning Act. Non-economic factors, including environmental, social, health, customer impacts, and technological are not thought to be significant in deciding which BMPs to implement. No water supply projects are currently planned that would supply water at a higher unit cost. Cal Water has the legal authority to implement the BMPs. However, the costs of implementing these BMPs are subject to CPUC approval.

7 WATER SHORTAGE CONTINGENCY PLAN

7.1 WATER USE

The past, current, and projected water use conditions in the Visalia District are discussed in detail in Section 3. *Water Sources and Supply Outlook.* Specific water use values are presented in the tables and figures of Appendix A. *Water Supply and Demand Forecasts.*

7.2 WORST CASE WATER SUPPLY AVAILABILITY

Cal Water's Visalia District's water source is from an unajudicated ground water basin. Since a safe yield for the basin has not been established, the Company will be able to supply its customer's full service demand. As regional supply conditions dictate, Cal Water will urge its customers to reduce demand accordingly.

7.3 STAGES OF ACTION

Cal Water has developed a four-stage rationing plan. The plan includes voluntary and mandatory stages. Approval from the CPUC must be obtained prior to implementation of mandatory restrictions.

RATIONING STAGES AND REDUCTION GOALS

SHORTAGE	STAGE	DEMAND REDUCTION GOAL	TYPE OF PROGRAM
Minimum 5 - 10%	Stage 1	10% reduction	Voluntary
Moderate 10 - 20%	Stage 2	20% reduction	Voluntary or Mandatory*
Severe 20 - 35%	Stage 3	35% reduction	Mandatory
Critical 35 - 50%	Stage 4	50% reduction	Mandatory
*Mandatory = Allocation			

Actions To Be Undertaken By California Water Service Company

Stage 1

Cal Water maintains an ongoing public information campaign consisting of distribution of literature, speaking engagements, bill inserts, and conservation messages printed in local newspapers. Educational programs in area schools are also ongoing.

Stage 2

- Cal water will aggressively continue its public information and education programs.
- Ask consumers for 10 to 20 percent voluntary or mandatory water use reductions.
- Prior to implementation of mandatory reductions, obtain approval from CPUC.
- Lobby for passage of drought ordinances by appropriate governmental agencies.

Stage 3

- Implement mandatory reductions after receiving approval from CPUC.
- Maintain rigorous public information campaign explaining water shortage conditions.

- Water use restrictions go into effect; prohibited uses can include watering resulting in gutter flooding, using a hose without shutoff device, filling of pools or fountains, etc.
- Limiting landscape irrigation by restricting the hours of the day and or days of the week during which water for irrigation can be used.
- Monitor production weekly for compliance with necessary reductions.
- Installation of a flow restrictor on the service line of customers who consistently violate water use restrictions.

Stage 4

- All of steps taken in prior stages intensified.
- Discontinuance of water service on customers consistently violating water use restrictions.
- Monitor production daily for compliance with necessary reductions.
- More restrictive conditions for, or prohibition of, landscape irrigation.

7.4 MANDATORY PROHIBITIONS

Due to Cal Water's investor-owned status, it is not authorized to pass any ordinances. Cal Water's Visalia district has worked in cooperation with the City of Visalia to develop a local ordinance for water restrictions in the city. Should conditions warrant mandatory reductions, Cal Water will request authority to add Tariff Rule 14.1, Mandatory Water Conservation plan (see Appendix D), to existing tariffs for a district. Included in Rule 14.1 is *Section A. Conservation - Nonessential or Unauthorized Water Use* which prohibits use of water for filling or refilling of swimming pools, use of water which results in flooding or run-off in gutters, etc.

7.5 CONSUMPTION LIMITS

Cal Water maintains extensive water use records on individual metered customer accounts. These records are reviewed in the districts on a daily basis to identify potential water loss problems.

In order to protect itself against serious and unnecessary waste or misuse of water, Cal Water may meter any flat rate service and apply the regularly established meter rates where the customer continues to misuse or waste water beyond five days after Cal Water has given the customer written notice to remedy such practices.

7.5.1 Monitoring Procedures during Periods of Water Shortages

During all stages of water shortages, production figures are reported to and monitored by the district manager on a daily basis. Consumption will be monitored through these daily production figures in the district for compliance with necessary reductions (see Rationing Stages and Reduction Goals).

7.6 PENALTIES OR CHARGES FOR EXCESSIVE USE

Cal Water, after one written warning, shall install a flow-restricting device on the service line of any customer observed by Cal Water personnel to be using water for any non-essential or unauthorized use defined in Section A of Tariff Rule 14.1 (see Appendix D). Repeated violations of unauthorized water use will result in discontinuance of water service.

7.7 ANALYSIS OF REVENUE AND EXPENDITURE IMPACTS

7.7.1 Lost Revenue and Recovery

California Water Service Company is an investor-owned water utility and, as such, is regulated by the CPUC. On March 8, 1989, the Commission instituted an investigation to determine what actions should be taken to mitigate the effects of water shortages on the State's regulated utilities and their customers. In decision D. 90-07-067, effective July 18, 1990, the Commission authorized all utilities to establish memorandum accounts to track expenses and revenue shortfalls caused both by mandatory rationing and by voluntary

conservation efforts. Subsequently, D. 90-08-55 required each Class A utility (more than 10,000 connections) seeking to recover revenues from a drought memorandum account to submit for Commission approval, a water management program that addresses long-term strategies for reducing water consumption. Utilities with approved water management programs were authorized to implement a surcharge to recover revenue shortfalls recorded in their drought memorandum accounts.

However, the Commission's Decision 94-02-043 dated February 16, 1994, states:

> 10. Now that the drought is over, there is no need to track losses in sales due to residual conservation.
>
> 11. The procedures governing voluntary conservation memorandum accounts (see D.92-09-084) developed in this Drought Investigation will no longer be available to water companies as of the date of this order.
>
> 12. Procedures and remedies developed in the Drought Investigation that are not specifically authorized for use in the event of future drought in these Ordering Paragraphs will no longer be available to water companies as of the date of this order except upon filing and approval of a formal application.
>
> (CPUC Decision 94-02-043, Findings of Fact, paragraphs 10-12)

It was at this time that Cal Water significantly curtailed conservation activities in its districts. At the time that triggers for voluntary or mandatory reductions should occur in the future, Cal Water will determine if a filing to the CPUC is necessary to enforce the reductions and to begin tracking lost sales from the required reductions.

7.8 IMPLEMENTING THE PLAN

Section 357 of the Water Code requires that suppliers that are subject to regulation by the CPUC shall secure its approval before imposing water consumption regulations and restrictions required by water shortage emergencies.

7.9 SUPPLY SHORTAGE TRIGGERS

Although Cal Water's Visalia District is not currently experiencing a supply shortage, Cal Water intends to manage its supply prudently. If a supply deficiency should occur, Cal Water will implement the appropriate "Stage of Action" unless the Public Utilities Commission adapts findings to implement a less restrictive stage.

WATER SUPPLY TRIGGERING LEVELS

STAGE	% SHORTAGE
Stage 1	Up to 10% Supply Reduction
Stage 2	10 to 20% Supply Reduction
Stage 3	20 to 35% Supply Reduction
Stage 4	35 to 50% Supply Reduction

APPENDIX A

WATER SUPPLY AND DEMAND FORECASTS

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Annual Services

Year	Total S.F. Residential	Metered Residential	Flat Rate Residential	Multi-Residential	Multi-Res. units	Commercial	Industrial	Government	Other	Total	Annual Change
1970	8,301	282	8,019	0	0	1,269	11	101	2	9,684	
1971	8,557	280	8,277	0	0	1,326	11	104	3	10,001	317
1972	8,899	291	8,608	0	0	1,392	10	111	5	10,417	416
1973	9,262	305	8,957	0	0	1,468	10	112	6	10,858	441
1974	9,900	342	9,558	43	754	1,469	9	118	9	11,548	690
1975	10,409	377	10,032	51	1,010	1,495	10	122	8	12,095	547
1976	11,017	403	10,614	57	1,242	1,553	11	127	12	12,777	682
1977	11,814	440	11,374	79	1,419	1,638	12	128	9	13,680	903
1978	12,664	528	12,136	98	1,568	1,779	12	128	7	14,688	1,008
1979	13,398	644	12,754	118	1,865	1,884	12	137	12	15,561	873
1980	13,942	788	13,154	129	2,047	1,952	13	146	6	16,188	627
1981	14,193	870	13,323	132	2,069	2,004	13	157	4	16,503	315
1982	14,370	926	13,444	133	2,075	2,028	13	165	5	16,714	211
1983	14,822	945	13,877	133	2,106	2,080	12	172	8	17,227	513
1984	15,512	1,049	14,463	138	2,199	2,138	14	180	9	17,991	764
1985	16,095	1,206	14,889	141	2,395	2,172	14	201	12	18,635	644
1986	16,739	1,280	15,459	154	2,659	2,310	14	197	17	19,431	796
1987	17,192	1,321	15,871	163	2,801	2,405	14	196	14	19,984	553
1988	17,740	1,362	16,378	163	2,801	2,451	14	201	12	20,581	597
1989	18,384	1,401	16,983	163	2,814	2,500	14	208	19	21,288	707
1990	19,228	1,431	17,797	164	2,748	2,555	14	215	27	22,203	915
1991	20,092	1,595	18,497	168	2,879	2,652	14	225	30	23,181	978
1992	21,168	2,252	18,916	174	2,966	2,767	14	234	26	24,383	1,202
1993	21,676	3,043	18,633	175	2,950	2,837	28	232	24	24,972	589
1994	22,199	4,798	17,401	176	2,965	2,944	58	237	22	25,636	664
1995	22,637	5,772	16,865	175	2,994	2,983	58	236	24	26,113	477
1996	23,048	6,215	16,833	174	2,932	3,021	58	230	20	26,551	438
1997	23,389	6,622	16,767	175	2,901	3,050	57	228	23	26,922	371
1998	23,738	7,002	16,736	178	2,999	3,069	57	225	28	27,295	373
1999	24,264	7,554	16,710	184	2,934	3,113	57	228	34	27,880	585
2000	24,871	8,159	16,712	188	2,918	3,191	60	236	36	28,582	702
2001	26,604	8,911	17,693	197	2,991	3,250	64	243	34	30,392	1,810
2002	27,494	9,695	17,799	190	3,038	3,194	64	368	34	31,344	952
2003	28,321	10,521	17,800	190	3,136	3,167	63	483	43	32,267	923
5 Yr Avg.	26,311	8,968	17,343	190	3,003	3,183	62	312	36	30,093	994
10 Yr Avg.	24,657	7,525	17,132	183	2,981	3,098	60	271	30	28,298	730
20 Yr Avg.	21,520	4,559	16,960	172	2,851	2,788	38	240	24	24,782	752

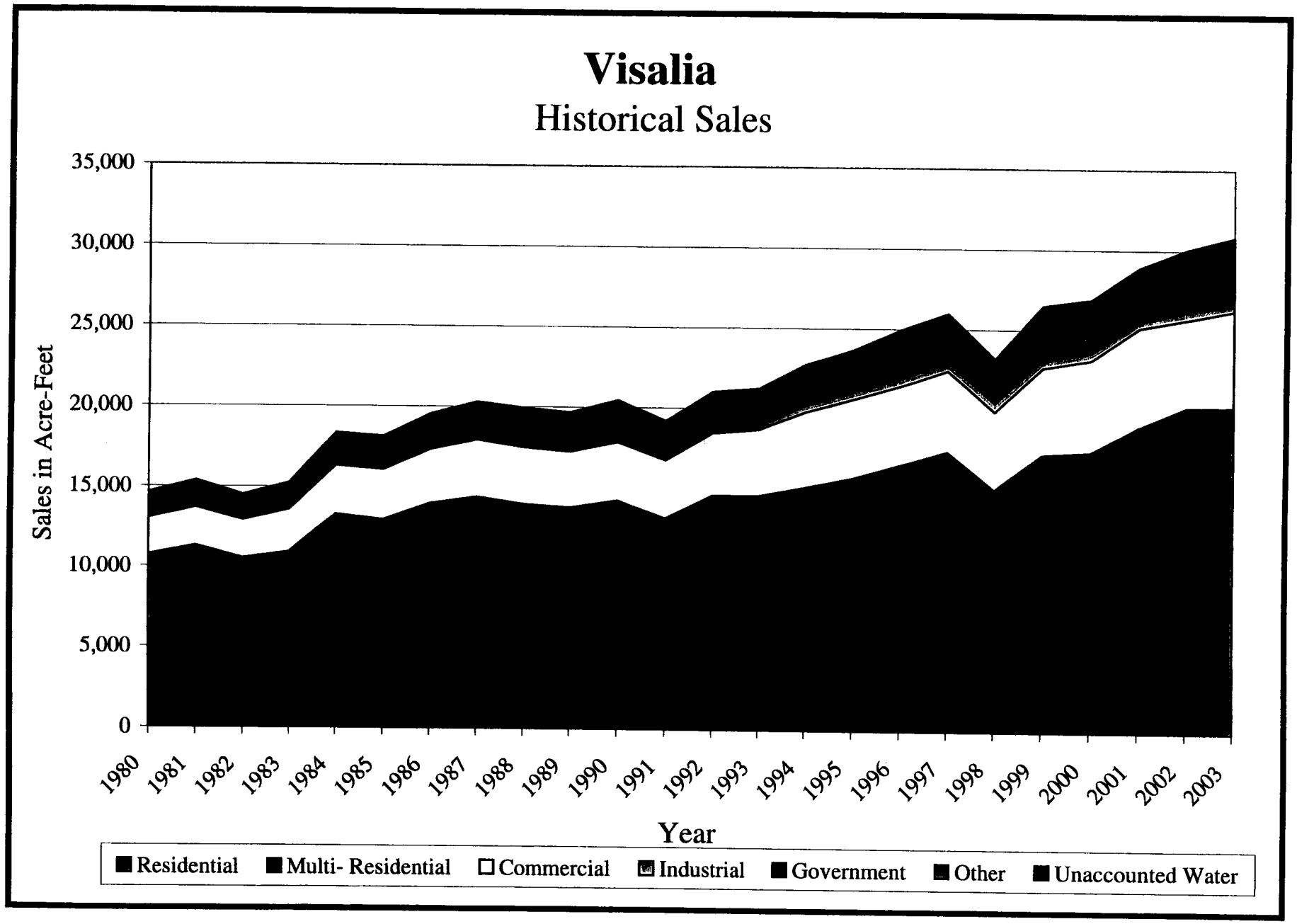
Five Year Average is from 1999 through 2003. Ten Year Average is from 1994 through 2003. Twenty Year Average is from years 1984 through 2003.

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Demand per Service (Gallons/Service/Year)

Year	Total Residential	Metered Residential	Flat Rate Residential	Multi-Residential (service)	Multi-Residential (unit)	Commercial	Industrial	Government	Total Other	Unaccounted/ Total Services	Combined Demand/Service
1980	239,000	247,256	238,506	1,267,235	79,860	385,988	2,096,560	713,493	738,452	23,554	294,429
1981	246,975	247,334	246,952	1,251,582	79,850	395,559	2,150,707	715,304	900,281	24,275	303,442
1982	227,413	231,953	227,100	1,184,335	75,912	386,297	2,225,052	609,200	828,842	22,592	282,400
1983	228,047	236,886	227,445	1,289,484	81,435	420,593	2,795,844	606,714	936,655	23,077	288,465
1984	267,546	271,749	267,241	1,334,633	83,756	461,140	2,843,613	720,233	1,020,260	26,578	332,226
1985	249,636	246,837	249,863	1,460,362	85,975	469,846	3,105,164	694,352	727,730	25,366	317,080
1986	255,830	246,803	256,577	1,812,549	104,977	473,347	4,222,059	684,969	596,989	26,220	327,754
1987	257,585	259,579	257,419	1,654,608	96,287	481,616	4,018,909	832,609	848,932	26,490	331,120
1988	241,203	257,393	239,857	1,708,633	99,431	468,325	3,717,925	1,031,508	1,014,109	25,253	315,660
1989	229,754	246,600	228,365	1,646,118	95,351	451,328	4,442,681	948,839	1,110,070	24,105	301,307
1990	226,607	247,467	224,930	1,737,807	103,712	462,551	4,999,606	979,638	1,002,694	24,014	300,180
1991	199,708	222,909	197,708	1,622,534	94,681	444,838	3,916,266	936,937	927,634	21,601	270,007
1992	211,580	217,404	210,886	1,603,260	94,055	456,239	2,007,932	984,980	907,186	22,476	280,946
1993	206,595	209,847	206,063	1,589,380	94,285	472,387	2,278,780	834,497	442,130	22,162	277,026
1994	209,173	208,732	209,294	1,663,659	98,753	515,884	2,192,025	922,992	691,948	23,120	289,000
1995	213,914	205,900	216,657	1,644,954	96,148	531,655	2,324,623	1,004,168	446,681	23,639	295,484
1996	222,109	218,682	223,374	1,604,748	95,234	526,906	2,694,354	1,422,063	550,903	24,512	306,406
1997	229,873	227,694	230,733	1,694,821	102,238	535,798	2,998,730	1,149,759	2,122,809	25,159	314,482
1998	195,654	190,559	197,787	1,519,373	90,180	512,511	3,004,846	1,029,788	2,280,757	22,156	276,951
1999	220,343	215,649	222,466	1,508,902	94,628	561,664	2,951,905	1,232,330	3,687,104	24,787	309,833
2000	217,158	212,701	219,334	1,485,711	95,721	584,035	2,486,425	1,171,034	2,809,953	24,554	306,920
2001	221,549	219,605	222,529	1,549,428	102,052	616,025	1,772,708	1,309,571	1,035,304	24,801	310,018
2002	229,261	209,876	239,819	1,537,341	96,147	557,620	2,707,001	1,156,196	1,115,170	25,005	312,558
2003	222,377	217,383	225,329	1,629,403	98,720	616,522	1,603,764	1,044,787	1,642,131	24,891	311,138
5 Yr. Avg.	222,138	215,043	225,895	1,542,157	97,454	587,173	2,304,361	1,182,784	2,057,932	24,807	310,094
10 Yr. Avg.	218,141	212,678	220,732	1,583,834	96,982	555,862	2,473,638	1,144,269	1,638,276	24,262	303,279


Visalia
Historical Sales
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Sales in Acre-Feet
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
Year
Residential
Multi- Residential
Commercial
Industrial
Government
Other
Unaccounted Water

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Sales(AF)

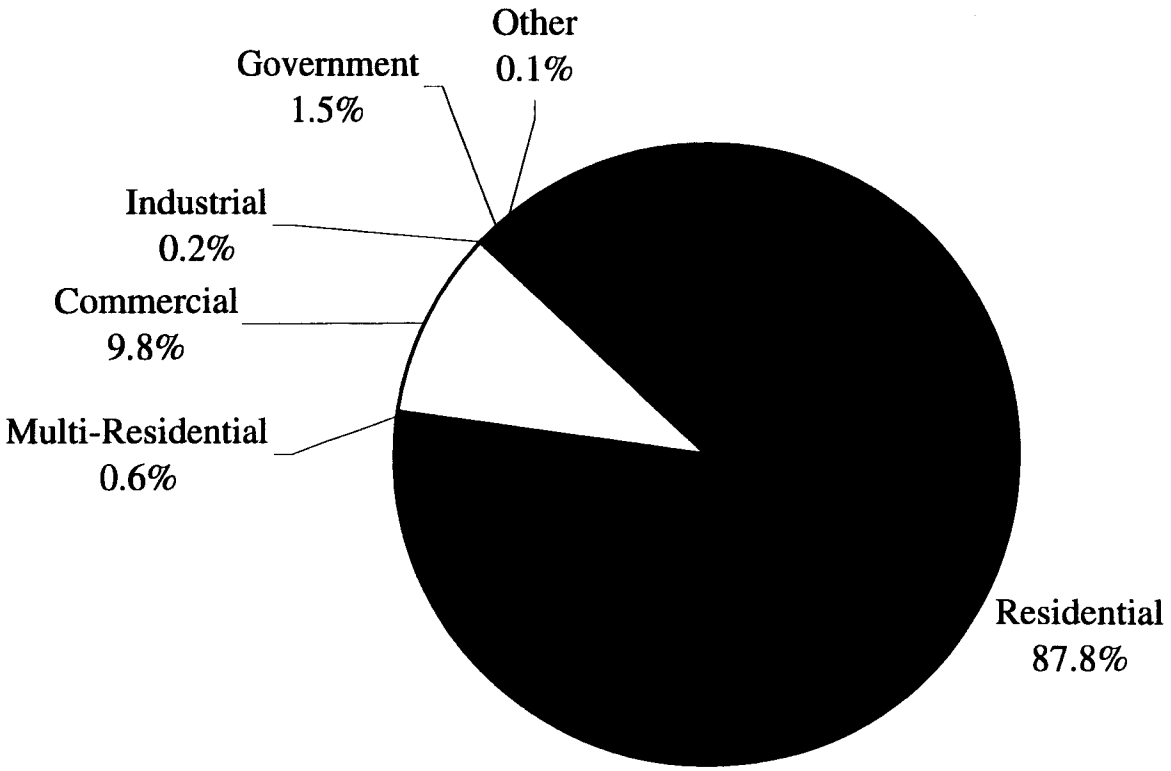
Year	Residential	Metered Residential	Flat Rate Residential	Multi-Residential	Commercial	Industrial	Government	Other & Water Util.	Unaccounted Water	Total(AF) Sales	Total(AF) Production	Total(Mgal) Production
1980	10,226.0	597.9	9,628.0	501.7	2,312.2	83.6	319.7	13.6	1,170.2	13,456.8	14,627.0	4,766.2
1981	10,757.4	660.4	10,097.1	507.0	2,432.7	85.8	344.6	11.1	1,229.4	14,138.6	15,368.1	5,007.7
1982	10,028.9	659.2	9,369.7	483.4	2,404.2	88.8	308.5	12.7	1,158.8	13,326.4	14,485.3	4,720.0
1983	10,373.2	687.0	9,686.2	526.3	2,684.8	103.0	320.3	23.0	1,220.0	14,030.4	15,250.5	4,969.4
1984	12,736.4	874.8	11,861.6	565.2	3,025.7	122.2	397.9	28.2	1,467.4	16,875.5	18,342.9	5,977.1
1985	12,330.4	913.6	11,416.9	631.9	3,131.8	133.4	428.3	26.8	1,450.7	16,682.7	18,133.3	5,908.8
1986	13,142.0	969.5	12,172.5	856.6	3,355.6	181.4	414.1	31.1	1,563.6	17,980.9	19,544.4	6,368.6
1987	13,590.3	1,052.3	12,537.9	827.7	3,554.6	172.7	500.8	36.5	1,624.6	18,682.5	20,307.1	6,617.1
1988	13,131.6	1,075.9	12,055.7	854.7	3,522.7	159.7	636.3	37.3	1,595.0	18,342.3	19,937.3	6,496.6
1989	12,962.4	1,060.3	11,902.1	823.4	3,462.7	190.9	605.7	64.7	1,574.8	18,109.8	19,684.5	6,414.2
1990	13,371.7	1,086.8	12,285.0	874.6	3,626.9	214.8	646.4	83.1	1,636.3	18,817.5	20,453.8	6,664.9
1991	12,314.0	1,091.1	11,222.9	836.5	3,620.4	168.3	647.0	85.4	1,536.7	17,671.6	19,208.2	6,259.0
1992	13,744.7	1,502.5	12,242.1	856.1	3,874.2	86.3	707.3	72.4	1,681.8	19,341.0	21,022.8	6,850.3
1993	13,742.9	1,959.7	11,783.2	853.6	4,112.8	195.8	594.1	32.6	1,698.4	19,531.8	21,230.2	6,917.9
1994	14,250.1	3,073.5	11,176.7	898.6	4,660.9	390.2	671.3	46.7	1,818.9	20,917.8	22,736.8	7,408.8
1995	14,860.7	3,647.2	11,213.5	883.4	4,867.0	413.8	727.3	32.9	1,894.4	21,785.1	23,679.4	7,716.0
1996	15,710.1	4,171.0	11,539.2	856.9	4,885.0	479.6	1,003.8	33.8	1,997.3	22,969.2	24,966.5	8,135.4
1997	16,499.8	4,627.2	11,872.6	910.2	5,015.1	524.6	804.5	149.8	2,078.6	23,904.1	25,982.7	8,466.5
1998	14,253.3	4,094.8	10,158.5	830.0	4,827.0	525.6	711.1	196.0	1,855.9	21,343.0	23,198.9	7,559.4
1999	16,407.5	4,999.2	11,408.3	852.0	5,365.8	516.4	862.3	384.7	2,120.8	24,388.7	26,509.5	8,638.1
2000	16,574.8	5,325.8	11,249.0	857.2	5,719.3	457.8	848.1	310.4	2,153.7	24,767.7	26,921.5	8,772.4
2001	18,088.3	6,005.5	12,082.8	936.7	6,144.1	348.2	976.6	108.0	2,313.2	26,602.0	28,915.2	9,422.1
2002	19,344.1	6,244.4	13,099.7	896.4	5,465.8	531.7	1,305.7	116.4	2,405.2	27,660.1	30,065.3	9,796.8
2003	19,327.7	7,018.8	12,308.9	950.1	5,992.1	310.1	1,548.7	216.7	2,464.8	28,345.3	30,810.1	10,039.5
5 Yr. Avg.	17,948.5	5,918.8	12,029.7	898.5	5,737.4	432.8	1,108.3	227.2	2,291.5	26,352.8	28,644.3	9,333.8
10 Yr. Avg.	16,531.6	4,920.7	11,610.9	887.2	5,294.2	449.8	945.9	159.5	2,110.3	24,268.3	26,378.6	8,595.5

Flat Rate Residential Sales estimated by setting "Unaccounted for Water" at 8.0% of total production.

Five Year Average is from 1999 through 2003.

Ten Year Average is from 1994 through 2003.

Visalia
Distribution of Services



California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Service Growth Percentage

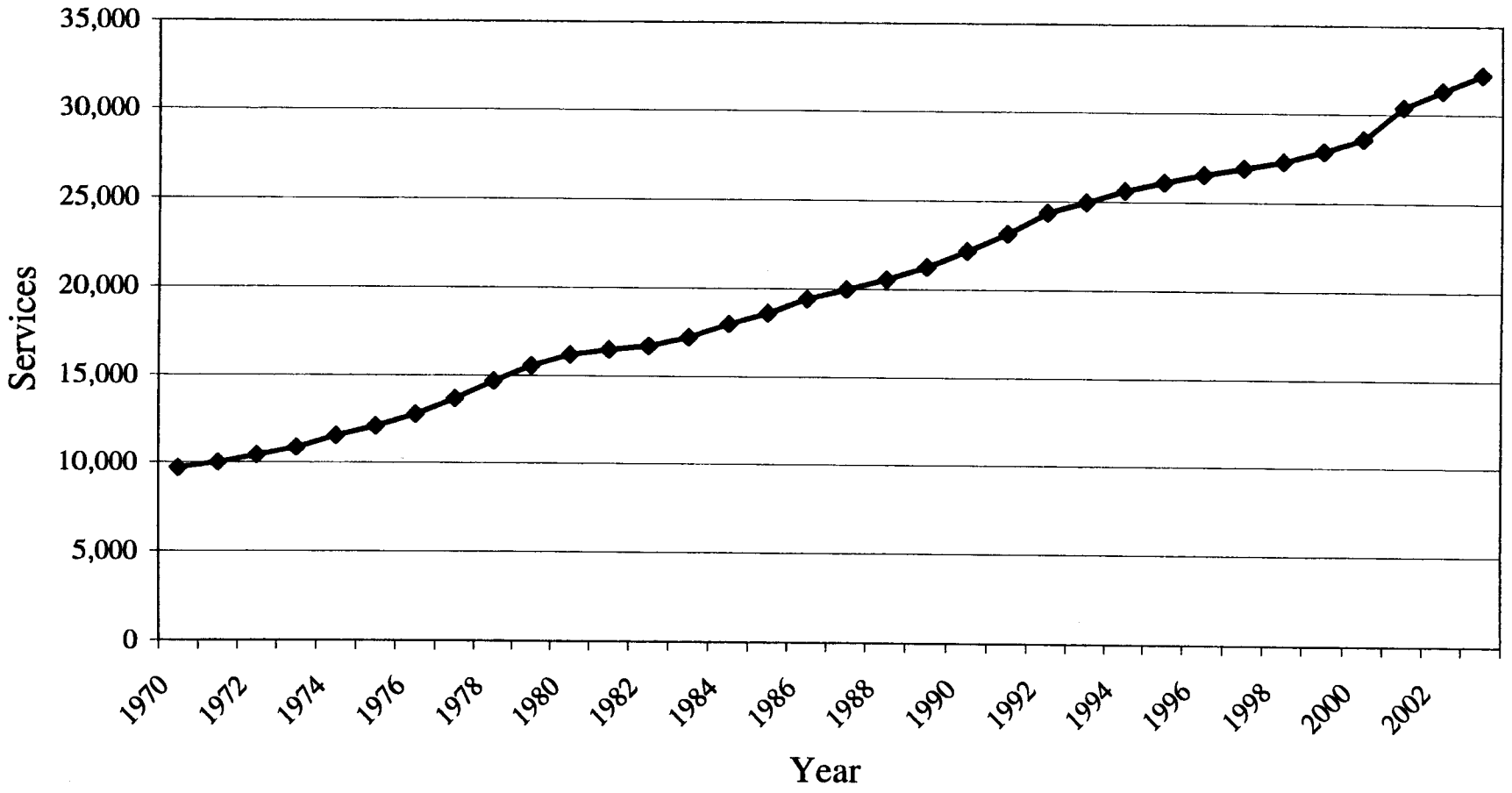
Year	Total S.F. Residential	Metered Residential	Flat Rate Residential	Multi-Residential	Multi-Res. units	Commercial	Industrial	Government	Other	Total
1981	1.80%	10.41%	1.28%	2.33%	1.07%	2.66%	0.00%	7.53%	-33.33%	1.95%
1982	1.25%	6.44%	0.91%	0.76%	0.29%	1.20%	0.00%	5.10%	25.00%	1.28%
1983	3.15%	2.05%	3.22%	0.00%	1.49%	2.56%	-7.69%	4.24%	60.00%	3.07%
1984	4.66%	11.01%	4.22%	3.76%	4.42%	2.79%	16.67%	4.65%	12.50%	4.43%
1985	3.76%	14.97%	2.95%	2.17%	8.91%	1.59%	0.00%	11.67%	33.33%	3.58%
1986	4.00%	6.14%	3.83%	9.22%	11.02%	6.35%	0.00%	-1.99%	41.67%	4.27%
1987	2.71%	3.20%	2.67%	5.84%	5.34%	4.11%	0.00%	-0.51%	-17.65%	2.85%
1988	3.19%	3.10%	3.19%	0.00%	0.00%	1.91%	0.00%	2.55%	-14.29%	2.99%
1989	3.63%	2.86%	3.69%	0.00%	0.46%	2.00%	0.00%	3.48%	58.33%	3.44%
1990	4.59%	2.14%	4.79%	0.61%	-2.35%	2.20%	0.00%	3.37%	42.11%	4.30%
1991	4.49%	11.46%	3.93%	2.44%	4.77%	3.80%	0.00%	4.65%	11.11%	4.40%
1992	5.36%	41.19%	2.27%	3.57%	3.02%	4.34%	0.00%	4.00%	-13.33%	5.19%
1993	2.40%	35.12%	-1.50%	0.57%	-0.54%	2.53%	100.00%	-0.85%	-7.69%	2.42%
1994	2.41%	57.67%	-6.61%	0.57%	0.51%	3.77%	107.14%	2.16%	-8.33%	2.66%
1995	1.97%	20.30%	-3.08%	-0.57%	0.98%	1.32%	0.00%	-0.42%	9.09%	1.86%
1996	1.82%	7.67%	-0.19%	-0.57%	-2.07%	1.27%	0.00%	-2.54%	-16.67%	1.68%
1997	1.48%	6.55%	-0.39%	0.57%	-1.06%	0.96%	-1.72%	-0.87%	15.00%	1.40%
1998	1.49%	5.74%	-0.18%	1.71%	3.38%	0.62%	0.00%	-1.32%	21.74%	1.39%
1999	2.22%	7.88%	-0.16%	3.37%	-2.17%	1.43%	0.00%	1.33%	21.43%	2.14%
2000	2.50%	8.01%	0.01%	2.17%	-0.55%	2.51%	5.26%	3.51%	5.88%	2.52%
2001	6.97%	9.22%	5.87%	4.79%	2.50%	1.85%	6.67%	2.97%	-5.56%	6.33%
2002	3.35%	8.80%	0.60%	-3.55%	1.57%	-1.72%	0.00%	51.44%	0.00%	3.13%
2003	3.01%	8.52%	0.01%	0.00%	3.23%	-0.85%	-1.56%	31.25%	26.47%	2.94%
5 Yr. Avg.	3.61%	8.49%	1.27%	1.36%	0.92%	0.64%	2.07%	18.10%	9.64%	3.41%
10 Yr. Avg.	2.72%	14.04%	-0.41%	0.85%	0.63%	1.12%	0.96%	8.75%	6.91%	2.61%

Five Year Average is from 1999 through 2003.

Ten Year Average is from 1994 through 2003.

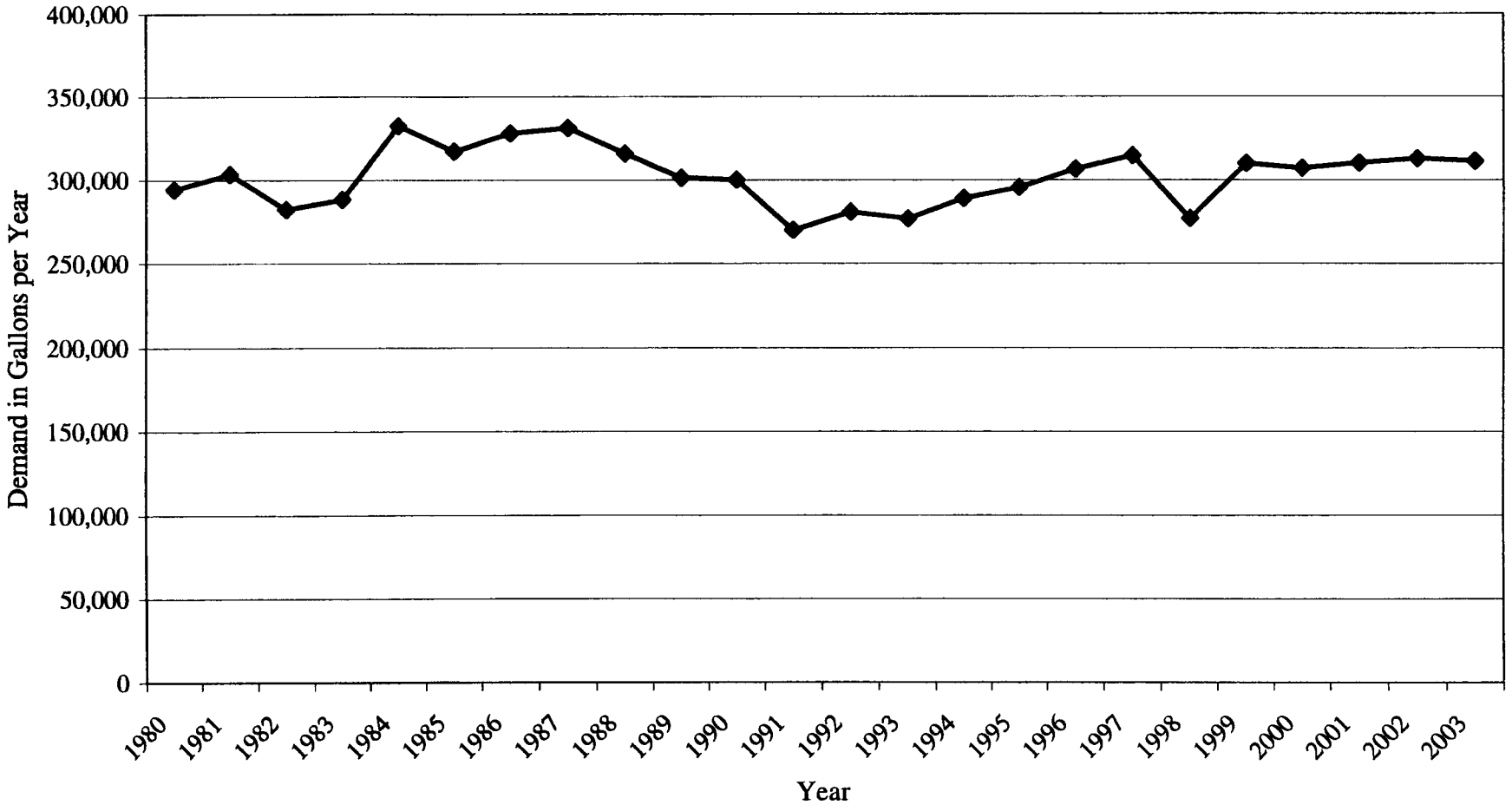
Visalia

Historical Annual Services



Visalia

Annual Demand per Service



California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Demand per Service (Gallons/Service/Day)

Year	Total Residential	Metered Residential	Flat Rate Residential	Multi-Residential (service)	Multi-Residential (unit)	Commercial	Industrial	Government	Total Other	Unaccounted/ Total Services	Combined Demand/Service
1980	655	677	653	3,472	219	1,058	5,744	1,955	2,023	65	807
1981	677	678	677	3,429	219	1,084	5,892	1,960	2,467	67	831
1982	623	635	622	3,245	208	1,058	6,096	1,669	2,271	62	774
1983	625	649	623	3,533	223	1,152	7,660	1,662	2,566	63	790
1984	733	745	732	3,657	229	1,263	7,791	1,973	2,795	73	910
1985	684	676	685	4,001	236	1,287	8,507	1,902	1,994	69	869
1986	701	676	703	4,966	288	1,297	11,567	1,877	1,636	72	898
1987	706	711	705	4,533	264	1,319	11,011	2,281	2,326	73	907
1988	661	705	657	4,681	272	1,283	10,186	2,826	2,778	69	865
1989	629	676	626	4,510	261	1,237	12,172	2,600	3,041	66	825
1990	621	678	616	4,761	284	1,267	13,698	2,684	2,747	66	822
1991	547	611	542	4,445	259	1,219	10,729	2,567	2,541	59	740
1992	580	596	578	4,392	258	1,250	5,501	2,699	2,485	62	770
1993	566	575	565	4,354	258	1,294	6,243	2,286	1,211	61	759
1994	573	572	573	4,558	271	1,413	6,006	2,529	1,896	63	792
1995	586	564	594	4,507	263	1,457	6,369	2,751	1,224	65	810
1996	609	599	612	4,397	261	1,444	7,382	3,896	1,509	67	839
1997	630	624	632	4,643	280	1,468	8,216	3,150	5,816	69	862
1998	536	522	542	4,163	247	1,404	8,232	2,821	6,249	61	759
1999	604	591	609	4,134	259	1,539	8,087	3,376	10,102	68	849
2000	595	583	601	4,070	262	1,600	6,812	3,208	7,699	67	841
2001	607	602	610	4,245	280	1,688	4,857	3,588	2,836	68	849
2002	628	575	657	4,212	263	1,528	7,416	3,168	3,055	69	856
2003	609	596	617	4,464	270	1,689	4,394	2,862	4,499	68	852
5 Yr. Avg.	609	589	619	4,225	267	1,609	6,313	3,241	5,638	68	850
10 Yr. Avg.	598	583	605	4,339	266	1,523	6,777	3,135	4,488	66	831

Five Year Average is from 1999 through 2003.

Ten Year Average is from 1994 through 2003.

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Percentage Change in Annual Demand

Year	Total S.F. Residential	Metered Residential	Flat Rate Residential	Multi-Residential	Commercial	Industrial	Government	Other	Unaccounted Water	Total
1981	5.20%	10.44%	4.87%	1.06%	5.21%	2.58%	7.81%	-18.72%	5.07%	5.07%
1982	-6.77%	-0.18%	-7.20%	-4.66%	-1.17%	3.46%	-10.49%	15.08%	-5.74%	-5.74%
1983	3.43%	4.22%	3.38%	8.88%	11.67%	15.99%	3.82%	80.81%	5.28%	5.28%
1984	22.78%	27.34%	22.46%	7.39%	12.70%	18.66%	24.23%	22.54%	20.28%	20.28%
1985	-3.19%	4.43%	-3.75%	11.80%	3.51%	9.20%	7.65%	-4.90%	-1.14%	-1.14%
1986	6.58%	6.12%	6.62%	35.56%	7.15%	35.97%	-3.31%	16.22%	7.78%	7.78%
1987	3.41%	8.55%	3.00%	-3.38%	5.93%	-4.81%	20.94%	17.11%	3.90%	3.90%
1988	-3.38%	2.24%	-3.85%	3.27%	-0.90%	-7.49%	27.05%	2.39%	-1.82%	-1.82%
1989	-1.29%	-1.45%	-1.27%	-3.66%	-1.70%	19.49%	-4.81%	73.32%	-1.27%	-1.27%
1990	3.16%	2.50%	3.22%	6.22%	4.74%	12.54%	6.72%	28.36%	3.91%	3.91%
1991	-7.91%	0.40%	-8.65%	-4.36%	-0.18%	-21.67%	0.09%	2.79%	-6.09%	-6.09%
1992	11.62%	37.70%	9.08%	2.34%	7.01%	-48.73%	9.33%	-15.24%	9.45%	9.45%
1993	-0.01%	30.43%	-3.75%	-0.30%	6.16%	126.98%	-16.00%	-55.01%	0.99%	0.99%
1994	3.69%	56.84%	-5.15%	5.27%	13.33%	99.26%	12.99%	43.46%	7.10%	7.10%
1995	4.28%	18.67%	0.33%	-1.69%	4.42%	6.05%	8.34%	-29.58%	4.15%	4.15%
1996	5.72%	14.36%	2.90%	-3.00%	0.37%	15.90%	38.02%	2.78%	5.44%	5.44%
1997	5.03%	10.94%	2.89%	6.22%	2.66%	9.38%	-19.85%	343.13%	4.07%	4.07%
1998	-13.62%	-11.51%	-14.44%	-8.82%	-3.75%	0.20%	-11.61%	30.80%	-10.71%	-10.71%
1999	15.11%	22.09%	12.30%	2.66%	11.16%	-1.76%	21.26%	96.30%	14.27%	14.27%
2000	1.02%	6.53%	-1.40%	0.60%	6.59%	-11.34%	-1.64%	-19.31%	1.55%	1.55%
2001	9.13%	12.76%	7.41%	9.28%	7.43%	-23.95%	15.15%	-65.20%	7.41%	7.41%
2002	6.94%	3.98%	8.42%	-4.31%	-11.04%	52.70%	33.70%	7.71%	3.98%	3.98%
2003	-0.08%	12.40%	-6.04%	5.99%	9.63%	-41.68%	18.60%	86.23%	2.48%	2.48%
5 Yr. Avg.	6.42%	11.55%	4.14%	2.84%	4.75%	-5.21%	17.41%	21.15%	5.94%	5.94%
10 Yr. Avg.	3.72%	14.71%	0.72%	1.22%	4.08%	10.48%	11.50%	49.63%	3.97%	3.97%

Five Year Average is from 1999 through 2003.

Ten Year Average is from 1994 through 2003.

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Percentage of Total Demand

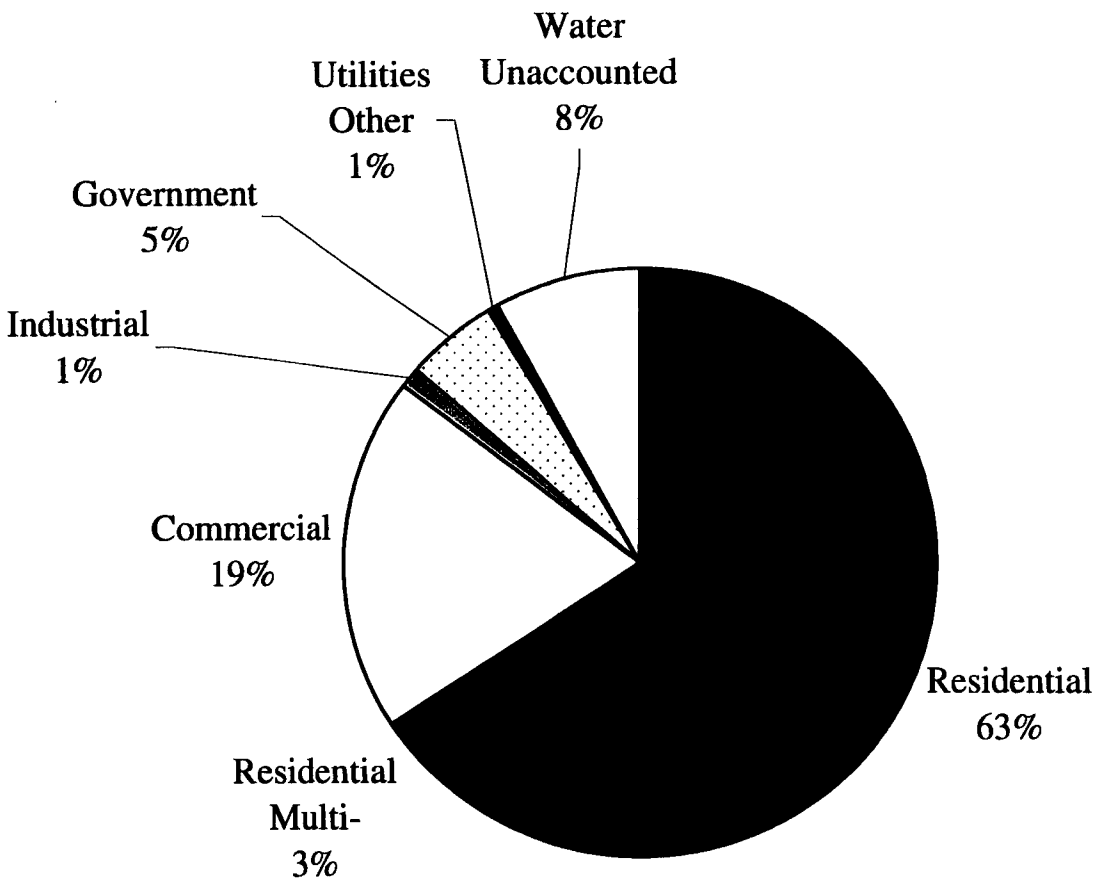
Year	Residential	Multi-Residential	Commercial	Industrial	Government	Other Utilities	Unaccounted Water	Percent Total
1980	69.91%	3.43%	15.81%	0.57%	2.19%	0.09%	8.00%	100.00%
1981	70.00%	3.30%	15.83%	0.56%	2.24%	0.07%	8.00%	100.00%
1982	69.24%	3.34%	16.60%	0.61%	2.13%	0.09%	8.00%	100.00%
1983	68.02%	3.45%	17.60%	0.68%	2.10%	0.15%	8.00%	100.00%
1984	69.43%	3.08%	16.49%	0.67%	2.17%	0.15%	8.00%	100.00%
1985	68.00%	3.48%	17.27%	0.74%	2.36%	0.15%	8.00%	100.00%
1986	67.24%	4.38%	17.17%	0.93%	2.12%	0.16%	8.00%	100.00%
1987	66.92%	4.08%	17.50%	0.85%	2.47%	0.18%	8.00%	100.00%
1988	65.86%	4.29%	17.67%	0.80%	3.19%	0.19%	8.00%	100.00%
1989	65.85%	4.18%	17.59%	0.97%	3.08%	0.33%	8.00%	100.00%
1990	65.38%	4.28%	17.73%	1.05%	3.16%	0.41%	8.00%	100.00%
1991	64.11%	4.36%	18.85%	0.88%	3.37%	0.44%	8.00%	100.00%
1992	65.38%	4.07%	18.43%	0.41%	3.36%	0.34%	8.00%	100.00%
1993	64.73%	4.02%	19.37%	0.92%	2.80%	0.15%	8.00%	100.00%
1994	62.67%	3.95%	20.50%	1.72%	2.95%	0.21%	8.00%	100.00%
1995	62.76%	3.73%	20.55%	1.75%	3.07%	0.14%	8.00%	100.00%
1996	62.92%	3.43%	19.57%	1.92%	4.02%	0.14%	8.00%	100.00%
1997	63.50%	3.50%	19.30%	2.02%	3.10%	0.58%	8.00%	100.00%
1998	61.44%	3.58%	20.81%	2.27%	3.07%	0.84%	8.00%	100.00%
1999	61.89%	3.21%	20.24%	1.95%	3.25%	1.45%	8.00%	100.00%
2000	61.57%	3.18%	21.24%	1.70%	3.15%	1.15%	8.00%	100.00%
2001	62.56%	3.24%	21.25%	1.20%	3.38%	0.37%	8.00%	100.00%
2002	64.34%	2.98%	18.18%	1.77%	4.34%	0.39%	8.00%	100.00%
2003	62.73%	3.08%	19.45%	1.01%	5.03%	0.70%	8.00%	100.00%
5 Yr. Avg.	62.62%	3.14%	20.07%	1.53%	3.83%	0.81%	8.00%	100.00%
10 Yr. Avg.	62.64%	3.39%	20.11%	1.73%	3.54%	0.60%	8.00%	100.00%

Five Year Average is from 1999 through 2003.

Ten Year Average is from 1994 through 2003.

Visalia

Percent of Total Demand by Type of Use



California Water Service Company - Visalia District
Water Supply and Demand Analysis and Projections

Scenario #1 1990's Projections

Based on Maintaining Constant Annual Growth at the Ten Year Average and Lowest Demand per Service.

Customer Type	Actual Services 1991	Projected Services 1992	Projected Services 1993	Projected Services 1994	Projected Services 1995	Projected Services 1996	Projected Services 1997	Projected Services 1998	Projected Services 1999	Projected Services 2000
Residential	20,092	20,639	21,201	21,778	22,371	22,979	23,605	24,248	24,908	25,586
Multi-Residential	168	169	171	172	174	175	177	178	180	181
Commercial	2,652	2,682	2,712	2,742	2,772	2,803	2,835	2,866	2,898	2,931
Industrial	14	14	28	58	59	59	60	60	61	61
Government	225	231	237	243	249	256	263	269	276	284
Other	30	31	32	32	33	34	35	36	37	38
Total	23,181	23,766	24,380	25,025	25,658	26,307	26,974	27,658	28,360	29,080

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 1991(ccf)	Demand 1992(ccf)	Demand 1993(ccf)	Demand 1994(ccf)	Demand 1995(ccf)	Demand 1996(ccf)	Demand 1997(ccf)	Demand 1998(ccf)	Demand 1999(ccf)	Demand 2000(ccf)
Residential	5,363,989	5,398,125	5,545,061	5,695,998	5,851,043	6,010,309	6,173,909	6,341,963	6,514,591	6,691,918
Multi-Residential	364,394	268,239	270,516	272,813	275,129	277,465	279,821	282,196	284,592	287,008
Commercial	1,577,045	1,383,673	1,399,115	1,414,729	1,430,518	1,446,482	1,462,625	1,478,948	1,495,453	1,512,142
Industrial	73,294	30,015	60,030	124,347	125,542	126,749	127,967	129,197	130,438	131,692
Government	281,813	187,241	192,119	197,123	202,259	207,527	212,933	218,480	224,172	230,011
Other	37,202	18,193	18,667	19,153	19,652	20,164	20,689	21,228	21,781	22,349
Unaccounted	669,368	686,246	703,974	722,622	740,888	759,636	778,879	798,629	818,901	839,709
Total	8,367,105	7,971,731	8,189,483	8,446,786	8,645,031	8,848,332	9,056,823	9,270,642	9,489,929	9,714,830

Customer Type	Demand 1991(AF)	Demand 1992(AF)	Demand 1993(AF)	Demand 1994(AF)	Demand 1995(AF)	Demand 1996(AF)	Demand 1997(AF)	Demand 1998(AF)	Demand 1999(AF)	Demand 2000(AF)
Residential	12,314	12,392	12,730	13,076	13,432	13,798	14,173	14,559	14,956	15,363
Multi-Residential	837	616	621	626	632	637	642	648	653	659
Commercial	3,620	3,176	3,212	3,248	3,284	3,321	3,358	3,395	3,433	3,471
Industrial	168	69	138	285	288	291	294	297	299	302
Government	647	430	441	453	464	476	489	502	515	528
Other	85	42	43	44	45	46	47	49	50	51
Unaccounted	1,537	1,575	1,616	1,659	1,701	1,744	1,788	1,833	1,880	1,928
Total	19,208	18,301	18,801	19,391	19,846	20,313	20,792	21,283	21,786	22,302

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Scenario #1 2000's Projections

Based on Maintaining Constant Annual Growth at the Ten Year Average and Lowest Demand per Service.

Customer Type	Projected Services 2001	Projected Services 2002	Projected Services 2003	Projected Services 2004	Projected Services 2005	Projected Services 2006	Projected Services 2007	Projected Services 2008	Projected Services 2009	Projected Services 2010
Residential	26,282	26,997	27,732	28,487	29,263	30,059	30,877	31,718	32,581	33,468
Multi-Residential	183	184	186	188	189	191	192	194	196	197
Commercial	2,963	2,996	3,030	3,064	3,098	3,132	3,167	3,203	3,238	3,275
Industrial	62	63	63	64	64	65	66	66	67	68
Government	285	292	300	308	316	324	333	341	350	359
Other	39	40	41	42	43	44	46	47	48	49
Total	29,814	30,573	31,352	32,152	32,973	33,816	34,681	35,569	36,480	37,416

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 2001(ccf)	Demand 2002(ccf)	Demand 2003(ccf)	Demand 2004(ccf)	Demand 2005(ccf)	Demand 2006(ccf)	Demand 2007(ccf)	Demand 2008(ccf)	Demand 2009(ccf)	Demand 2010(ccf)
Residential	6,874,072	7,061,185	7,253,390	7,450,827	7,653,639	7,861,971	8,075,974	8,295,802	8,521,613	8,753,572
Multi-Residential	289,445	291,903	294,381	296,880	299,401	301,942	304,506	307,091	309,698	312,328
Commercial	1,529,018	1,546,081	1,563,336	1,580,783	1,598,424	1,616,263	1,634,300	1,652,539	1,670,981	1,689,629
Industrial	132,958	134,236	135,526	136,828	138,143	139,471	140,812	142,165	143,531	144,911
Government	231,162	237,183	243,362	249,701	256,206	262,880	269,728	276,755	283,964	291,362
Other	23,111	23,713	24,331	24,965	25,615	26,283	26,967	27,670	28,391	29,130
Unaccounted	860,903	882,822	905,320	928,413	952,118	976,451	1,001,429	1,027,069	1,053,389	1,080,407
Total	9,940,669	10,177,123	10,419,645	10,668,398	10,923,547	11,185,261	11,453,716	11,729,090	12,011,568	12,301,338

Customer Type	Demand 2001(AF)	Demand 2002(AF)	Demand 2003(AF)	Demand 2004(AF)	Demand 2005(AF)	Demand 2006(AF)	Demand 2007(AF)	Demand 2008(AF)	Demand 2009(AF)	Demand 2010(AF)
Residential	15,781	16,210	16,652	17,105	17,570	18,049	18,540	19,045	19,563	20,096
Multi-Residential	664	670	676	682	687	693	699	705	711	717
Commercial	3,510	3,549	3,589	3,629	3,670	3,710	3,752	3,794	3,836	3,879
Industrial	305	308	311	314	317	320	323	326	330	333
Government	531	545	559	573	588	603	619	635	652	669
Other	53	54	56	57	59	60	62	64	65	67
Unaccounted	1,976	2,027	2,078	2,131	2,186	2,242	2,299	2,358	2,418	2,480
Total	22,821	23,364	23,920	24,491	25,077	25,678	26,294	26,926	27,575	28,240

California Water Service Company - Visalia District
Water Supply and Demand Analysis and Projections

Scenario #1 2010's Projections

Based on Maintaining Constant Annual Growth at the Ten Year Average and Lowest Demand per Service.

Customer Type	Projected Services 2011	Projected Services 2012	Projected Services 2013	Projected Services 2014	Projected Services 2015	Projected Services 2016	Projected Services 2017	Projected Services 2018	Projected Services 2019	Projected Services 2020
Residential	34,379	35,315	36,276	37,263	38,278	39,320	40,390	41,489	42,619	43,779
Multi-Residential	199	201	202	204	206	208	209	211	213	215
Commercial	3,311	3,348	3,385	3,423	3,461	3,500	3,539	3,579	3,619	3,659
Industrial	68	69	70	70	71	72	72	73	74	74
Government	361	370	380	390	400	411	421	432	444	455
Other	51	52	54	55	56	58	59	61	63	64
Total	38,369	39,355	40,367	41,406	42,472	43,567	44,691	45,845	47,030	48,246

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 2011(ccf)	Demand 2012(ccf)	Demand 2013(ccf)	Demand 2014(ccf)	Demand 2015(ccf)	Demand 2016(ccf)	Demand 2017(ccf)	Demand 2018(ccf)	Demand 2019(ccf)	Demand 2020(ccf)
Residential	8,991,844	9,236,602	9,488,022	9,746,286	10,011,580	10,284,095	10,564,028	10,851,581	11,146,961	11,450,382
Multi-Residential	314,979	317,654	320,351	323,070	325,813	328,579	331,369	334,182	337,019	339,881
Commercial	1,708,486	1,727,552	1,746,832	1,766,326	1,786,039	1,805,971	1,826,125	1,846,505	1,867,112	1,887,949
Industrial	146,304	147,710	149,129	150,563	152,010	153,471	154,946	156,435	157,938	159,456
Government	292,818	300,446	308,273	316,303	324,543	332,997	341,672	350,573	359,705	369,075
Other	30,124	30,909	31,714	32,540	33,388	34,257	35,150	36,066	37,005	37,969
Unaccounted	1,107,935	1,136,401	1,165,624	1,195,623	1,226,419	1,258,034	1,290,490	1,323,810	1,358,017	1,393,134
Total	12,592,490	12,897,274	13,209,945	13,530,712	13,859,791	14,197,405	14,543,781	14,899,152	15,263,758	15,637,846

Customer Type	Demand 2011(AF)	Demand 2012(AF)	Demand 2013(AF)	Demand 2014(AF)	Demand 2015(AF)	Demand 2016(AF)	Demand 2017(AF)	Demand 2018(AF)	Demand 2019(AF)	Demand 2020(AF)
Residential	20,643	21,204	21,782	22,375	22,984	23,609	24,252	24,912	25,590	26,287
Multi-Residential	723	729	735	742	748	754	761	767	774	780
Commercial	3,922	3,966	4,010	4,055	4,100	4,146	4,192	4,239	4,286	4,334
Industrial	336	339	342	346	349	352	356	359	363	366
Government	672	690	708	726	745	764	784	805	826	847
Other	69	71	73	75	77	79	81	83	85	87
Unaccounted	2,543	2,609	2,676	2,745	2,815	2,888	2,963	3,039	3,118	3,198
Total	28,909	29,608	30,326	31,062	31,818	32,593	33,388	34,204	35,041	35,900

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Scenario #1 2020's Projections

Based on Maintaining Constant Annual Growth at the Ten Year Average and Lowest Demand per Service.

Customer Type	Projected Services 2021	Projected Services 2022	Projected Services 2023	Projected Services 2024	Projected Services 2025	Projected Services 2026	Projected Services 2027	Projected Services 2028	Projected Services 2029	Projected Services 2030
Residential	44,970	46,195	47,452	48,744	50,070	51,433	52,833	54,271	55,749	57,266
Multi-Residential	216	218	220	222	224	226	228	230	232	234
Commercial	3,700	3,741	3,783	3,825	3,868	3,911	3,954	3,999	4,043	4,088
Industrial	75	76	77	77	78	79	80	80	81	82
Government	457	469	481	494	507	520	534	548	562	576
Other	66	68	70	72	74	76	78	80	82	84
Total	49,486	50,767	52,083	53,434	54,821	56,244	57,706	59,207	60,748	62,330

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 2021(ccf)	Demand 2022(ccf)	Demand 2023(ccf)	Demand 2024(ccf)	Demand 2025(ccf)	Demand 2026(ccf)	Demand 2027(ccf)	Demand 2028(ccf)	Demand 2029(ccf)	Demand 2030(ccf)
Residential	11,762,061	12,082,224	12,411,103	12,748,933	13,095,959	13,452,431	13,818,606	14,194,748	14,581,129	14,978,028
Multi-Residential	342,766	345,676	348,611	351,571	354,556	357,566	360,602	363,663	366,751	369,864
Commercial	1,909,018	1,930,323	1,951,865	1,973,648	1,995,674	2,017,946	2,040,466	2,063,238	2,086,264	2,109,546
Industrial	160,989	162,536	164,098	165,676	167,268	168,876	170,499	172,137	173,792	175,462
Government	370,921	380,583	390,497	400,670	411,107	421,817	432,805	444,080	455,648	467,517
Other	39,265	40,287	41,337	42,414	43,519	44,652	45,815	47,009	48,233	49,490
Unaccounted	1,428,925	1,465,932	1,503,925	1,542,931	1,582,977	1,624,092	1,666,304	1,709,642	1,754,138	1,799,822
Total	16,013,945	16,407,563	16,811,437	17,225,842	17,651,060	18,087,379	18,535,096	18,994,517	19,465,955	19,949,730

Customer Type	Demand 2021(AF)	Demand 2022(AF)	Demand 2023(AF)	Demand 2024(AF)	Demand 2025(AF)	Demand 2026(AF)	Demand 2027(AF)	Demand 2028(AF)	Demand 2029(AF)	Demand 2030(AF)
Residential	27,002	27,737	28,492	29,268	30,064	30,883	31,723	32,587	33,474	34,385
Multi-Residential	787	794	800	807	814	821	828	835	842	849
Commercial	4,383	4,431	4,481	4,531	4,581	4,633	4,684	4,737	4,789	4,843
Industrial	370	373	377	380	384	388	391	395	399	403
Government	852	874	896	920	944	968	994	1,019	1,046	1,073
Other	90	92	95	97	100	103	105	108	111	114
Unaccounted	3,280	3,365	3,453	3,542	3,634	3,728	3,825	3,925	4,027	4,132
Total	36,763	37,667	38,594	39,545	40,522	41,523	42,551	43,606	44,688	45,799

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Scenario #2 1990's Projections

Based on Maintaining Constant Annual Growth at the Ten Year Average and Average Demand per Service.

Customer Type	Actual Services 1991	Projected Services 1992	Projected Services 1993	Projected Services 1994	Projected Services 1995	Projected Services 1996	Projected Services 1997	Projected Services 1998	Projected Services 1999	Projected Services 2000
Residential	20,092	20,639	21,201	21,778	22,371	22,979	23,605	24,248	24,908	25,586
Multi-Residential	168	169	171	172	174	175	177	178	180	181
Commercial	2,652	2,682	2,712	2,742	2,772	2,803	2,835	2,866	2,898	2,931
Industrial	14	14	28	58	59	59	60	60	61	61
Government	225	231	237	243	249	256	263	269	276	284
Other	30	31	32	32	33	34	35	36	37	38
Total	23,181	23,766	24,380	25,025	25,658	26,307	26,974	27,658	28,360	29,080

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 1991(ccf)	Demand 1992(ccf)	Demand 1993(ccf)	Demand 1994(ccf)	Demand 1995(ccf)	Demand 1996(ccf)	Demand 1997(ccf)	Demand 1998(ccf)	Demand 1999(ccf)	Demand 2000(ccf)
Residential	5,363,989	6,286,967	6,458,098	6,633,887	6,814,462	6,999,952	7,190,490	7,386,215	7,587,268	7,793,794
Multi-Residential	364,394	349,179	352,143	355,133	358,148	361,189	364,255	367,348	370,467	373,612
Commercial	1,577,045	1,760,814	1,780,465	1,800,335	1,820,427	1,840,742	1,861,285	1,882,057	1,903,061	1,924,299
Industrial	73,294	54,241	108,482	224,712	226,872	229,053	231,254	233,477	235,721	237,986
Government	281,813	292,361	299,977	307,792	315,809	324,036	332,477	341,138	350,025	359,143
Other	37,202	48,666	49,934	51,235	52,570	53,939	55,344	56,786	58,265	59,783
Unaccounted	669,368	768,282	788,131	809,007	829,457	850,446	871,989	894,101	916,797	940,092
Total	8,367,105	9,560,511	9,837,230	10,182,101	10,417,745	10,659,357	10,907,096	11,161,122	11,421,603	11,688,709

Customer Type	Demand 1991(AF)	Demand 1992(AF)	Demand 1993(AF)	Demand 1994(AF)	Demand 1995(AF)	Demand 1996(AF)	Demand 1997(AF)	Demand 1998(AF)	Demand 1999(AF)	Demand 2000(AF)
Residential	12,314	14,433	14,826	15,229	15,644	16,070	16,507	16,957	17,418	17,892
Multi-Residential	837	802	808	815	822	829	836	843	850	858
Commercial	3,620	4,042	4,087	4,133	4,179	4,226	4,273	4,321	4,369	4,418
Industrial	168	125	249	516	521	526	531	536	541	546
Government	647	671	689	707	725	744	763	783	804	824
Other	85	112	115	118	121	124	127	130	134	137
Unaccounted	1,537	1,764	1,809	1,857	1,904	1,952	2,002	2,053	2,105	2,158
Total	19,208	21,948	22,583	23,375	23,916	24,471	25,039	25,623	26,221	26,834

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Actual & Projected Annual Average Services

Year	Actual Services	Projected Services	
		Ten Year Average	Five Year Average
1980	16,188		
1981	16,503		
1982	16,714		
1983	17,227		
1984	17,991		
1985	18,635		
1986	19,431		
1987	19,984		
1988	20,581		
1989	21,288		
1990	22,203		
1991	23,181		
1992	24,383	23,766	23,934
1993	24,972	24,380	24,728
1994	25,636	25,025	25,566
1995	26,113	25,658	26,403
1996	26,551	26,307	27,270
1997	26,922	26,974	28,168
1998	27,295	27,658	29,097
1999	27,880	28,360	30,060
2000	28,582	29,080	31,056
2001	30,392	29,814	32,088
2002	31,344	30,573	33,157
2003	32,267	31,352	34,263
2004		32,152	35,409
2005		32,973	36,595
2006		33,816	37,823
2007		34,681	39,096
2008		35,569	40,413
2009		36,480	41,777
2010		37,416	43,190
2011		38,369	44,654
2012		39,355	46,169
2013		40,367	47,738
2014		41,406	49,364
2015		42,472	51,047
2016		43,567	52,790
2017		44,691	54,596
2018		45,845	56,466
2019		47,030	58,402
2020		48,246	60,408
2021		49,486	62,486
2022		50,767	64,637
2023		52,083	66,866
2024		53,434	69,174
2025		54,821	71,565
2026		56,244	74,042
2027		57,706	76,607
2028		59,207	79,264
2029		60,748	82,016
2030		62,330	84,866

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Scenario #3 2010's Projections

Based on Maintaining Constant Annual Growth at Ten Year Average and Highest Demand per Service.

Customer Type	Projected Services 2021	Projected Services 2022	Projected Services 2023	Projected Services 2024	Projected Services 2025	Projected Services 2026	Projected Services 2027	Projected Services 2028	Projected Services 2029	Projected Services 2030
Residential	44,970	46,195	47,452	48,744	50,070	51,433	52,833	54,271	55,749	57,266
Multi-Residential	216	218	220	222	224	226	228	230	232	234
Commercial	3,700	3,741	3,783	3,825	3,868	3,911	3,954	3,999	4,043	4,088
Industrial	75	76	77	77	78	79	80	80	81	82
Government	457	469	481	494	507	520	534	548	562	576
Other	66	68	70	72	74	76	78	80	82	84
Total	49,486	50,767	52,083	53,434	54,821	56,244	57,706	59,207	60,748	62,330

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 2021(ccf)	Demand 2022(ccf)	Demand 2023(ccf)	Demand 2024(ccf)	Demand 2025(ccf)	Demand 2026(ccf)	Demand 2027(ccf)	Demand 2028(ccf)	Demand 2029(ccf)	Demand 2030(ccf)
Residential	16,083,939	16,521,744	16,971,466	17,433,430	17,907,967	18,395,422	18,896,146	19,410,499	19,938,853	20,481,588
Multi-Residential	524,582	529,036	533,527	538,057	542,625	547,232	551,878	556,563	561,289	566,054
Commercial	3,049,194	3,083,223	3,117,632	3,152,425	3,187,606	3,223,179	3,259,150	3,295,522	3,332,300	3,369,489
Industrial	501,870	506,694	511,564	516,480	521,444	526,456	531,516	536,624	541,782	546,989
Government	869,393	892,041	915,278	939,121	963,586	988,687	1,014,442	1,040,868	1,067,983	1,095,804
Other	327,443	335,973	344,725	353,705	362,919	372,373	382,074	392,027	402,239	412,717
Unaccounted	1,758,199	1,803,733	1,850,481	1,898,475	1,947,749	1,998,338	2,050,277	2,103,603	2,158,352	2,214,563
Total	23,114,621	23,672,444	24,244,674	24,831,694	25,433,897	26,051,688	26,685,483	27,335,707	28,002,797	28,687,205

Customer Type	Demand 2021(AF)	Demand 2022(AF)	Demand 2023(AF)	Demand 2024(AF)	Demand 2025(AF)	Demand 2026(AF)	Demand 2027(AF)	Demand 2028(AF)	Demand 2029(AF)	Demand 2030(AF)
Residential	36,924	37,929	38,961	40,022	41,111	42,230	43,380	44,561	45,774	47,020
Multi-Residential	1,204	1,215	1,225	1,235	1,246	1,256	1,267	1,278	1,289	1,299
Commercial	7,000	7,078	7,157	7,237	7,318	7,399	7,482	7,566	7,650	7,735
Industrial	1,152	1,163	1,174	1,186	1,197	1,209	1,220	1,232	1,244	1,256
Government	1,996	2,048	2,101	2,156	2,212	2,270	2,329	2,390	2,452	2,516
Other	752	771	791	812	833	855	877	900	923	947
Unaccounted	4,036	4,141	4,248	4,358	4,471	4,588	4,707	4,829	4,955	5,084
Total	53,064	54,345	55,658	57,006	58,389	59,807	61,262	62,755	64,286	65,857

California Water Service Company - Visalia District
Water Supply and Demand Analysis and Projections

Scenario #3 2010's Projections
Based on Maintaining Constant Annual Growth at Ten Year Average and Highest Demand per Service.

Customer Type	Projected Services 2011	Projected Services 2012	Projected Services 2013	Projected Services 2014	Projected Services 2015	Projected Services 2016	Projected Services 2017	Projected Services 2018	Projected Services 2019	Projected Services 2020
Residential	34,379	35,315	36,276	37,263	38,278	39,320	40,390	41,489	42,619	43,779
Multi-Residential	199	201	202	204	206	208	209	211	213	215
Commercial	3,311	3,348	3,385	3,423	3,461	3,500	3,539	3,579	3,619	3,659
Industrial	68	69	70	70	71	72	72	73	74	74
Government	361	370	380	390	400	411	421	432	444	455
Other	51	52	54	55	56	58	59	61	63	64
Total	38,369	39,355	40,367	41,406	42,472	43,567	44,691	45,845	47,030	48,246

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 2011(ccf)	Demand 2012(ccf)	Demand 2013(ccf)	Demand 2014(ccf)	Demand 2015(ccf)	Demand 2016(ccf)	Demand 2017(ccf)	Demand 2018(ccf)	Demand 2019(ccf)	Demand 2020(ccf)
Residential	12,295,828	12,630,520	12,974,323	13,327,484	13,690,258	14,062,907	14,445,699	14,838,911	15,242,826	15,657,736
Multi-Residential	482,056	486,149	490,276	494,439	498,636	502,870	507,139	511,445	515,787	520,166
Commercial	2,728,892	2,759,346	2,790,140	2,821,278	2,852,764	2,884,601	2,916,793	2,949,344	2,982,259	3,015,541
Industrial	456,090	460,473	464,899	469,367	473,878	478,433	483,031	487,673	492,361	497,093
Government	686,331	704,210	722,554	741,377	760,690	780,506	800,838	821,700	843,105	865,068
Other	251,217	257,761	264,476	271,365	278,434	285,687	293,130	300,766	308,601	316,640
Unaccounted	1,363,241	1,398,267	1,434,224	1,471,135	1,509,028	1,547,928	1,587,863	1,628,861	1,670,950	1,714,160
Total	18,263,654	18,696,726	19,140,891	19,596,445	20,063,688	20,542,931	21,034,493	21,538,700	22,055,888	22,586,402

Customer Type	Demand 2011(AF)	Demand 2012(AF)	Demand 2013(AF)	Demand 2014(AF)	Demand 2015(AF)	Demand 2016(AF)	Demand 2017(AF)	Demand 2018(AF)	Demand 2019(AF)	Demand 2020(AF)
Residential	28,228	28,996	29,785	30,596	31,429	32,284	33,163	34,066	34,993	35,945
Multi-Residential	1,107	1,116	1,126	1,135	1,145	1,154	1,164	1,174	1,184	1,194
Commercial	6,265	6,335	6,405	6,477	6,549	6,622	6,696	6,771	6,846	6,923
Industrial	1,047	1,057	1,067	1,078	1,088	1,098	1,109	1,120	1,130	1,141
Government	1,576	1,617	1,659	1,702	1,746	1,792	1,838	1,886	1,936	1,986
Other	577	592	607	623	639	656	673	690	708	727
Unaccounted	3,130	3,210	3,293	3,377	3,464	3,554	3,645	3,739	3,836	3,935
Total	41,928	42,922	43,942	44,988	46,060	47,160	48,289	49,446	50,634	51,852

California Water Service Company - Visalia District
Water Supply and Demand Analysis and Projections

Scenario #3 2000's Projections

Based on Maintaining Constant Annual Growth at Ten Year Average and Highest Demand per Service.

Customer Type	Projected Services 2001	Projected Services 2002	Projected Services 2003	Projected Services 2004	Projected Services 2005	Projected Services 2006	Projected Services 2007	Projected Services 2008	Projected Services 2009	Projected Services 2010
Residential	26,282	26,997	27,732	28,487	29,263	30,059	30,877	31,718	32,581	33,468
Multi-Residential	183	184	186	188	189	191	192	194	196	197
Commercial	2,963	2,996	3,030	3,064	3,098	3,132	3,167	3,203	3,238	3,275
Industrial	62	63	63	64	64	65	66	66	67	68
Government	285	292	300	308	316	324	333	341	350	359
Other	39	40	41	42	43	44	46	47	48	49
Total	29,814	30,573	31,352	32,152	32,973	33,816	34,681	35,569	36,480	37,416

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 2001(ccf)	Demand 2002(ccf)	Demand 2003(ccf)	Demand 2004(ccf)	Demand 2005(ccf)	Demand 2006(ccf)	Demand 2007(ccf)	Demand 2008(ccf)	Demand 2009(ccf)	Demand 2010(ccf)
Residential	9,399,897	9,655,762	9,918,592	10,188,576	10,465,909	10,750,791	11,043,428	11,344,030	11,652,814	11,970,004
Multi-Residential	442,977	446,738	450,531	454,356	458,214	462,104	466,027	469,984	473,974	477,998
Commercial	2,442,235	2,469,490	2,497,050	2,524,917	2,553,095	2,581,588	2,610,398	2,639,530	2,668,987	2,698,773
Industrial	414,485	418,469	422,491	426,551	430,651	434,790	438,969	443,188	447,447	451,748
Government	541,814	555,929	570,411	585,270	600,516	616,160	632,211	648,680	665,578	682,916
Other	192,735	197,756	202,907	208,193	213,617	219,181	224,891	230,749	236,760	242,928
Unaccounted	1,059,285	1,086,254	1,113,936	1,142,352	1,171,519	1,201,459	1,232,192	1,263,741	1,296,125	1,329,370
Total	14,493,429	14,830,398	15,175,918	15,530,215	15,893,521	16,266,073	16,648,116	17,039,901	17,441,687	17,853,737

Customer Type	Demand 2001(AF)	Demand 2002(AF)	Demand 2003(AF)	Demand 2004(AF)	Demand 2005(AF)	Demand 2006(AF)	Demand 2007(AF)	Demand 2008(AF)	Demand 2009(AF)	Demand 2010(AF)
Residential	21,579	22,167	22,770	23,390	24,027	24,681	25,352	26,042	26,751	27,480
Multi-Residential	1,017	1,026	1,034	1,043	1,052	1,061	1,070	1,079	1,088	1,097
Commercial	5,607	5,669	5,732	5,796	5,861	5,927	5,993	6,060	6,127	6,196
Industrial	952	961	970	979	989	998	1,008	1,017	1,027	1,037
Government	1,244	1,276	1,309	1,344	1,379	1,415	1,451	1,489	1,528	1,568
Other	442	454	466	478	490	503	516	530	544	558
Unaccounted	2,432	2,494	2,557	2,622	2,689	2,758	2,829	2,901	2,976	3,052
Total	33,273	34,046	34,839	35,653	36,487	37,342	38,219	39,119	40,041	40,987

California Water Service Company - Visalia District
Water Supply and Demand Analysis and Projections

Scenario #3 1990's Projections

Based on Maintaining Constant Annual Growth at Ten Year Average and Highest Demand per Service.

Customer Type	Actual Services 1991	Projected Services 1992	Projected Services 1993	Projected Services 1994	Projected Services 1995	Projected Services 1996	Projected Services 1997	Projected Services 1998	Projected Services 1999	Projected Services 2000
Residential	20,092	20,639	21,201	21,778	22,371	22,979	23,605	24,248	24,908	25,586
Multi-Residential	168	169	171	172	174	175	177	178	180	181
Commercial	2,652	2,682	2,712	2,742	2,772	2,803	2,835	2,866	2,898	2,931
Industrial	14	14	28	58	59	59	60	60	61	61
Government	225	231	237	243	249	256	263	269	276	284
Other	30	31	32	32	33	34	35	36	37	38
Total	23,181	23,766	24,380	25,025	25,658	26,307	26,974	27,658	28,360	29,080

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 1991(ccf)	Demand 1992(ccf)	Demand 1993(ccf)	Demand 1994(ccf)	Demand 1995(ccf)	Demand 1996(ccf)	Demand 1997(ccf)	Demand 1998(ccf)	Demand 1999(ccf)	Demand 2000(ccf)
Residential	5,363,989	7,381,624	7,582,551	7,788,949	8,000,964	8,218,750	8,442,464	8,672,268	8,908,327	9,150,812
Multi-Residential	364,394	410,523	414,008	417,523	421,068	424,643	428,248	431,884	435,550	439,248
Commercial	1,577,045	2,210,083	2,234,747	2,259,687	2,284,905	2,310,405	2,336,189	2,362,261	2,388,623	2,415,281
Industrial	73,294	93,569	187,137	387,641	391,367	395,129	398,926	402,760	406,631	410,539
Government	281,813	438,870	450,303	462,033	474,069	486,419	499,090	512,091	525,431	539,119
Other	37,202	151,720	155,672	159,727	163,888	168,157	172,538	177,032	181,644	186,376
Unaccounted	669,368	844,380	866,194	889,139	911,614	934,682	958,359	982,661	1,007,605	1,033,207
Total	8,367,105	11,530,768	11,890,613	12,364,699	12,647,875	12,938,184	13,235,814	13,540,958	13,853,812	14,174,582

Customer Type	Demand 1991(AF)	Demand 1992(AF)	Demand 1993(AF)	Demand 1994(AF)	Demand 1995(AF)	Demand 1996(AF)	Demand 1997(AF)	Demand 1998(AF)	Demand 1999(AF)	Demand 2000(AF)
Residential	12,314	16,946	17,407	17,881	18,368	18,868	19,381	19,909	20,451	21,008
Multi-Residential	837	942	950	959	967	975	983	991	1,000	1,008
Commercial	3,620	5,074	5,130	5,188	5,245	5,304	5,363	5,423	5,484	5,545
Industrial	168	215	430	890	898	907	916	925	934	942
Government	647	1,008	1,034	1,061	1,088	1,117	1,146	1,176	1,206	1,238
Other	85	348	357	367	376	386	396	406	417	428
Unaccounted	1,537	1,938	1,989	2,041	2,093	2,146	2,200	2,256	2,313	2,372
Total	19,208	26,471	27,297	28,386	29,036	29,702	30,385	31,086	31,804	32,541

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Scenario #2 2010's Projections

Based on Maintaining Constant Annual Growth at the Ten Year Average and Average Demand per Service.

Customer Type	Projected Services 2021	Projected Services 2022	Projected Services 2023	Projected Services 2024	Projected Services 2025	Projected Services 2026	Projected Services 2027	Projected Services 2028	Projected Services 2029	Projected Services 2030
Residential	44,970	46,195	47,452	48,744	50,070	51,433	52,833	54,271	55,749	57,266
Multi-Residential	216	218	220	222	224	226	228	230	232	234
Commercial	3,700	3,741	3,783	3,825	3,868	3,911	3,954	3,999	4,043	4,088
Industrial	75	76	77	77	78	79	80	80	81	82
Government	457	469	481	494	507	520	534	548	562	576
Other	66	68	70	72	74	76	78	80	82	84
Total	49,486	50,767	52,083	53,434	54,821	56,244	57,706	59,207	60,748	62,330

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 2021(ccf)	Demand 2022(ccf)	Demand 2023(ccf)	Demand 2024(ccf)	Demand 2025(ccf)	Demand 2026(ccf)	Demand 2027(ccf)	Demand 2028(ccf)	Demand 2029(ccf)	Demand 2030(ccf)
Residential	13,698,774	14,071,654	14,454,685	14,848,141	15,252,308	15,667,476	16,093,944	16,532,021	16,982,023	17,444,274
Multi-Residential	446,194	449,983	453,803	457,656	461,541	465,460	469,412	473,397	477,416	481,469
Commercial	2,429,350	2,456,461	2,483,876	2,511,596	2,539,625	2,567,967	2,596,626	2,625,604	2,654,906	2,684,535
Industrial	290,930	293,726	296,549	299,399	302,277	305,182	308,115	311,076	314,066	317,085
Government	579,161	594,248	609,728	625,612	641,909	658,631	675,788	693,392	711,455	729,989
Other	105,033	107,769	110,576	113,457	116,412	119,445	122,556	125,749	129,025	132,386
Unaccounted	1,599,745	1,641,176	1,683,711	1,727,380	1,772,213	1,818,243	1,865,501	1,914,021	1,963,836	2,014,981
Total	19,149,187	19,615,017	20,092,928	20,583,240	21,086,285	21,602,403	22,131,942	22,675,261	23,232,727	23,804,718

Customer Type	Demand 2021(AF)	Demand 2022(AF)	Demand 2023(AF)	Demand 2024(AF)	Demand 2025(AF)	Demand 2026(AF)	Demand 2027(AF)	Demand 2028(AF)	Demand 2029(AF)	Demand 2030(AF)
Residential	31,448	32,304	33,184	34,087	35,015	35,968	36,947	37,953	38,986	40,047
Multi-Residential	1,024	1,033	1,042	1,051	1,060	1,069	1,078	1,087	1,096	1,105
Commercial	5,577	5,639	5,702	5,766	5,830	5,895	5,961	6,028	6,095	6,163
Industrial	668	674	681	687	694	701	707	714	721	728
Government	1,330	1,364	1,400	1,436	1,474	1,512	1,551	1,592	1,633	1,676
Other	241	247	254	260	267	274	281	289	296	304
Unaccounted	3,673	3,768	3,865	3,966	4,068	4,174	4,283	4,394	4,508	4,626
Total	43,961	45,030	46,127	47,253	48,408	49,593	50,808	52,056	53,335	54,648

California Water Service Company - Visalia District
Water Supply and Demand Analysis and Projections

Scenario #2 2010's Projections
Based on Maintaining Constant Annual Growth at the Ten Year Average and Average Demand per Service.

Customer Type	Projected Services 2011	Projected Services 2012	Projected Services 2013	Projected Services 2014	Projected Services 2015	Projected Services 2016	Projected Services 2017	Projected Services 2018	Projected Services 2019	Projected Services 2020
Residential	34,379	35,315	36,276	37,263	38,278	39,320	40,390	41,489	42,619	43,779
Multi-Residential	199	201	202	204	206	208	209	211	213	215
Commercial	3,311	3,348	3,385	3,423	3,461	3,500	3,539	3,579	3,619	3,659
Industrial	68	69	70	70	71	72	72	73	74	74
Government	361	370	380	390	400	411	421	432	444	455
Other	51	52	54	55	56	58	59	61	63	64
Total	38,369	39,355	40,367	41,406	42,472	43,567	44,691	45,845	47,030	48,246

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 2011(ccf)	Demand 2012(ccf)	Demand 2013(ccf)	Demand 2014(ccf)	Demand 2015(ccf)	Demand 2016(ccf)	Demand 2017(ccf)	Demand 2018(ccf)	Demand 2019(ccf)	Demand 2020(ccf)
Residential	10,472,419	10,757,479	11,050,297	11,351,086	11,660,063	11,977,450	12,303,476	12,638,377	12,982,393	13,335,774
Multi-Residential	410,023	413,504	417,015	420,555	424,126	427,727	431,358	435,020	438,714	442,438
Commercial	2,174,159	2,198,422	2,222,957	2,247,765	2,272,850	2,298,215	2,323,863	2,349,797	2,376,021	2,402,538
Industrial	264,391	266,932	269,498	272,088	274,703	277,343	280,009	282,700	285,417	288,160
Government	457,211	469,121	481,342	493,881	506,746	519,947	533,492	547,389	561,649	576,280
Other	80,582	82,681	84,835	87,045	89,312	91,639	94,026	96,475	98,988	101,567
Unaccounted	1,240,383	1,272,252	1,304,968	1,338,553	1,373,031	1,408,425	1,444,761	1,482,064	1,520,360	1,559,676
Total	15,099,168	15,460,392	15,830,911	16,210,973	16,600,831	17,000,746	17,410,985	17,831,823	18,263,542	18,706,432

Customer Type	Demand 2011(AF)	Demand 2012(AF)	Demand 2013(AF)	Demand 2014(AF)	Demand 2015(AF)	Demand 2016(AF)	Demand 2017(AF)	Demand 2018(AF)	Demand 2019(AF)	Demand 2020(AF)
Residential	24,042	24,696	25,368	26,059	26,768	27,497	28,245	29,014	29,804	30,615
Multi-Residential	941	949	957	965	974	982	990	999	1,007	1,016
Commercial	4,991	5,047	5,103	5,160	5,218	5,276	5,335	5,394	5,455	5,516
Industrial	607	613	619	625	631	637	643	649	655	662
Government	1,050	1,077	1,105	1,134	1,163	1,194	1,225	1,257	1,289	1,323
Other	185	190	195	200	205	210	216	221	227	233
Unaccounted	2,848	2,921	2,996	3,073	3,152	3,233	3,317	3,402	3,490	3,581
Total	34,663	35,492	36,343	37,216	38,111	39,029	39,970	40,937	41,928	42,944

California Water Service Company - Visalia District
Water Supply and Demand Analysis and Projections

Scenario #2 2000's Projections
Based on Maintaining Constant Annual Growth at the Ten Year Average and Average Demand per Service.

Customer Type	Projected Services 2001	Projected Services 2002	Projected Services 2003	Projected Services 2004	Projected Services 2005	Projected Services 2006	Projected Services 2007	Projected Services 2008	Projected Services 2009	Projected Services 2010
Residential	26,282	26,997	27,732	28,487	29,263	30,059	30,877	31,718	32,581	33,468
Multi-Residential	183	184	186	188	189	191	192	194	196	197
Commercial	2,963	2,996	3,030	3,064	3,098	3,132	3,167	3,203	3,238	3,275
Industrial	62	63	63	64	64	65	66	66	67	68
Government	285	292	300	308	316	324	333	341	350	359
Other	39	40	41	42	43	44	46	47	48	49
Total	29,814	30,573	31,352	32,152	32,973	33,816	34,681	35,569	36,480	37,416

"Industrial" & "Other" Five year average service growth percentages adjusted due to large fluctuations of values.

Customer Type	Demand 2001(ccf)	Demand 2002(ccf)	Demand 2003(ccf)	Demand 2004(ccf)	Demand 2005(ccf)	Demand 2006(ccf)	Demand 2007(ccf)	Demand 2008(ccf)	Demand 2009(ccf)	Demand 2010(ccf)
Residential	8,005,941	8,223,862	8,447,716	8,677,663	8,913,869	9,156,504	9,405,744	9,661,769	9,924,762	10,194,914
Multi-Residential	376,784	379,983	383,209	386,462	389,743	393,052	396,389	399,755	403,148	406,571
Commercial	1,945,774	1,967,489	1,989,446	2,011,648	2,034,098	2,056,799	2,079,753	2,102,963	2,126,432	2,150,163
Industrial	240,274	242,583	244,914	247,268	249,645	252,044	254,466	256,912	259,381	261,874
Government	360,939	370,341	379,989	389,888	400,044	410,465	421,158	432,129	443,386	454,936
Other	61,823	63,433	65,086	66,781	68,521	70,306	72,137	74,016	75,945	77,923
Unaccounted	963,820	988,358	1,013,546	1,039,400	1,065,939	1,093,180	1,121,144	1,149,849	1,179,315	1,209,563
Total	11,955,354	12,236,050	12,523,905	12,819,110	13,121,859	13,432,351	13,750,792	14,077,393	14,412,370	14,755,945

Customer Type	Demand 2001(AF)	Demand 2002(AF)	Demand 2003(AF)	Demand 2004(AF)	Demand 2005(AF)	Demand 2006(AF)	Demand 2007(AF)	Demand 2008(AF)	Demand 2009(AF)	Demand 2010(AF)
Residential	18,379	18,880	19,393	19,921	20,464	21,021	21,593	22,181	22,784	23,404
Multi-Residential	865	872	880	887	895	902	910	918	926	933
Commercial	4,467	4,517	4,567	4,618	4,670	4,722	4,774	4,828	4,882	4,936
Industrial	552	557	562	568	573	579	584	590	595	601
Government	829	850	872	895	918	942	967	992	1,018	1,044
Other	142	146	149	153	157	161	166	170	174	179
Unaccounted	2,213	2,269	2,327	2,386	2,447	2,510	2,574	2,640	2,707	2,777
Total	27,446	28,090	28,751	29,429	30,124	30,837	31,568	32,317	33,086	33,875

California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

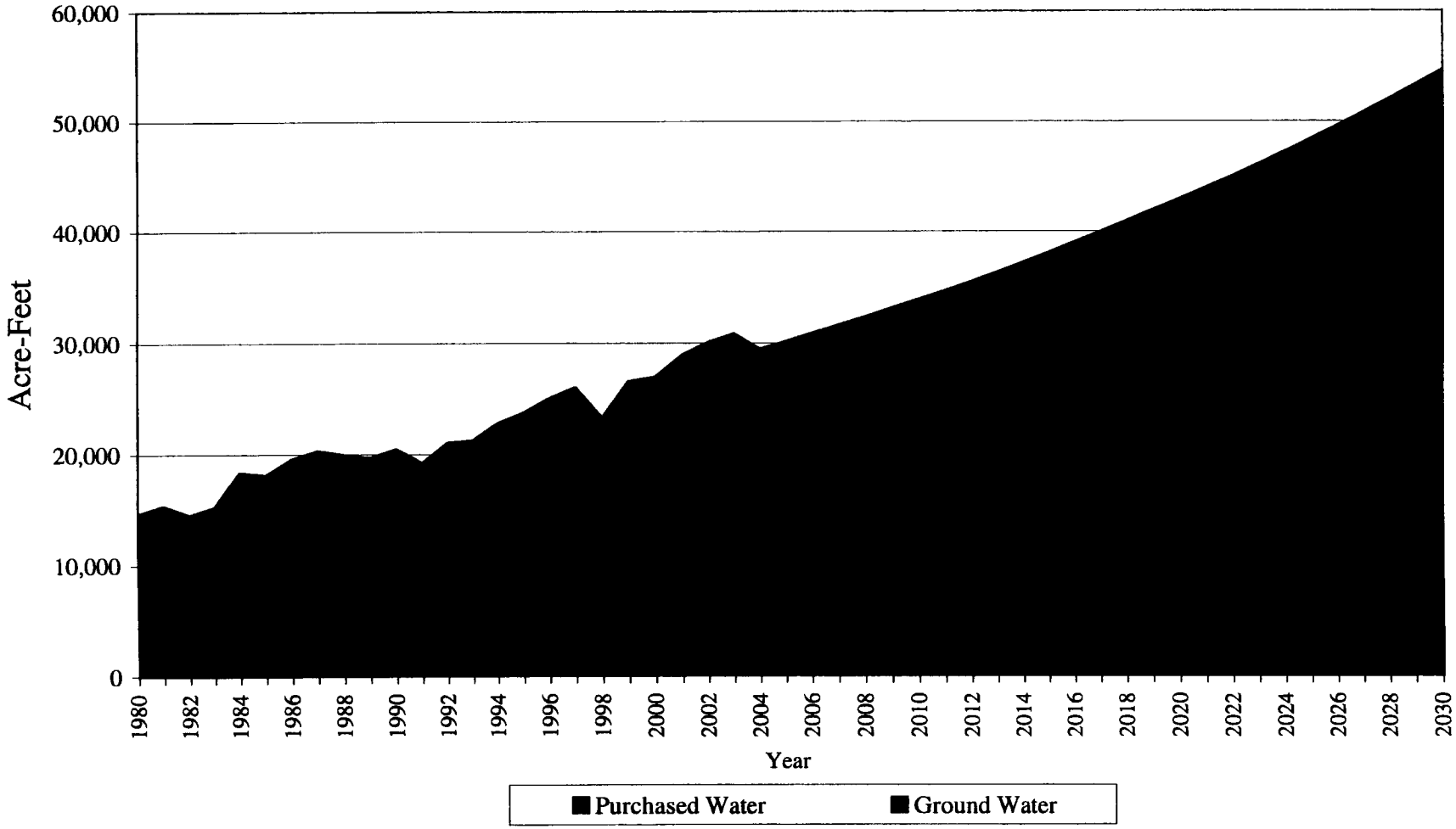
Historical and Projected Maximum Day Demand

Actual 1980 to 2003 / Projected 2020

Year	Historical Annual Demand (AF)	Historical Annual Demand (MG)	Average Day Demand (MG)	Average Day Use Per Service (gal)	Maximum Day Demand (MG)	Maximum Day Use Per Service (gal)	Max Day : Ave. Day Ratio
1980	14,627	4,766	13.1	807	26.9	1,663	2.06
1981	15,368	5,008	13.7	831	27.0	1,639	1.97
1982	14,485	4,720	12.9	774	25.1	1,502	1.94
1983	15,251	4,969	13.6	790	27.7	1,609	2.04
1984	18,343	5,977	16.4	910	30.9	1,715	1.88
1985	18,133	5,909	16.2	869	30.6	1,642	1.89
1986	19,544	6,369	17.4	898	30.1	1,550	1.73
1987	20,307	6,617	18.1	907	32.8	1,641	1.81
1988	19,937	6,497	17.8	865	32.1	1,561	1.81
1989	19,685	6,414	17.6	825	29.8	1,402	1.70
1990	20,454	6,665	18.3	822	31.2	1,403	1.71
1991	19,208	6,259	17.1	740	30.6	1,320	1.78
1992	21,023	6,850	18.8	770	31.2	1,281	1.66
1993	21,230	6,918	19.0	759	33.8	1,355	1.79
1994	22,737	7,409	20.3	792	36.7	1,433	1.81
1995	23,679	7,716	21.1	810	37.9	1,449	1.79
1996	24,967	8,135	22.3	839	38.5	1,452	1.73
1997	25,983	8,466	23.2	862	38.5	1,430	1.66
1998	23,199	7,559	20.7	759	39.1	1,432	1.89
1999	26,510	8,638	23.7	849	41.8	1,499	1.77
2000	26,922	8,772	24.0	841	39.8	1,393	1.66
2001	28,915	9,422	25.8	849	42.0	1,383	1.63
2002	30,065	9,797	26.8	856	48.3	1,542	1.80
2003	30,810	10,040	27.5	852	47.7	1,478	1.73
10 year Average (1994-2003)			23.5	831	41.0	1,449	1.75
5 year Average (1999-2003)			25.6	850	43.9	1,459	1.72

Projected Year 2020	Projected Annual Demand (AF)	Projected Annual Demand (MG)	Average Day Demand (MG)	Average Day Use Per Service (gal)	Maximum Day Demand (MG)	Maximum Day Use Per Service (gal)	Max Day : Ave. Day Ratio
Scenario #1	35,900	11,698	32.05	664	55.96	1,160	1.75
Scenario #2	42,944	13,993	38.34	795	66.94	1,388	1.75
Scenario #3	51,852	16,896	46.29	959	80.83	1,675	1.75

Visalia
Historical & Projected Sources

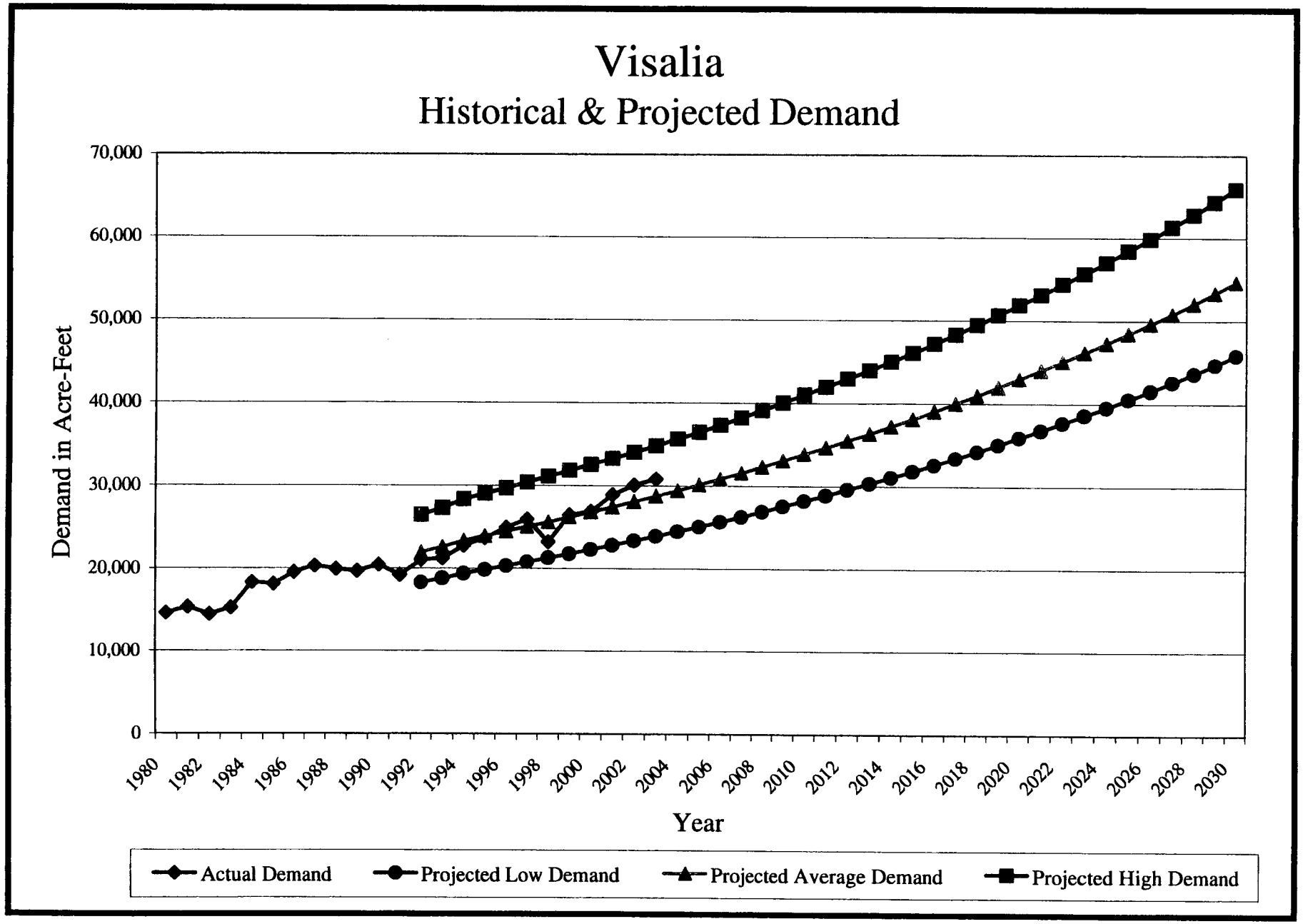


California Water Service Company - Visalia District

Water Supply and Demand Analysis and Projections

Projected Annual Supply by Source

Year	Purchased Water KGal	Purchased Water (Acre-Feet)	Ground Water KGal	Ground Water (Acre-Feet)	Total Supply KGal	Total Supply (Acre-Feet)
1980	0	0	4,766,218	14,627	4,766,218	14,627
1981	0	0	5,007,709	15,368	5,007,709	15,368
1982	0	0	4,720,041	14,485	4,720,041	14,485
1983	0	0	4,969,393	15,251	4,969,393	15,251
1984	0	0	5,977,074	18,343	5,977,074	18,343
1985	0	0	5,908,777	18,133	5,908,777	18,133
1986	0	0	6,368,584	19,544	6,368,584	19,544
1987	0	0	6,617,102	20,307	6,617,102	20,307
1988	0	0	6,496,593	19,937	6,496,593	19,937
1989	0	0	6,414,229	19,685	6,414,229	19,685
1990	0	0	6,664,896	20,454	6,664,896	20,454
1991	0	0	6,259,030	19,208	6,259,030	19,208
1992	0	0	6,850,305	21,023	6,850,305	21,023
1993	0	0	6,917,901	21,230	6,917,901	21,230
1994	0	0	7,408,809	22,737	7,408,809	22,737
1995	0	0	7,715,983	23,679	7,715,983	23,679
1996	0	0	8,135,379	24,967	8,135,379	24,967
1997	0	0	8,466,490	25,983	8,466,490	25,983
1998	0	0	7,559,382	23,199	7,559,382	23,199
1999	0	0	8,638,151	26,510	8,638,151	26,510
2000	0	0	8,772,398	26,922	8,772,398	26,922
2001	0	0	9,422,064	28,915	9,422,064	28,915
2002	0	0	9,796,814	30,065	9,796,814	30,065
2003	0	0	10,039,505	30,810	10,039,505	30,810
2004	0	0	9,589,428	29,429	9,589,428	29,429
2005	0	0	9,815,901	30,124	9,815,901	30,124
2006	0	0	10,048,167	30,837	10,048,167	30,837
2007	0	0	10,286,379	31,568	10,286,379	31,568
2008	0	0	10,530,695	32,317	10,530,695	32,317
2009	0	0	10,781,277	33,086	10,781,277	33,086
2010	0	0	11,038,291	33,875	11,038,291	33,875
2011	0	0	11,295,041	34,663	11,295,041	34,663
2012	0	0	11,565,257	35,492	11,565,257	35,492
2013	0	0	11,842,427	36,343	11,842,427	36,343
2014	0	0	12,126,735	37,216	12,126,735	37,216
2015	0	0	12,418,371	38,111	12,418,371	38,111
2016	0	0	12,717,530	39,029	12,717,530	39,029
2017	0	0	13,024,412	39,970	13,024,412	39,970
2018	0	0	13,339,223	40,937	13,339,223	40,937
2019	0	0	13,662,174	41,928	13,662,174	41,928
2020	0	0	13,993,481	42,944	13,993,481	42,944
2021	0	0	14,324,687	43,961	14,324,687	43,961
2022	0	0	14,673,155	45,030	14,673,155	45,030
2023	0	0	15,030,659	46,127	15,030,659	46,127
2024	0	0	15,397,441	47,253	15,397,441	47,253
2025	0	0	15,773,747	48,408	15,773,747	48,408
2026	0	0	16,159,833	49,593	16,159,833	49,593
2027	0	0	16,555,958	50,808	16,555,958	50,808
2028	0	0	16,962,392	52,056	16,962,392	52,056
2029	0	0	17,379,408	53,335	17,379,408	53,335
2030	0	0	17,807,291	54,648	17,807,291	54,648


Visalia
Historical & Projected Demand
Demand in Acre-Feet
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
Year
Actual Demand
Projected Low Demand
Projected Average Demand
Projected High Demand

California Water Service Company - Visalia District

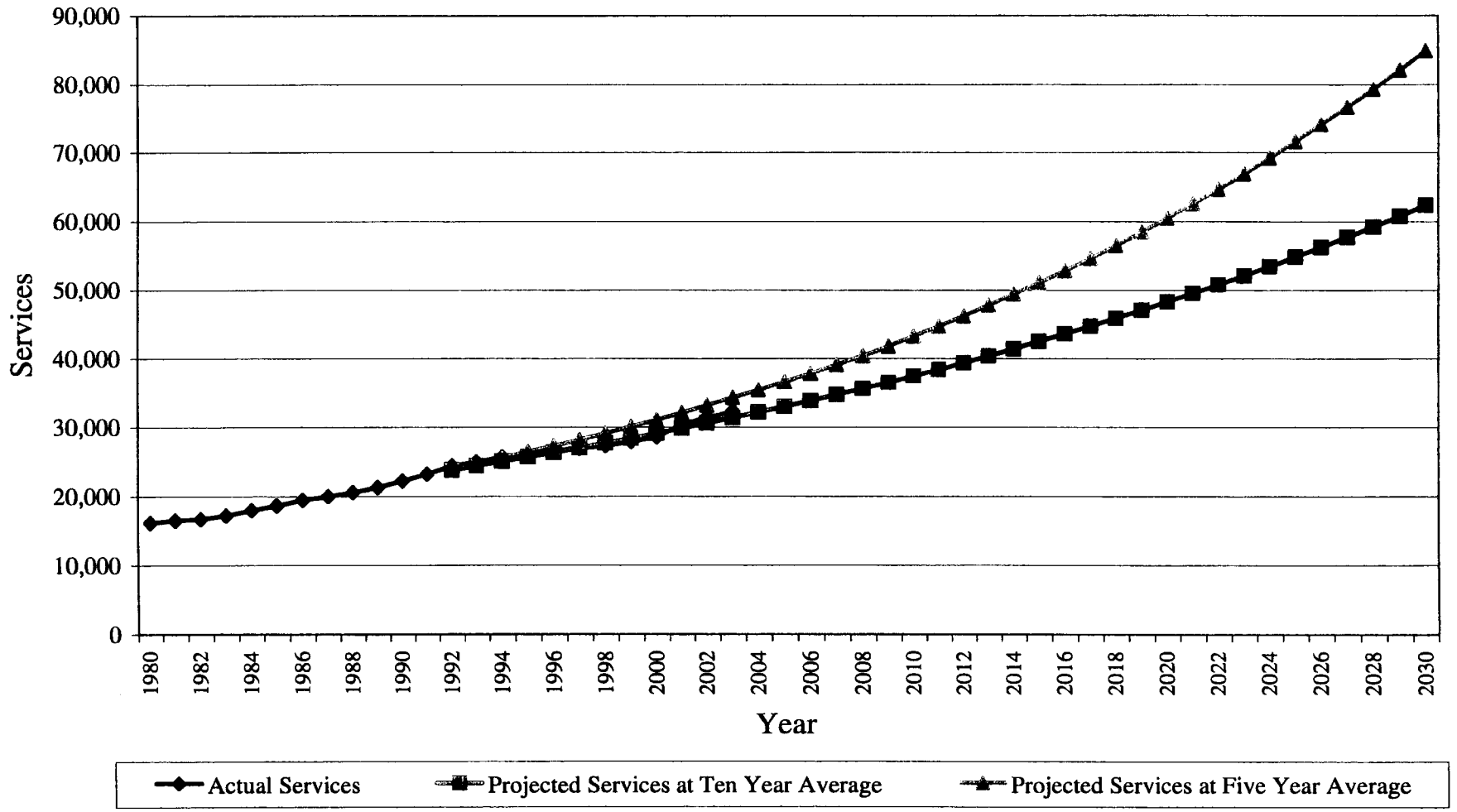
Water Supply and Demand Analysis and Projections

Actual & Projected Demand in Acre-Feet

Year	Actual Demand	Projected Low Demand	Projected Average Demand	Projected High Demand
1980	14,627			
1981	15,368			
1982	14,485			
1983	15,251			
1984	18,343			
1985	18,133			
1986	19,544			
1987	20,307			
1988	19,937			
1989	19,685			
1990	20,454			
1991	19,208			
1992	21,023	18,301	21,948	26,471
1993	21,230	18,801	22,583	27,297
1994	22,737	19,391	23,375	28,386
1995	23,679	19,846	23,916	29,036
1996	24,967	20,313	24,471	29,702
1997	25,983	20,792	25,039	30,385
1998	23,199	21,283	25,623	31,086
1999	26,510	21,786	26,221	31,804
2000	26,922	22,302	26,834	32,541
2001	28,915	22,821	27,446	33,273
2002	30,065	23,364	28,090	34,046
2003	30,810	23,920	28,751	34,839
2004		24,491	29,429	35,653
2005		25,077	30,124	36,487
2006		25,678	30,837	37,342
2007		26,294	31,568	38,219
2008		26,926	32,317	39,119
2009		27,575	33,086	40,041
2010		28,240	33,875	40,987
2011		28,909	34,663	41,928
2012		29,608	35,492	42,922
2013		30,326	36,343	43,942
2014		31,062	37,216	44,988
2015		31,818	38,111	46,060
2016		32,593	39,029	47,160
2017		33,388	39,970	48,289
2018		34,204	40,937	49,446
2019		35,041	41,928	50,634
2020		35,900	42,944	51,852
2021		36,763	43,961	53,064
2022		37,667	45,030	54,345
2023		38,594	46,127	55,658
2024		39,545	47,253	57,006
2025		40,522	48,408	58,389
2026		41,523	49,593	59,807
2027		42,551	50,808	61,262
2028		43,606	52,056	62,755
2029		44,688	53,335	64,286
2030		45,799	54,648	65,857

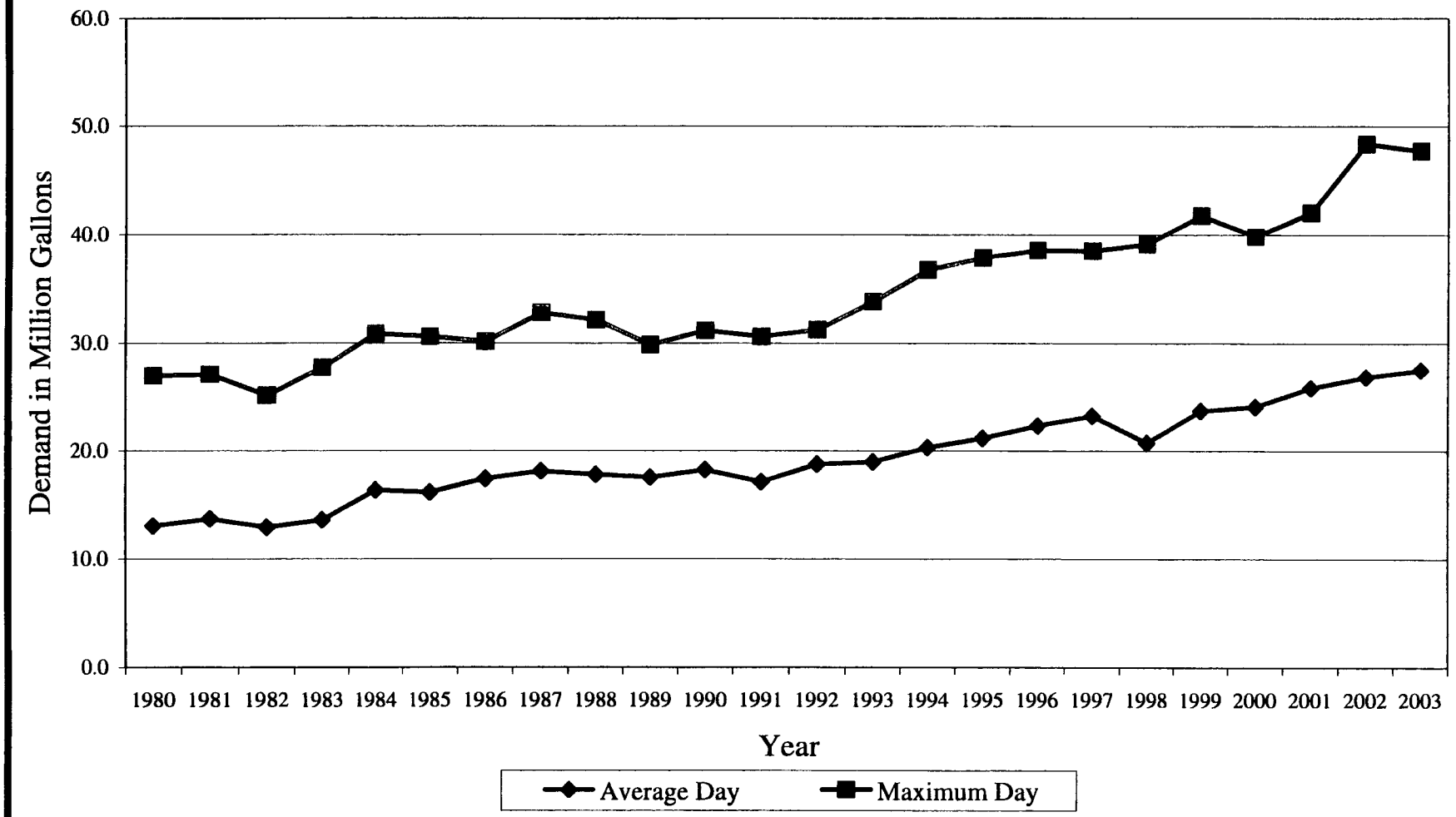
Visalia

Historical & Projected Services



Visalia

Maximum Day & Average Day Demand



APPENDIX B

WATER EFFICIENT LANDSCAPE GUIDELINES

CALIFORNIA WATER SERVICE COMPANY

LANDSCAPE GUIDELINES

The Water Conservation Landscape Guide is intended to apply to all Cal Water landscape projects. As Cal Water has been active in promoting water conserving landscaping to its customers, so should those same principles be adopted and applied within, to company projects involving landscape installations and renovations.

Although these guidelines will apply in most cases, some flexibility may be allowed to accommodate individual site constraints and changes in technology that are rapidly developing in the landscape industry.

Whether your landscape project is put out to bid or performed by district personnel, landscape designs should include the following considerations:

I. Design - Addresses site planning considerations, plant material selection, and earthwork/mounding as they impact water use on-site.

II. Soils - Specifies soil testing (if needed), preparation and amendment requirements to make the best use of the water delivered to the plant material. Soil preparation is an important element in assuring the success of drought-tolerant, low water use planting designs.

III. Irrigation Management - Addresses the key irrigation considerations which produce a design capable of delivering the amount of water appropriate to the plant materials in the most efficient way possible. In addition, this section addresses concerns relative to the long-term operation and maintenance of the irrigation systems by establishing long-term operational schedules.

WATER CONSERVATION LANDSCAPE GUIDELINES

I. DESIGN

a) Site Planning - Landscape planting is required for erosion control, fire clearance zones, screening, solar control, etc., as well as for design continuity and aesthetic enhancement of the individual site and its surrounding area. If feasible, the design may incorporate existing, established on-site plant material into the new design.

b) Plant Material Selection - Drought tolerant plant materials (xeriscape) should be provided in all projects. Plant materials shall be capable of healthy growth in their specific location and capable of producing the desired effect. Plant materials should be grouped by water needs for maximum irrigation efficiency. Little or no turf should be included in the design. If turf is included, a drought tolerant species should be considered.

c) Earthwork - Lawn should be discouraged on bermed areas. Terracing of large mounds or slope areas should be reviewed as a design possibility to reduce irrigation water runoff.

II. SOILS

a) A determination of soil type, depth, and uniformity present on-site should be made at which time soil amendment consistent with findings should be addressed. Decomposed organic matter or polymer water retention products should be incorporated in the soil to improve water infiltration and retention on all sites.

b) Two or three inches of organic mulch should be added on top of non-turf planted areas to reduce evaporation, moderate soil temperatures, and discourage weeds. Sheet plastic and other non-porous materials should not be placed under the mulch.

III. IRRIGATION MANAGEMENT

a) All irrigation systems should be designed to avoid runoff, low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, or structures.

b) The design of the irrigation system should take into account the soil's water holding capacity to determine appropriate water application rates, timing, and quantities.

c) All landscaped areas should be serviced by an automatic irrigation system operated by a multiple programmable controller. Irrigation plans and specifications should include watering schedules for each zone area and valve system based on the actual needs of the plant material and the zone climatic conditions. Schedules should call for early morning watering.

d) The irrigation design should utilize separate valve systems for high water use and low water use areas and sprinkler head types (spray heads, bubblers, drip emitters, etc.) capable of emitting the amount of water appropriate to the plant material zone.

e) Adjustments in watering schedules should be made for the establishment of new plant materials, maintenance of plant materials after the initial establishment period, and weather changes.

f) Irrigation plans should include provisions for the long-term maintenance of the systems including periodic inspection to assure long-term water use efficiency.

APPENDIX C

SERVICE AREA MAP

APPENDIX D

TARIFF RULE 14.1 MANDATORY WATER CONSERVATION AND RATIONING PLAN

_____ Cal. P.U.C. Sheet No. _____

Canceling _____ Cal. P.U.C. Sheet No. _____

SAMPLE

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)

JUL 90

_____ Cal. P.U.C. Sheet No. _____

Canceling _____ Cal. P.U.C. Sheet No. _____

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)

JUL 90

Cal. P.U.C. Sheet No.

Canceling Cal. P.U.C. Sheet No.

RULE NO. 14.1
(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.

JUL 90

(continued)

Cal. P.U.C. Sheet No.

Canceling Cal. P.U.C. Sheet No.

RULE NO. 14.1
(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.

JUL 90

(continued)

Cal. P.U.C. Sheet No.

Canceling Cal. P.U.C. Sheet No.

RULE 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).

JUL 90

APPENDIX E

BMP ECONOMIC ANALYSIS ASSUMPTIONS

Visalia

Table E-1. Assumptions Used for Economic Analysis of Water Conservation BMPs

BMP 1 – Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers

Description: Conduct water surveys that include both indoor and outdoor components. Provide recommendations and install plumbing retrofit devices where needed.

Assumptions:

1. Number of surveys necessary to complete is 15% of the baseline number of housing units in 1997. 15% of single-family units and 15% of multi-family units will be surveyed within 10 years of the date implementation is to commence. Surveys will be conducted according to the following schedule: 1.5% by end of the first reporting period, 3.6% by end of second reporting period, 6.3% by end of third reporting period, 9.6% by end of fourth reporting period, and 15% by end of the fifth reporting period.

MOU, page 16 and page 17 Section E.d. California legislation requires that plumbing fixtures manufactured, sold or installed after early 1992 be low-water-use fixtures. Therefore, the greatest water savings can be achieved in pre-1992 homes.

2. Single-family water usage = 600 gpd/unit (62% is outdoor use)

Single-family water usage was calculated based on historical single family water use and single-family households. The monthly indoor water use is assumed to be equivalent to 90 percent of the total water used in the lowest water use month in 1997. Outdoor water is calculated as the difference between annual total use and the assumed annual indoor water use.

3. Multi-family water usage = 280 gpd/unit (36% is outdoor use)

Multi-family water usage was calculated based on historical multi-family water use and multi-family households. The monthly indoor water use is assumed to be equivalent to 90 percent of the total water used in the lowest water use month in 1997. Outdoor water is calculated as the difference between annual total use and the assumed annual indoor water use.

4. Water savings from indoor leak detection, not including toilet leaks = 0.5 gpd per residence

A & N Technical Services report (2000, page 2-20) (12.4 gpd per household repair; 4 percent of households audited have leaks).

5. Water surveys decrease outdoor water use by 10%

MOU estimate is 10% (page 17).

6. Each water survey costs $50

7. The life span of a water survey is four years.

A & N Technical Services report (2000, page 2-20) gives life spans for various components of a water survey. Four years was selected as a reasonable average value based on that information.

8. Water savings from indoor plumbing retrofits are tracked under BMP 2. Only water savings from a decrease in outdoor water use and water savings from indoor leak detection are tracked in BMP 1 to avoid double counting of water savings.

Visalia

Table E-2. Economic Analysis Worksheets

BMP 1. Water Survey Programs for Single-Family and Multi-Family Residential Customers

									Benefits ($)					Costs ($)					
Calendar Year	Single Family Interventions	Multi Family Interventions	Percent Units Surveyed[a]	Single-Family Outdoor Savings (AF/yr)	Multi-Family Outdoor Savings (AF/yr)	Total Outdoor Savings (AF/yr)	Total Indoor Savings (AF/yr)	Annual Water Savings (AF/yr)	Avoided Capital Costs	Avoided Variable Costs	Avoided Purchase Costs	Total Undiscounted Benefits	Total Discounted Benefits	Capital Costs	Financial Incentives	Operating Expenses	Total Undiscounted Costs	Total Discounted Costs	Net Present Value ($)
Pre-1998	0	0	0.0%	0	0.0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1998	175	22	0.8%	7	0.2	8	0.11	8	0	1,533	0	1,533	1,834	0	0	9,859	9,859	11,792	-9,958
1999	175	22	0.8%	7	0.2	8	0.11	15	0	3,067	0	3,067	3,455	0	0	9,859	9,859	11,109	-7,653
2000	246	30	1.1%	10	0.3	11	0.15	26	0	5,213	0	5,213	5,534	0	0	13,802	13,802	14,651	-9,117
2001	246	30	1.1%	10	0.3	11	0.15	37	0	7,360	0	7,360	7,360	0	0	13,802	13,802	13,802	-6,443
2002	316	39	1.4%	13	0.4	14	0.20	43	0	8,586	0	8,586	8,089	0	0	17,746	17,746	16,718	-8,629
2003	316	39	1.4%	13	0.4	14	0.20	49	0	9,813	0	9,813	8,709	0	0	17,746	17,746	15,749	-7,040
2004	386	48	1.7%	16	0.5	17	0.24	55	0	11,040	0	11,040	9,230	0	0	21,689	21,689	18,134	-8,904
2005	386	48	1.7%	16	0.5	17	0.24	61	0	12,266	0	12,266	9,661	0	0	21,689	21,689	17,083	-7,422
2006	632	78	2.7%	26	0.9	27	0.40	75	0	15,026	0	15,026	11,149	0	0	35,492	35,492	26,334	-15,185
2007	632	78	2.7%	26	0.9	27	0.40	89	0	17,786	0	17,786	12,433	0	0	35,492	35,492	24,809	-12,376
2008								72	0	14,413	0	14,413	9,491						9,491
2009								55	0	11,040	0	11,040	6,848						6,848
2010								28	0	5,520	0	5,520	3,226						3,226
2011																			
2012																			
2013																			
2014																			
2015																			
2016																			
2017																			
2018																			
2019																			
2020																			
Totals:	3,508	435	15%	146	5	151	2.2	613	0	122,662	0	122,662	97,019	0	0	197,175	197,175	170,180	-73,162

[a]Percent surveyed from MOU, Exhibit 1,1.E(d)

Value of conserved water ($/AF) =	200
Discount rate (real) =	6.15%
Water savings from indoor leak detection (gpd/unit) =	0.50
Outdoor water savings =	10%
Single-family outdoor water usage (gpd/unit) =	372
Multi-family outdoor water usage (gpd/unit) =	101
Conservation measure unit cost ($) =	50
1997 single family units =	23,389
1997 multi-family units =	2,901

Benefit cost ratio:	0.6
Simple pay-back period (years):	22.8
Discounted cost / water saved ($/acre-feet):	277
NPV / water saved ($/acre-feet):	-119

Credit Table for Previously Performed Surveys

Year	Single family units surveys	Multi-family units surveys	% Credit	Single family credits	Multi-family credits
Pre-1990	0	0	0.0%	0	0
1990	0	0	12.5%	0	0
1991	0	0	25.0%	0	0
1992	0	0	37.5%	0	0
1993	0	0	50.0%	0	0
1994	0	0	62.5%	0	0
1995	0	0	75.0%	0	0
1996	0	0	87.5%	0	0
1997	0	0	100.0%	0	0
				0	0

Visalia

Table E-1. Assumptions Used for Economic Analysis of Water Conservation BMPs

BMP 2 – Residential Plumbing Retrofit

Description: Install plumbing retrofit devices in single- and multi- family residences.

Assumptions:

1. Plumbing retrofit devices will be installed at a minimum of 10% of residences per reporting period until it can be demonstrated that 75% of pre-1992 single-family residences and 75% of pre-1992 multi-family residences have low flow showerheads (LFSHs).

MOU, page 19.

2. 22.5% of residences have low-water-use fixtures.

Based on professional judgement, it was estimated that 45% of plumbing fixtures in pre-1992 residences have been replaced with low-water-use fixtures due to natural attrition. Assuming that one-half of these plumbing fixtures have replaced all fixtures in some pre-1992 residences and one-half of these plumbing fixtures are spreadout, replacing only a portion of the fixtures in some pre-1992 residences, then 22.5 percent of pre-1992 residences already have low-water-use fixtures.

3. It will take approximately 10.5 years to demonstrate that 75% of residences have LFSHs.

It was assumed that two LFSHs in a residence must be replaced to meet MOU requirements. If 22.5% of the residences have low-water-use fixtures, then 52.5% of the pre-1992 residences must still be replaced. At 5% of the residences replaced per year (10% replaced per reporting period) it would take 10.5 years to demonstrate that a total of 75% of residences have LFSHs.

4. There are an average of 1.1 showers, 1.7 toilets, and 2.6 faucets (1 kitchen faucet and 1.6 other faucets) per residence.

For BMP 14, it has been determined that there is an average of 1.7 toilets per residence (see BMP 14 for details). Based on professional judgement, it is assumed there are two-thirds the number of showers as toilets, and 1.5 times the number of faucets as toilets.

5. Water savings from one low-flow showerhead = 5.5 gpd

A & N Technical Services report (2000, page 2-16).

6. Water savings from one faucet aerator = 1.5 gpd

A & N Technical Services report (2000, page 2-16).

7. Water savings from one toilet flapper = 8 gpd; assume 8 percent of toilets leak.

A & N Technical Services report (2000, page 2-16).

8. Water savings from one kitchen "flip" aerator = 3.0 gpd.

Based on data provided by Southern California Water Company. Kitchen faucet water savings are due to the intermittent use of the flip feature during the rinse cycle.

9. Indoor water savings = 12.5 gpd/unit.

The following equation was used to calculate indoor water savings, based on assumptions 4 through 8:

$$[(1.1*5.5) + (1.0*3.0+1.6*1.5) + (1.7*8*0.08)]$$

10. The BMP will cost an average of $50 per residence.

11. The life span of the retrofit devices is four years.

A & N Technical Services report (2000, page 2-16) gives life spans for a various components of a water survey. Four years was selected as a reasonable average value based on that information.

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Table E-2. Economic Analysis Worksheets

BMP 2. Residential Plumbing Retrofit

						Benefits ($)					Costs ($)					
Calendar Year	Single Family Interventions	Multi Family Interventions	Percent Units Receiving Retrofits	Incremental Water Savings (AF/yr)	Annual Water Savings (AF/yr)	Avoided Capital Costs	Avoided Variable Costs	Avoided Purchase Costs	Total Undiscounted Benefits	Total Discounted Benefits	Capital Costs	Financial Incentives	Operating Expenses	Total Undiscounted Costs	Total Discounted Costs	Net Present Value ($)
2001	1,005	142	5.0%	16.1	16	0	3,211	0	3,211	3,211	0	0	57,323	57,323	57,323	-54,112
2002	1,005	142	5.0%	16.1	32	0	6,421	0	6,421	6,049	0	0	57,323	57,323	54,001	-47,952
2003	1,005	142	5.0%	16.1	48	0	9,632	0	9,632	8,548	0	0	57,323	57,323	50,873	-42,325
2004	1,005	142	5.0%	16.1	64	0	12,842	0	12,842	10,737	0	0	57,323	57,323	47,925	-37,188
2005	1,005	142	5.0%	16.1	64	0	12,842	0	12,842	10,115	0	0	57,323	57,323	45,149	-35,034
2006	1,005	142	5.0%	16.1	64	0	12,842	0	12,842	9,529	0	0	57,323	57,323	42,533	-33,004
2007	1,005	142	5.0%	16.1	64	0	12,842	0	12,842	8,977	0	0	57,323	57,323	40,069	-31,092
2008	1,005	142	5.0%	16.1	64	0	12,842	0	12,842	8,457	0	0	57,323	57,323	37,747	-29,290
2009	1,005	142	5.0%	16.1	64	0	12,842	0	12,842	7,967	0	0	57,323	57,323	35,560	-27,593
2010	1,005	142	5.0%	16.1	64	0	12,842	0	12,842	7,505	0	0	57,323	57,323	33,500	-25,995
2011	502	71	2.5%	8.0	56	0	11,237	0	11,237	6,187	0	0	28,661	28,661	15,780	-9,593
2012					40	0	8,026	0	8,026	4,163						4,163
2013					24	0	4,816	0	4,816	2,353						2,353
2014					8	0	1,605	0	1,605	739						739
2015																
2016																
2017																
2018																
2019																
2020																
Totals:	10,548	1,489	53%	169	674	0	134,845	0	134,845	94,536	0	0	601,886	601,886	460,459	-365,923

Value of conserved water ($/AF) =	200	Benefit cost ratio:	0.2
Discount rate (real) =	6.15%	Simple pay-back period (years):	68
Water savings (gpd/unit) =	12.5	Discounted cost / water saved ($/acre-feet):	683
Conservation measure unit cost ($) =	50	NPV / water saved ($/acre-feet):	-543
Percent units receiving retrofits =	5%		
1991 single family units =	20,092		
1991 multi-family units =	2,837		

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Table E-1. Assumptions Used for Economic Analysis of Water Conservation BMPs

BMP 4 – Metering With Commodity Rates for all New Connections and Retrofit of Existing Connections
Description: Install water meters at connections that serve single- and multi- family residences.
Assumptions: 1. Meters will be installed at 10% of pre-1992 single-family residences every year for ten years. *The MOU (page 23) requires 100% of existing unmetered accounts to be metered within 10 years of implementation date. As of January 1992, California law requires all new services to include water meter installation.* 2. Single-family water usage = 600 gpd/unit. *See BMP 1 for determination of water usage.* 3. Metering will reduce water usage by 20%. *MOU, page 24.* 4. Meters cost an average of $620 each, including meters and overhead. *Cost estimate based on information obtained during a meter study for the City of Fresno (Brown and Caldwell, 1992).* 5. It will cost an average of $18/year to read and maintain one meter. *Cost estimate based on information obtained during a meter study for the City of Fresno (Brown and Caldwell, 1992). We also incorporated information provided by SCWC.* 6. The life span of water meters is 20 years. *Public Utilities Commission Order 103 gives a 20 year life span for smaller than one-inch meters and 15 years for one-inch meters. It is assumed meters being installed are smaller than one-inch. This analysis does not include replacement of meters.*

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Table E-2. Economic Analysis Worksheets

BMP 4. Metering With Commodity Rates for all New Connections and Retrofit Existing Connections

					Benefits ($)					Costs ($)						
Calendar Year	Percent of Meters Installed	Number of Meters Installed per year	Incremental Water Savings (AF/yr)	Annual Water Savings (AF/yr)	Avoided Capital Costs	Avoided Variable Costs	Avoided Purchase Costs	Total Undiscounted Benefits	Total Discounted Benefits	Capital Costs	Financial Incentives	Annual Meters	Operating Expenses	Total Undiscounted Costs	Total Discounted Costs	Net Present Value ($)
1999	5%	127	17	17	0	3,409	0	3,409	3,841	78,616	0	127	2,282	80,898	91,155	-87,314
2000	5%	127	17	34	0	6,818	0	6,818	7,237	78,616	0	254	4,565	83,181	88,296	-81,059
2001	7%	178	24	58	0	11,590	0	11,590	11,590	110,062	0	431	7,760	117,823	117,823	-106,232
2002	7%	178	24	82	0	16,363	0	16,363	15,415	110,062	0	609	10,956	121,018	114,007	-98,592
2003	9%	228	31	112	0	22,499	0	22,499	19,968	141,509	0	837	15,064	156,573	138,956	-118,988
2004	9%	228	31	143	0	28,635	0	28,635	23,941	141,509	0	1,065	19,172	160,681	134,340	-110,399
2005	11%	279	37	181	0	36,135	0	36,135	28,461	172,955	0	1,344	24,193	197,149	155,279	-126,819
2006	11%	279	37	218	0	43,635	0	43,635	32,377	172,955	0	1,623	29,215	202,170	150,009	-117,632
2007	18%	456	61	280	0	55,907	0	55,907	39,079	283,018	0	2,080	37,431	320,449	223,995	-184,916
2008	18%	456	61	341	0	68,179	0	68,179	44,896	283,018	0	2,536	45,648	328,666	216,428	-171,532
2009				341	0	68,179	0	68,179	42,295	0	0	2,536	45,648	45,648	28,318	13,977
2010				341	0	68,179	0	68,179	39,845	0	0	2,536	45,648	45,648	26,677	13,167
2011				341	0	68,179	0	68,179	37,536	0	0	2,536	45,648	45,648	25,132	12,405
2012				341	0	68,179	0	68,179	35,361	0	0	2,536	45,648	45,648	23,676	11,686
2013				341	0	68,179	0	68,179	33,313	0	0	2,536	45,648	45,648	22,304	11,009
2014				341	0	68,179	0	68,179	31,383	0	0	2,536	45,648	45,648	21,012	10,371
2015				341	0	68,179	0	68,179	29,564	0	0	2,536	45,648	45,648	19,794	9,770
2016				341	0	68,179	0	68,179	27,852	0	0	2,536	45,648	45,648	18,648	9,204
2017				341	0	68,179	0	68,179	26,238	0	0	2,536	45,648	45,648	17,567	8,671
2018				341	0	68,179	0	68,179	24,718	0	0	2,536	45,648	45,648	16,549	8,168
2019				341	0	68,179	0	68,179	23,286	0	0	2,536	45,648	45,648	15,591	7,695
2020				341	0	68,179	0	68,179	21,937	0	0	2,536	45,648	45,648	14,687	7,249
Totals:	100%	2,536	341	5,557	0	1,111,317	0	1,111,317	600,132	1,572,320	0		744,062	2,316,382	1,680,242	-1,080,110

Value of conserved water ($/AF) =	200	Benefit cost ratio:	0.4
Discount rate (real) =	6.15%	Simple pay-back period (years):	62
Single-family water usage (gpd/unit) =	600	Discounted cost / water saved ($/acre-feet):	302
Water savings =	20%	NPV / water saved ($/acre-feet):	-194
Conservation measure unit cost ($) =	620		
Cost to read and maintain one meter ($/year) =	18		
Percent units receiving meters =	10%		
Number of unmetered accounts as of 1999 =	2,536		

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Table E-1. Assumptions Used for Economic Analysis of Water Conservation BMPs

BMP 5 – Large Landscape Conservation Programs and Incentives

Description: Conduct water surveys for accounts with large landscaped areas including schools, cemeteries, parks, and civic centers. Provide recommendations for water conservation.

Assumptions:

1. Eto-based water use budgets will be developed for 90 percent of the CII accounts with dedicated irrigation meters by the end of the second reporting period (22.5 percent per year for four years).

MOU (Page 27, Section C.a.)

2. Water surveys will be offered to 20 percent of the CII accounts with mixed use or no meters every reporting period (10 percent per year).

MOU (Page 27, Section C.b.)

3. Irrigation water use surveys will be completed for 15 percent of CII accounts with mixed use or no meters within 10 years of the date implementation was to commence. An agency will be considered on track if the percent of CII accounts with mixed use or no meters receiving landscape water use equals or exceeds the following: 1.5% by end of the first reporting period, 3.6% by end of second reporting period, 6.3% by end of third reporting period, 9.6% by end of fourth reporting period, and 13.5 percent by end of the 9th year. 15% must be reached by the end of the fifth reporting period.

MOU (Page 28, Section E.d.)

4. There are 0 dedicated landscape metered accounts and 3,335 CII mixed use accounts.

Data provided by California Water Service Company in a spreadsheet entitled Water Supply and Demand Analysis and Projections, prepared October 16, 2000.

5. CII mixed use account landscape areas are assumed to be an average of 0.5 acre in size.

This is based on professional judgement.

6. Water use prior to the survey is 5.1 ft per year.

Irrigation allocation is equal to 100 percent of local evapotranspiration (ETo), and the MOU estimates that surveys will reduce water usage by 15 percent. The local ETo was determined (53 in/year based on California Irrigation Management Information System data) and multiplied by 1.15 to obtain 61 inches (5.1 ft) per year for current water use. (Most conservative approach for economic analysis)

7. Surveys will reduce water usage by 15%.

MOU, page 29.

8. The life span of the large landscape water surveys is four years.

A & N Technical Services report (2000) gives a life span of four years for turf audits (page 2-20). It is assumed that water surveys for large landscapes will have a similar life span.

9. Each survey will cost $250 per acre.

This estimate is based on information presented in Cal Poly's 1988/89 annual report on their landscape water management program. The estimate includes labor, administration, evaluation and overhead.

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Table E-2. Economic Analysis Worksheets

BMP 5. Large Landscape Conservation Programs and Incentives

							Benefits ($)					Costs ($)					
Calendar Year	CII Accounts w/Dedicated Irr. Meters *Interventions*	CII Accounts w/Mixed Use or No Meters *Offered Surveys*	CII Accounts w/Mixed Use or No Meters *Percent Surveyed*[a]	CII Accounts w/Mixed Use or No Meters *Interventions*	Incremental Water Savings (AF/yr)	Annual Water Savings (AF/yr)	Avoided Capital Costs	Avoided Variable Costs	Avoided Purchase Costs	Total Undiscounted Benefits	Total Discounted Benefits	Capital Costs	Financial Incentives	Operating Expenses	Total Undiscounted Costs	Total Discounted Costs	Net Present Value ($)
Pre-1999				0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	334	0.8%	25	10	10	0	1,913	0	1,913	2,156	0	0	3,127	3,127	3,523	-1,367
2000	0	334	0.8%	25	10	19	0	3,827	0	3,827	4,062	0	0	3,127	3,127	3,319	743
2001	0	334	1.1%	35	13	33	0	6,506	0	6,506	6,506	0	0	4,377	4,377	4,377	2,129
2002	0	334	1.1%	35	13	46	0	9,185	0	9,185	8,652	0	0	4,377	4,377	4,124	4,529
2003		334	1.4%	45	17	54	0	10,715	0	10,715	9,510	0	0	5,628	5,628	4,995	4,515
2004		334	1.4%	45	17	61	0	12,246	0	12,246	10,239	0	0	5,628	5,628	4,705	5,533
2005		334	1.7%	55	21	69	0	13,777	0	13,777	10,851	0	0	6,878	6,878	5,418	5,433
2006		334	1.7%	55	21	77	0	15,308	0	15,308	11,358	0	0	6,878	6,878	5,104	6,254
2007		334	2.7%	90	34	94	0	18,752	0	18,752	13,108	0	0	11,256	11,256	7,868	5,240
2008		334	2.7%	90	34	111	0	22,196	0	22,196	14,616	0	0	11,256	11,256	7,412	7,204
2009						90	0	17,986	0	17,986	11,158						11,158
2010						69	0	13,777	0	13,777	8,051						8,051
2011						34	0	6,888	0	6,888	3,792						3,792
2012																	
2013																	
2014																	
2015																	
2016																	
2017																	
2018																	
2019																	
2020																	
Totals:	0	3335	15%	500	191	765	0	153,077	0	153,077	114,060	0	0	62,531	62,531	50,843	63,216

[a]Percent surveyed from MOU, Exhibit 1,5.E(d)

Credit Table for Previously Performed Surveys			
Year	# of Surveys	% Credit	Credits
Surveyed prior to July 1, 1996 w/follow up inspection	0	100%	0
Surveyed prior to July 1, 1996 - have not received follow up inspection	0	50%	0
Surveyed after July 1, 1996	0	100%	0
Total			0

Value of conserved water ($/AF) =	200
Discount rate (real) =	6.15%
Acres / CII accounts with dedicated irrigation meters =	0.0
Acres / CII accounts with mixed use meters =	0.5
Annual water use (ac-ft/acre) =	5.1
Water savings =	15%
Conservation measure unit cost ($/acre) =	250
Number of CII accounts with dedicated irrigation meters in 1997 =	0
Number of CII accounts with mixed use or no meter as of 1997 =	3,335
Percent of CII accounts with dedicated irrigation meters to receive Eto-based water use budgets annually for two reporting periods =	22.5%
Percent of CII accounts with mixed use or no meters offered surveys annually =	10%

Benefit cost ratio:	2.2
Simple pay-back period (years):	5.8
Discounted cost / water saved ($/acre-feet):	66
NPV / water saved ($/acre-feet):	83

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Table E-1. Assumptions Used for Economic Analysis of Water Conservation BMPs

BMP 6 – High-Efficiency Washing Machine Rebate Programs
Description: Provide rebates to single-family residences for high-efficiency washing machines.
Assumptions 1. Each rebate will cost $75. *The MOU does not require implementation of this BMP if the maximum cost-effective rebate is less than $50 (MOU, page 31). A $50 rebate plus an additional $25 per rebate for program administration and overhead was assumed.* 2. Each high efficiency washing machine will reduce water usage by 5,100 gallons per year. *MOU, page 32.* 3. Rebates will be accepted by one percent of single-family residences per year for 20 years. *Estimate based on professional judgement.* 4. The life span of a high efficiency washing machine is 12 years. *CUWCC, 1996, Guidelines for Preparing Cost Effective Analysis of Urban Water Conservation Best Management Practices, September 1996, page 3-2.*

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Table E-2. Economic Analysis Worksheets

BMP 6. High-Efficiency Washing Machine Rebate Programs

					Benefits ($)					Costs ($)					
Calendar Year	Total Single-Family Units	Number of Units Accepting Rebates	Incremental Water Savings (AF/yr)	Annual Water Savings (AF/yr)	Avoided Capital Costs	Avoided Variable Costs	Avoided Purchase Costs	Total Undiscounted Benefits	Total Discounted Benefits	Capital Costs	Financial Incentives	Operating Expenses	Total Undiscounted Costs	Total Discounted Costs	Net Present Value ($)
2001	24022	240	3.8	4	0	752	0	752	752	0	12,011	6,006	18,017	18,017	-17,265
2002	24461	245	3.8	8	0	1,518	0	1,518	1,430	0	12,231	6,115	18,346	17,283	-15,853
2003	24900	249	3.9	11	0	2,297	0	2,297	2,039	0	12,450	6,225	18,675	16,574	-14,535
2004	25339	253	4.0	15	0	3,090	0	3,090	2,584	0	12,670	6,335	19,004	15,889	-13,305
2005	25778	258	4.0	19	0	3,897	0	3,897	3,070	0	12,889	6,445	19,334	15,228	-12,158
2006	26258	263	4.1	24	0	4,719	0	4,719	3,502	0	13,129	6,565	19,694	14,612	-11,111
2007	26738	267	4.2	28	0	5,556	0	5,556	3,884	0	13,369	6,685	20,054	14,017	-10,134
2008	27218	272	4.3	32	0	6,408	0	6,408	4,220	0	13,609	6,805	20,414	13,442	-9,222
2009	27698	277	4.3	36	0	7,275	0	7,275	4,513	0	13,849	6,925	20,774	12,887	-8,374
2010	28178	282	4.4	41	0	8,157	0	8,157	4,767	0	14,089	7,045	21,134	12,351	-7,583
2011	28703	287	4.5	45	0	9,056	0	9,056	4,986	0	14,351	7,176	21,527	11,852	-6,866
2012	29227	292	4.6	50	0	9,971	0	9,971	5,171	0	14,614	7,307	21,920	11,369	-6,198
2013	29752	298	4.7	51	0	10,150	0	10,150	4,959	0	14,876	7,438	22,314	10,903	-5,943
2014	30276	303	4.7	52	0	10,332	0	10,332	4,756	0	15,138	7,569	22,707	10,452	-5,696
2015	30801	308	4.8	53	0	10,517	0	10,517	4,560	0	15,401	7,700	23,101	10,017	-5,457
2016	31374	314	4.9	54	0	10,706	0	10,706	4,373	0	15,687	7,844	23,531	9,613	-5,239
2017	31948	319	5.0	54	0	10,899	0	10,899	4,194	0	15,974	7,987	23,961	9,221	-5,027
2018	32521	325	5.1	55	0	11,095	0	11,095	4,022	0	16,261	8,130	24,391	8,843	-4,820
2019	33095	331	5.2	56	0	11,294	0	11,294	3,857	0	16,547	8,274	24,821	8,477	-4,620
2020	33668	337	5.3	57	0	11,496	0	11,496	3,699	0	16,834	8,417	25,251	8,125	-4,426
Totals:		5,720	90	746	0	149,188	0	149,188	75,340	285,978	285,978	142,989	428,966	249,171	-173,831

Value of conserved water ($/AF) =	200	Benefit cost ratio:	0.3
Discount rate (real) =	6.15%	Simple pay-back period (years):	66
Water savings (gpy/unit) =	5,100	Discounted cost / water saved ($/acre-feet):	334
Amount of rebate ($) =	50	NPV / water saved ($/acre-feet):	-233
Cost to administer rebate ($) =	25		
Percent accepting rebates =	1.0%		
Single family units in 2000 =	23,583		
Single family units in 2005 =	25,778		
Single family units in 2010 =	28,178		
Single family units in 2015 =	30,801		
Single family units in 2020 =	33,668		

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Table E-1. Assumptions Used for Economic Analysis of Water Conservation BMPs

BMP 9 – Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts

Description: Implement a program to conduct water-use surveys and customer incentives programs for CII customers.

Assumptions:

1. Water-use surveys will be conducted at 10% of CII accounts within 10 years of the date implementation is to commence. Surveys will be conducted according to the following schedule: 0.5% of the total number of surveys required by the end of the first reporting period, 2.4% by end of second reporting period, 4.2% by end of third reporting period, 6.4% by end of fourth reporting period, and 10% by the end of the fifth reporting period. Those customers will also be included in an incentives program.

MOU, page 37 and page 40, Section E.b.3

2. Ultra-low-flush toilets (ULFT) in CII establishments will be replaced to produce water savings over a 10 year implementation period equal to 15 percent of total water savings potential as determined in Table E-2. Economic Analysis Worksheets.

MOU, BMP 9, A.(b)ii.

3. Given the choice to implement BMP 9 A (c) or (d), BMP 9 A (c), CII Water Use Survey and Customer Incentives Program, was selected for implementation.

MOU BMP 9, A.(c)

4. The life span of a water survey is four years.

It was assumed that the life span for a CII water survey is the same as the life span for a residential survey. A & N Technical Services report (2000, page 2-20) gives life spans for various components of a residential water survey. Four years was selected as a reasonable average value based on that information.

5. The average annual water savings resulting from a commercial and institutional water survey is 0.83 acre-feet per account.

A & N Technical Services report (2000, page 2-35) gives average annual water savings for three types of surveys; "analyst surveys", "consultant surveys" and "water efficiency studies". Analyst surveys are conducted by non-engineers, consultant surveys are conducted by engineers for sites that have process water, and water efficiency studies are conducted at major industrial facilities that use very large quantities of water. For purposes of this economic analysis, it was assumed that only analyst surveys will be conducted for commercial and institutional account surveys. Values for water savings in the A & N report represent the maximum potential water savings that could occur if a customer were to implement every possible water conservation measure. Experience has shown that approximately 25% of the maximum potential water savings is actually realized, which is what was assumed (personal communication with John Sweeten, Metropolitan Water District, 5-9-00.)

6. The average annual water savings resulting from an industrial water survey is 2.1 acre-feet per account.

A & N Technical Services report (2000, page 2-35) gives average annual water savings for three types of surveys; "analyst surveys", "consultant surveys" and "water efficiency studies". Analyst surveys are conducted by non-engineers, consultant surveys are conducted by engineers for sites that have process water, and water efficiency studies are conducted at major industrial facilities that use very large quantities of water. For purposes of this economic analysis, it was assumed that only consultant surveys will be conducted for industrial account surveys. Values for water savings in the A & N report represent the maximum potential water savings that could occur if a customer were to implement every possible water conservation measure. Experience has shown that approximately 25% of the maximum potential water savings is actually realized, which is what was assumed (personal communication with John Sweeten, Metropolitan Water District, 5-9-00.)

7. Each analyst survey (for commercial and institutional accounts) will cost an average of $680 and each consultant survey (for industrial accounts) will cost an average of $1,680. These costs include the cost of conducting the survey and overhead.

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Table E-1. Assumptions Used for Economic Analysis of Water Conservation BMPs

BMP 9 – Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts
Description: Implement a program to conduct water-use surveys and customer incentives programs for CII customers.
A & N Technical Services report (2000, page 2-35). 8. The cost of toilets, advertising, administration, overhead, and toilet recycling is $126 per ULFT. The cost does not include installation, which will be covered by the customer. 9. The life span of the new ULFTs is 20 years. *MOU, page 70.* 10. Table E-2. Economic Analysis Worksheet for BMP 9 requires the input of toilet counts per CII subsector. Number of 1992 toilets per CII subgroup provided by CUWCC 10/4/00.

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Table E-2. Economic Analysis Worksheets

BMP 9. Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts

Calendar Year	*From BMP 9 ULFT Coverage Calculator*		CII accounts surveyed				Incremental Savings (Surveys)	Annual Savings (Total)	Benefits ($)					Costs ($)						Net Present Value ($)
	No. of Installed Toilets	Annual Savings (AF/yr)	*Percent Surveyed*[a]	Commercial Interventions	Industrial Interventions	Institutional Interventions	(AF/yr)	(AF/yr)	Avoided Capital Costs	Avoided Variable Costs	Avoided Purchase Costs	Total Undiscounted Benefits	Total Discounted Benefits	Capital Costs	Financial Incentives	Operating Expenses	Total Undiscounted Costs	Total Discounted Costs	
Pre-1999			0.0%	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
1999			0.25%	7.6	0.1	0.6	7.1	7	0	1,420	0	1,420	1,600	0	0	5,812	5,812	6,549	-4,949
2000			0.25%	7.6	0.1	0.6	7.1	14	0	2,840	0	2,840	3,015	0	0	5,812	5,812	6,169	-3,154
2001	126	4	0.95%	29.0	0.5	2.2	27.0	45	0	9,002	0	9,002	9,002	0	0	37,911	37,911	37,911	-28,909
2002	126	8	0.95%	29.0	0.5	2.2	27.0	76	0	15,164	0	15,164	14,285	0	0	37,911	37,911	35,715	-21,429
2003	126	11	0.9%	27.5	0.5	2.1	25.6	98	0	19,621	0	19,621	17,413	0	0	36,749	36,749	32,614	-15,200
2004	126	15	0.9%	27.5	0.5	2.1	25.6	120	0	24,079	0	24,079	20,131	0	0	36,749	36,749	30,724	-10,593
2005	126	19	1.1%	33.6	0.6	2.5	31.2	128	0	25,696	0	25,696	20,239	0	0	41,398	41,398	32,606	-12,368
2006	126	23	1.1%	33.6	0.6	2.5	31.2	137	0	27,313	0	27,313	20,266	0	0	41,398	41,398	30,717	-10,451
2007	126	27	1.8%	54.9	1.0	4.1	51.1	166	0	33,190	0	33,190	23,200	0	0	57,672	57,672	40,313	-17,113
2008	126	31	1.8%	54.9	1.0	4.1	51.1	195	0	39,068	0	39,068	25,726	0	0	57,672	57,672	37,977	-12,251
2009	126	34						168	0	33,584	0	33,584	20,834	0	0	15,825	15,825	9,817	11,016
2010	126	38						140	0	28,100	0	28,100	16,422	0	0	15,825	15,825	9,249	7,173
2011								89	0	17,874	0	17,874	9,841						9,841
2012								38	0	7,648	0	7,648	3,967						3,967
2013								38	0	7,648	0	7,648	3,737						3,737
2014								38	0	7,648	0	7,648	3,521						3,521
2015								38	0	7,648	0	7,648	3,317						3,317
2016								38	0	7,648	0	7,648	3,124						3,124
2017								38	0	7,648	0	7,648	2,943						2,943
2018								38	0	7,648	0	7,648	2,773						2,773
2019								38	0	7,648	0	7,648	2,612						2,612
2020								38	0	7,648	0	7,648	2,461						2,461
Totals:	1,256	210	10.0%	305	6	23	284	1,729	0	345,785	0	345,785	230,429	0	0	390,734	390,734	310,361	-79,932

[a]Percent surveyed from MOU, Exhibit 1.9.E(b.3)

Value of conserved water ($/AF) =	200
Discount rate (real) =	6.15%
Benefit cost ratio:	0.7
Simple pay-back period (years):	17.5

Credit Table for Previously Installed Toilets

Year	Avg. # of Installed Toilets	Incremental Water Savings (Ac-ft/yr)	Annual Water Savings (AF)
1991	0	0	0
1992	0	0	0
1993	0	0	0
1994	0	0	0
1995	0	0	0
1996	0	0	0
1997	0	0	0
1998	0	0	0
1999	0	0	0
2000	0	0	0
Total			0

Analyst survey - Annual water savings (AF/account) =	0.83
Analyst survey - Conservation measure unit cost ($) =	680
Consultant survey - Annual water savings (AF/account) =	2.1
Consultant survey - Conservation measure unit cost ($) =	1,680
Cost of conservation measure for ULFT replacement ($) =	126
Number of commercial accounts in 1997 =	3,050
Number of industrial accounts in 1997 =	57
Number of institutional accounts in 1997 =	228
Percent units surveyed =	10%
Discounted cost / water saved ($/acre-feet):	180
NPV / water saved ($/acre-feet):	-46

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Table E-2. Economic Analysis Worksheets

BMP 9. Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts

Credit Table for Previously Performed Surveys																						
Year		# of Surveys			% Credit	Credits																
		Commercial	Industrial	Institutional		Commercial	Industrial	Institutional														
Surveyed prior to July 1, 1996 w/follow up inspection		0	0	0	100%	0	0	0														
Surveyed prior to July 1, 1996 - have not received follow up inspection		0	0	0	50%	0	0	0														
Surveyed after July 1, 1996		0	0	0	100%	0	0	0														
Total						0	0	0														
Enter CII Toilet Census Results					Annual Savings (gpd)																	
CII Subsector	Unadjusted Toilet Count	Adjusted Toilet Count	Savings Per ULFT (gpd)	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total								
Hotels/Motels	728	570	16	8,753	8,403	8,067	7,744	7,434	7,137	6,851	6,577	6,314	6,062	73,342								
Eating and Drinking	240	188	47	8,476	8,137	7,812	7,499	7,199	6,911	6,635	6,370	6,115	5,870	71,025								
Health Services	1,107	867	21	17,469	16,770	16,099	15,455	14,837	14,244	13,674	13,127	12,602	12,098	146,375								
Offices	1,331	1,042	20	20,004	19,203	18,435	17,698	16,990	16,310	15,658	15,032	14,430	13,853	167,613								
Retail/Wholesale	2,313	1,811	40	69,524	66,743	64,073	61,510	59,050	56,688	54,420	52,244	50,154	48,148	582,554								
Other	534	418	18	7,223	6,934	6,657	6,390	6,135	5,889	5,654	5,428	5,211	5,002	60,522								
Industrial	318	249	23	5,496	5,276	5,065	4,863	4,668	4,481	4,302	4,130	3,965	3,806	46,053								
Churches	114	89	28	2,399	2,303	2,211	2,122	2,037	1,956	1,878	1,802	1,730	1,661	20,098								
Gov't	162	127	25	3,043	2,922	2,805	2,693	2,585	2,481	2,382	2,287	2,195	2,108	25,501								
Schools: K to 12	467	366	20	7,019	6,738	6,468	6,210	5,961	5,723	5,494	5,274	5,063	4,861	58,809								
Total	7,314	5,725	258	149,405	143,429	137,692	132,184	126,897	121,821	116,948	112,270	107,779	103,468	1,251,892								
Estimated Rate of CII Toilet Turnover (percent of remaining stock per year)	0.04																					
Average Savings per toilet (gpd)	27.18																					
Coverage requirement is 15 percent of Total Savings Potential:																						
(gpd)	(ac-ft)																					
187,784	210																					

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Table E-1. Assumptions Used for Economic Analysis of Water Conservation BMPs

BMP 14 – Residential ULFT Replacement Programs

Description: Implement a program to replace existing high-water-using toilets with ultra-low-flush toilets (ULFT) in single- and multi-family residences.

Assumptions:

1. There are an average of 3.4 people per single-family residence and 2.5 people per multi-family residence.

Visalia has an average of 3.0 people per household (California Department of Finance Report E-5, Table 2 "City/County Population and Housing Estimates" January 1, 2000). Because useful data quantifying single-family and multi-family household sizes in this CSA are unavailable, it is assumed that a ratio of multi-family to single-family household sizes is 0.7.

2. There are an average of 1.7 toilets per single-family residence and 1.5 toilets per multi-family residence.

An average of 1.7 toilets per unit was calculated using 1990 census data concerning the number of bedrooms per housing unit. Based on professional judgement, it was assumed a one bedroom unit has 1 toilet, a two bedroom unit has 1.5 toilets, a three bedroom unit has 2 toilets, a four bedroom unit has 2.5 toilets and a five bedroom unit has 3 toilets. Because multi-family units tend to have fewer toilets on average than single-family units, it was assumed 1.5 toilets per multi-family residence and calculated that the single-family units would need to have 1.7 toilets per unit to achieve an overall average of 1.7 toilets per dwelling unit.

3. Water savings from ULFTs are 34.2 gpd/unit for single-family residences and 53.0 gpd/unit for multi-family residences.

MOU, Exhibit 6, Table 1 and Table 2.

4. Homes constructed after 1991 already have ULFTs.

As of January 1992, California legislation requires that ULFTs be installed in all newly constructed homes.

5. The life span of the new ULFTs is 20 years.

MOU, page 70.

6. Natural toilet replacement rate is 4% per year.

MOU, page 70.

7. Average resale rate for single-family units in Tulare County is 3.2%

Assumption based on the 1996 single-family average resale rate for Tulare County. This rate was obtained from the CUWCC Website, WWW.CUWCC.ORG, November 2000.

8. Average resale rate for multi-family units in Tulare County is 2.0%

Assumption based on the 1998 multi-family average resale rate for Tulare County. This rate was obtained from the CUWCC Website, WWW.CUWCC.ORG, November 2000.

9. The cost of toilets, advertising, administration, overhead, and toilet recycling is $126 per ULFT. The cost does not include installation, which will be covered by the customer.

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Table E-2. Economic Analysis Worksheets

BMP 14. Residential ULFT Replacement Programs (3 pages)

	Determination of Water Conservation Goal: Single-Family Units										
Calendar Year	Single-Family Units	SF Units Naturally Retrofitted	SF Toilets Naturally Retrofitted	Water Savings from Natural Replacement SF (AF/yr)	Single-Family Units	SF Units Naturally Retrofitted	Single-Family Turnover	Combined SF Homes Retrofitted	Combined SF Toilets Retrofitted	Water Savings from Natural Replacement and Turnover SF (AF/yr)	Water Savings from Turnover SF (AF/yr)
1998	15,098	0	0	0	15,098	0	0	0	0	0	0
1999	14,494	604	1,027	23	14,011	604	483	1,087	1,848	42	19
2000	13,914	580	986	22	13,002	560	448	1,009	1,715	39	16
2001	13,358	557	946	21	12,066	520	416	936	1,591	36	15
2002	12,824	534	908	20	11,197	483	386	869	1,477	33	13
2003	12,311	513	872	20	10,391	448	358	806	1,371	31	11
2004	11,818	492	837	19	9,643	416	333	748	1,272	29	10
2005	11,345	473	804	18	8,949	386	309	694	1,180	27	8
2006	10,892	454	771	17	8,304	358	286	644	1,095	25	7
2007	10,456	436	741	17	7,706	332	266	598	1,016	23	6
2008	10,038	418	711	16	7,152	308	247	555	943	21	5
2009	9,636	402	683	15	6,637	286	229	515	875	20	4
2010	9,251	385	655	15	6,159	265	212	478	812	18	4
2011	8,881	370	629	14	5,715	246	197	443	754	17	3
2012	8,525	355	604	14	5,304	229	183	412	700	16	2
2013	8,184	341	580	13	4,922	212	170	382	649	15	2
2014	7,857	327	557	13	4,568	197	158	354	602	14	1
2015	7,543	314	534	12	4,239	183	146	329	559	13	1
2016	7,241	302	513	12	3,934	170	136	305	519	12	0
2017	6,951	290	492	11	3,650	157	126	283	481	11	0
2018	6,673	278	473	11	3,388	146	117	263	447	10	0
2019	6,406	267	454	10	3,144	136	108	244	415	9	0
2020	6,150	256	436	10	2,917	126	101	226	385	9	0
Totals:											

Credit Table for Previously Installed ULF Toilets

Year	Avg. # of Installed Toilets: Single Family	Avg. # of Installed Toilets: Multi-family	Incremental Water Savings (Ac-ft/yr)	Annual Water Savings (Ac-ft/yr)
1991	0	0	0	0
1992	0	0	0	0
1993	0	0	0	0
1994	0	0	0	0
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	0	36	1	1
1999	0	0	0	1
2000	0	0	0	1
	0	36		4

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Table E-2. Economic Analysis Worksheets

BMP 14. Residential ULFT Replacement Programs (3 pages)

	Determination of Water Conservation Goal: Multi-Family Units											Conservation Goal - Combined	
Calendar Year	Multi-Family Units	MF Units Naturally Retrofitted	MF Toilets Naturally Retrofitted	Water Savings from Natural Replacement MF (AF/yr)	Multi-Family Units	MF Units Naturally Retrofitted	Multi-Family Turnover	Combined MF Homes Retrofitted	Combined MF Toilets Retrofitted	Water Savings from Natural Replacement and Turnover MF (AF/yr)	Water Savings from Turnover MF (AF/yr)	Annual Water Savings from Turnover (AF/yr)	Cumulative Water Savings from Turnover (AF/yr)
1998	2,132	0	0	0.0	2,132	0	0	0	0	0	0	0	0
1999	2,047	85	128	5.1	2,004	85	43	128	192	8	3	21	21
2000	1,965	82	123	4.9	1,884	80	40	120	180	7	2	40	61
2001	1,886	79	118	4.7	1,771	75	38	113	170	7	2	56	117
2002	1,811	75	113	4.5	1,664	71	35	106	159	6	2	71	188
2003	1,738	72	109	4.3	1,565	67	33	100	150	6	2	84	272
2004	1,669	70	104	4.1	1,471	63	31	94	141	6	1	95	367
2005	1,602	67	100	4.0	1,382	59	29	88	132	5	1	105	472
2006	1,538	64	96	3.8	1,300	55	28	83	124	5	1	113	585
2007	1,476	62	92	3.7	1,222	52	26	78	117	5	1	120	706
2008	1,417	59	89	3.5	1,148	49	24	73	110	4	1	127	832
2009	1,361	57	85	3.4	1,079	46	23	69	103	4	1	132	964
2010	1,306	54	82	3.2	1,015	43	22	65	97	4	1	136	1,100
2011	1,254	52	78	3.1	954	41	20	61	91	4	1	139	1,239
2012	1,204	50	75	3.0	896	38	19	57	86	3	0	142	1,380
2013	1,156	48	72	2.9	843	36	18	54	81	3	0	144	1,524
2014	1,109	46	69	2.7	792	34	17	51	76	3	0	145	1,669
2015	1,065	44	67	2.6	745	32	16	48	71	3	0	146	1,814
2016	1,022	43	64	2.5	700	30	15	45	67	3	0	146	1,960
2017	982	41	61	2.4	658	28	14	42	63	2	0	146	2,106
2018	942	39	59	2.3	618	26	13	39	59	2	0	146	2,252
2019	905	38	57	2.2	581	25	12	37	56	2	0	146	2,398
2020	868	36	54	2.1	546	23	12	35	52	2	0	146	2,544

Value of conserved water ($/AF) =	200
Discount rate (real) =	6.15%
Natural toilet replacement rate =	4.0%
Annual single-family housing turnover rate =	3.2%
Annual multi-family housing turnover rate =	2.0%
Water savings due to toilet replacement at SF homes (gal/dwelling unit/day) =	34.2
Water savings due to toilet replacement at MF homes (gal/dwelling unit/day) =	53.0
Number of toilets per SF home =	1.7
Number of toilets per MF home =	1.5
Cost of conservation measure ($) =	126
1991 single family units =	20,092
1991 multi-family units =	2,837

Visalia

Table E-2. Economic Analysis Worksheets

BMP 14. Residential ULFT Replacement Programs (3 pages)

	Water Savings from ULFT Replacement Program						Benefits ($)					Costs ($)					
Calendar Year	No. of SF Toilets Required to be Replaced	Incremental[a] Water Savings SF (AF/yr)	No. of MF Toilets Required to be Replaced	Incremental[a] Water Savings MF (AF/yr)	Annual[b] Water Savings (AF/yr)	Cummulative[c] Water Savings (AF/yr)	Avoided Capital Costs	Avoided Variable Costs	Avoided Purchase Costs	Total Undiscounted Benefits	Total Discounted Benefits	Capital Costs	Financial Incentives	Operating Expenses	Total Undiscounted Costs	Total Discounted Costs	Net Present Value ($)
Pre-2001	0	0	36	1	1	4	0		0	0	0	0	0		0	0	0
2001	650	15	195	8	24	28	0	4,760	0	4,760	4,760	0	0	106,495	106,495	106,495	-101,735
2002	650	15	195	8	46	74	0	9,235	0	9,235	8,700	0	0	106,495	106,495	100,325	-91,625
2003	650	15	195	8	69	143	0	13,709	0	13,709	12,167	0	0	106,495	106,495	94,512	-82,345
2004	650	15	195	8	91	234	0	18,184	0	18,184	15,203	0	0	106,495	106,495	89,036	-73,833
2005	650	15	195	8	113	347	0	22,659	0	22,659	17,847	0	0	106,495	106,495	83,878	-66,031
2006	650	15	195	8	136	483	0	27,134	0	27,134	20,133	0	0	106,495	106,495	79,018	-58,885
2007	650	15	195	8	158	641	0	31,608	0	31,608	22,094	0	0	106,495	106,495	74,440	-52,346
2008	650	15	195	8	180	821	0	36,083	0	36,083	23,761	0	0	106,495	106,495	70,127	-46,366
2009					180	1,002	0	36,083	0	36,083	22,384	0	0	0	0	0	22,384
2010					180	1,182	0	36,083	0	36,083	21,087	0	0	0	0	0	21,087
2011					180	1,362	0	36,083	0	36,083	19,866	0	0	0	0	0	19,866
2012					180	1,543	0	36,083	0	36,083	18,715	0	0	0	0	0	18,715
2013					180	1,723	0	36,083	0	36,083	17,630	0	0	0	0	0	17,630
2014					180	1,904	0	36,083	0	36,083	16,609	0	0	0	0	0	16,609
2015					180	2,084	0	36,083	0	36,083	15,647	0	0	0	0	0	15,647
2016					180	2,264	0	36,083	0	36,083	14,740	0	0	0	0	0	14,740
2017					180	2,445	0	36,083	0	36,083	13,886	0	0	0	0	0	13,886
2018					180	2,625	0	36,083	0	36,083	13,082	0	0	0	0	0	13,082
2019					180	2,806	0	36,083	0	36,083	12,324	0	0	0	0	0	12,324
2020					180	2,986	0	36,083	0	36,083	11,610	0	0	0	0	0	11,610
	5,200		1,598		2,983		0	596,370	0	596,370	322,245	0	0	851,957	851,957	697,832	-375,587

[a]Incremental Water Savings is water savings from replaced toilets during corresponding year only.

[b]Annual Water Savings is water savings from all replaced toilets through corresponding year.

[c]Cummulative Water Savings is running total of water saved through corresponding year. "Cummulative Water Savings" must match "Cummulative Water Savings from Turnover" within 10% each reporting period through 2008.

Benefit cost ratio:	0.5
Simple pay-back period (years):	43
Discounted cost / water saved ($/acre-feet):	234
NPV / water saved ($/acre-feet):	-126

Visalia
Results of Economic Analysis of Water Conservation BMPs

BMP No.	BMP Name	Total Discounted Cost ($)	Total Water Saved (acre-feet)	Benefit / Cost Ratio	Simple Payback Analysis (years)	Discounted Cost / Water Saved ($/acre-feet)	Net Present Value / Water Saved ($/acre-feet)
1	Water Survey Programs for Single-family Residential and Multi-family Residential Customers	170,180	613	0.6	23	277	-119
2	Residential Plumbing Retrofits	460,459	674	0.2	68	683	-543
4	Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	1,680,242	5,557	0.4	62	302	-194
5	Large Landscape Conservation Programs and Incentives	50,843	765	2.2	6	66	83
6	High-efficiency Washing Machine Rebate Programs	249,171	746	0.3	66	334	-233
9	Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts	310,361	1,729	0.7	18	180	-46
14	Residential ULFT Replacement Programs	697,832	2,983	0.5	43	234	-126

Value of conserved water ($/AF) = 200
Discount rate (real) = 6.15%
System name = Visalia

APPENDIX F

CALIFORNIA'S GROUNDWATER BULLETIN 118
TULARE LAKE HYDROLOGIC REGION
KAWEAH GROUNDWATER BASIN,
SAN JOAQUIN VALLEY GROUNDWATER BASIN, KAWEAH SUBBASIN (DWR)

San Joaquin Valley Groundwater Basin, Kaweah Subbasin

- Groundwater Subbasin Number: 5-22.11
- County: Tulare, Kings
- Surface Area: 446,000 acres (696 square miles)

Basin Boundaries and Hydrology

The San Joaquin Valley is surrounded on the west by the Coast Ranges, on the south by the San Emigdio and Tehachapi Mountains, on the east by the Sierra Nevada and on the north by the Sacramento-San Joaquin Delta and Sacramento Valley. The northern portion of the San Joaquin Valley drains toward the Delta by the San Joaquin River and its tributaries, the Fresno, Merced, Tuolumne, and Stanislaus Rivers. The southern portion of the valley is internally drained by the Kings, Kaweah, Tule, and Kern Rivers that flow into the Tulare drainage basin including the beds of the former Tulare, Buena Vista, and Kern Lakes.

The Kaweah subbasin lies between the Kings Groundwater Subbasin on the north, the Tule Groundwater Subbasin on the south, crystalline bedrock of the Sierra Nevada foothills on the east, and the Kings River Conservation District on the west. The subbasin generally comprises lands in the Kaweah Delta Water Conservation District. Major rivers and streams in the subbasin include the Kaweah and St. Johns Rivers. The Kaweah River is the primary source of recharge to the area. Average annual precipitation is seven to 13 inches, increasing eastward.

Hydrogeologic Information

The San Joaquin Valley represents the southern portion of the Great Central Valley of California. The San Joaquin Valley is a structural trough up to 200 miles long and 70 miles wide. It is filled with up to 32,000 feet of marine and continental sediments deposited during periodic inundation by the Pacific Ocean and by erosion of the surrounding mountains, respectively. Continental deposits shed from the surrounding mountains form an alluvial wedge that thickens from the valley margins toward the axis of the structural trough. This depositional axis is below to slightly west of the series of rivers, lakes, sloughs, and marshes, which mark the current and historic axis of surface drainage in the San Joaquin Valley.

Water Bearing Formations

The sediments that comprise the Kaweah Subbasin aquifers are unconsolidated deposits of Pliocene, Pleistocene, and Holocene age. On the east side of the subbasin, these deposits consist of arkosic material derived from the Sierra Nevada and are divided into three stratigraphic units: continental deposits, older alluvium and younger alluvium. In the western portion of the subbasin, near Tulare Lake bed, unconsolidated deposits consisting of flood-subbasin and lacustrine and marsh deposits interfinger with east side deposits.

The continental deposits of Pliocene and Pleistocene age are divided into oxidized and reduced deposits based on depositional environment. The

oxidized deposits, which crop out along the eastern margin of the valley, consist of deeply weathered, poorly permeable, reddish-brown sandy silt and clay with well-developed soil profiles. The reduced deposits are moderately permeable and consist of micaceous sand, silt, and clay that extend across the trough in the subsurface to the west side of the valley.

Older alluvium, which overlies the continental deposits, is moderately to highly permeable and is the major aquifer in the subbasin. Younger alluvium consists of arkosic beds, moderately to highly permeable consisting of sand and silty sand. Flood-basin deposits consist of poorly permeable silt, clay, and fine sand. Ground water in the flood-basin deposits is often of poor quality. Lacustrine and marsh deposits consist of blue, green, or gray silty clay and fine sand and underlie the flood-subbasin deposits. Clay beds of the lacustrine and marsh deposits form aquitards that control the vertical and lateral movement of ground water. The most prominent clay bed is the Corcoran clay which underlies the western half of the Kaweah Subbasin at depths ranging from about 200 to 500 feet (DWR 1981). In the eastern portion of the subbasin, ground water occurs under unconfined and semi-confined conditions. In the western half of the subbasin, where the Corcoran Clay is present, ground water is confined below the clay.

Land subsidence of up to 4 feet due to deep compaction of fine-grained units has occurred in separate areas of the southern and western portion of the Subbasin (Ireland and others 1984). The estimated average specific yield for this subbasin is 10.8 percent (based on DWR internal data and Davis 1959).

Restrictive Structures

Groundwater flow is generally southwestward. Small groundwater depressions occurred to the north and south of Visalia and at the subbasin's northwest corner, and a groundwater mound was present in the central western subbasin during 1999 (DWR 2000). Based on current and historical groundwater elevation maps, horizontal groundwater barriers do not appear to exist in the Subbasin.

Groundwater Level Trends

Changes in groundwater levels are based on annual water level measurements by DWR and cooperators. Water level changes were evaluated by quarter township and computed through a custom DWR computer program using geostatistics (kriging). On average, the subbasin water level has declined about 12 feet from 1970 through 2000. The period from 1970 through 1978 showed steep declines totaling about 25 feet. The ten-year period from 1978 to 1988 saw stabilization and rebound of about 50 feet, bringing water levels above the 1970 water level by 25 feet. 1988 through 1995 again showed steep declines, bottoming out in 1995 at nearly 35 feet below the 1970 level. Water levels then rose about 22 feet from 1996 to 2000, bringing water levels to approximately 12 feet below 1970 levels.

Groundwater Storage

Estimations of the total storage capacity of the subbasin and the amount of water in storage as of 1995 were calculated using an estimated specific yield of 10.8 percent and water levels collected by DWR and cooperators.

According to these calculations, the total storage capacity of this subbasin is estimated to be 15,400,000 af to a depth of 300 feet and 107,000,000 af to the base of fresh groundwater. These same calculations give an estimate of 11,600,000 af of groundwater to a depth of 300 feet stored in this subbasin as of 1995 (DWR 1995). According to published literature, the amount of stored groundwater in this subbasin as of 1961 is 34,000,000 af to a depth of $\leq$ 1000 feet (Williamson 1989).

Groundwater Budget (Type B)

Although a detailed budget was not available for this subbasin, an estimate of groundwater demand was calculated based on the 1990 normalized year and data on land and water use. A subsequent analysis was done by a DWR water budget spreadsheet to estimate overall applied water demands, agricultural groundwater pumpage, urban pumping demand and other extraction data.

Natural recharge is estimated to be 62,400 af. Artificial recharge was not determined for all entities, but Lakeside Irrigation District has recharged about 7,000 af per year and in wet years may recharge up to 30,000 af (Cartwright 2001). There is approximately 286,000 af of applied water recharge into the subbasin. Subsurface inflow was not determined. Annual urban and agricultural extraction is estimated to be 58,800 af and 699,000 af, respectively. Other extractions and subsurface inflow were not determined.

Groundwater Quality

Characterization. The groundwater in this basin is generally of a calcium bicarbonate type, with sodium bicarbonate waters near the western margin. TDS values range from 35 to 1,000 mg/L, with a typical range of 300 to 600 mg/L. The Department of Health Services, which monitors Title 22 water quality standards, reports TDS values in 153 wells ranging from 35 to 580 mg/L, with an average value of 189 mg/L.

Impairments. There are localized areas of high nitrate pollution on the eastern side of the basin. There is also high salinity water between Lindsay and Exeter (Edwards 2001).

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	157	1
Radiological	158	8
Nitrates	165	13
Pesticides	167	16
VOCs and SOCs	165	5
Inorganics – Secondary	157	25

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).
[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.

[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range: 100 – 2,500	Average: 1,000 – 2,000
	Total depths (ft)	
Domestic		
Municipal/Irrigation	Range: 100 - 500	

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
DWR (incl. Cooperators)	Groundwater levels	568 Semi-annually
Department of Health Services (inc. cooperators)	Title 22 water quality	270 Varies

Basin Management

Groundwater management:	Kings County Water District promulgated a Ground Water Management Plan under AB 255 during 1992, and the Kaweah Delta Water Conservation District passed a Ground Water Management Plan under AB 3030 in 1995.
Water agencies	
Public	Exeter I.D., Ivanhoe I.D., Kaweah-Delta Water Conservation District, Kings River Conservation District, Lakeside Irrigation Water District, Lindmore I.D., Lindsay-Strathmore I.D., St. Johns W.D., Tulare I.D., and Stone Corral W.D.
Private	California Water Service – Visalia; Melga Canal Company; Settlers Ditch Company; Corcoran Irrigation Company.

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DISTRICT WELL LEVEL AVERAGE (Static)

VISALIA

As of ***Tuesday, June 15, 2004***