Final Report

2005 Urban Water Management Plan—Cowan Heights

Golden State Water Company
A Subsidiary of American States Water Company

Region III Headquarters

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December 2005

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Notice of Adoption

A meeting to solicit public comments on the 2005 Urban Water Management Plan for the Golden State Water Company Cowan Heights System was held on November 16, 2005 at 7:00 PM at the GSWC Corporate Office in San Dimas, California. Notice of this meeting was published in accordance with Section 6066 of Government Code in the San Gabriel Valley Tribune and the Pasadena Star-News on November 2, 2005 and on November 9, 2005.

Copies of the Urban Water Management Plan were made available to the public at the Claremont, San Dimas, and San Gabriel Valley Customer Service Offices two weeks prior to the public hearing.

Comments, oral and written, if received and responses to comments are documented in Appendix H of this document.

Golden State Water Company hereby adopts the 2005 Urban Water Management Plan for the Cowan Heights System.

James B. Gallagher
Vice President, Customer Service
Region III
Golden State Water Company

December 31, 2005

Abbreviations

ABAG	Association of Bay Area Governments
ac-ft	acre-feet
ac-ft/yr	acre-feet per year
Act	Urban Water Management Planning Act
AMCL	alternative MCL
AWWA	American Water Works Association
BMPs	best management practices
CBO	community-based organization
CCL	contaminant candidate list
CCRs	consumer confidence reports
CDHS	California Department of Health Services
cfs	cubic feet per second
CIMIS	California Irrigation Management Information System
Council	California Urban Water Conservation Council
CPE	comprehensive performance evaluation
CPUC	California Public Utilities Commission
CSA	customer service area
CT	concentration time
CUWA	California Urban Water Agencies
CWSs	community water systems
D/DBP	disinfectant/disinfection by-product
DMM	demand management measure
DOC	dissolved organic carbon
DOF	Department of Finance
DWR Guidebook	Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan
DWR	Department of Water Resources (California)

EC	enhanced coagulation
EPA	Environmental Protection Agency
ERP	emergency response plan
ETo	evapotranspiration
gpm	U.S. gallons per minute
GSWC	Golden State Water Company
GWR	Groundwater Rule
HAA5	haloacetic acids
IESWTR	Interim Enhanced Surface Water Treatment Rule
IOCs	inorganic contaminants
IRP	Integrated Resource Plan
LACSD	Sanitation Districts of Los Angeles County
LT1ESWTR	Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
MCLGs	maximum contaminant level goals
MCLs	maximum contaminant levels
Metropolitan	Metropolitan Water District of Southern California
MG	million gallons
MMM	multimedia mitigation
MOU	memorandum of understanding (regarding urban water conservation in California)
MRDLs	maximum residual disinfectant levels
mrem	millirems
MTBE	methyl tertiary-butyl ether
MWD	Municipal Water District with reference to any of the member agencies of the Metropolitan Water District of Southern California
N/A	not available
NAICS	North American Industry Classification System
NDMA	N-nitrosodimethylamine
NPV	net present value
NTNCWS	non-transient non-community water systems

NTU	nephelometric turbidity units
O&M	operation and maintenance
OEHHA	Office of Environmental Health Hazard Assessment
pCi	picoCuries
RO	reverse osmosis
SCAG	Southern California Association of Governments
SDWA	Safe Drinking Water Act
SMCL	secondary maximum contaminant level
SOCs	synthetic organic contaminants
SUVA	source-water-specific ultraviolet absorbance
SWP	State Water Project
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
TDS	total dissolved solids
TOC	total organic carbon
TTHMs	Total Trihalomethanes Rule
UCM	unregulated contaminants monitoring
ULF	ultra low flush
ULFT	ultra-low-flush-toilet
UWMP	Urban Water Management Plan
VOCs	volatile organic compounds
WEWAC	Water Education Water Awareness Committee
WRCC	Western Regional Climate Center
WRP	water reclamation plant
WSDM Plan	Water Surplus and Drought Management Plan
WY	water year

Definitions

Chapter 2, Part 2.6, Division 6 of the California Water Code provides definitions for the construction of the Urban Water Management Plans. Appendix A contains the full text of the Urban Water Management Planning Act.

CHAPTER 2. DEFINITIONS

Section 10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

Section 10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

Section 10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

Section 10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

Section 10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

Section 10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

Section 10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

Section 10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

Section 10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

Chapter 1. Introduction and Overview

Background

The Urban Water Management Plan (UWMP) for the Golden State Water Company (GSWC) Cowan Heights System is prepared in compliance with Division 6, Part 2.6, of the California Water Code, Sections 10610 through 10657 as last amended by Senate Bill (SB) 318, the Urban Water Management Planning Act (Act). The original bill, requiring a UWMP, was initially enacted in 1983. SB 318, which became law in 2004, is the eighteenth amendment to the bill. Increased emphasis on drought contingency planning, water demand management, reclamation, and groundwater resources has been provided through the updates to the original bill.

Under the current law, urban water suppliers with more than 3,000 service connections or water use of more than 3,000 acre-feet per year (ac-ft/yr) are required to submit a UWMP every five years to the California Department of Water Resources (DWR). The reports must be submitted by December 31of years ending in zero and five. Under the name Southern California Water Company, GSWC prepared an UWMP for the Cowan Heights System in 1985, 1990, 1995, and 2000. The 2005 UWMP is an update to the 2000 plan.

The law, as it is now, states and declares the following:

Section 10610.2

(a) The Legislature finds and declares all of the following:

(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.

(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.

(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.

(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.

(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.

(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.

(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.

(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

Section 10610.4. The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.

(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

System Overview

GSWC owns and operates the Cowan Heights System. GSWC is an investor-owned public utility company regulated by the California Public Utilities Commission (CPUC).

Located in the eastern portion of Orange County, the Cowan Heights System serves part of the City of Orange and unincorporated areas of Orange County, unincorporated communities of Cowan Heights, Lemon Heights and Tustin. The service area is primarily characterized by residential land use. The Cowan Heights System is part of GSWC's Orange County District. Figure 1-1 illustrates the location of the Cowan Heights System.

Figure 1-1 Cowan Heights System Location Map

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California Urban Water Conservation Council

GSWC is a signatory to the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) administered by the California Urban Water Conservation Council (Council). The Council had its beginnings as an independent entity housed under California Urban Water Agencies (CUWA). Currently, the Council is a fully independent nonprofit organization.

The objective of the Council is to implement the MOU. The MOU was signed into existence in 1991 by nearly 100 urban water agencies and environmental groups. Current membership of the Council is over 300 members from various groups such as water suppliers, public advocacy organizations, and other interested groups (Council, 2004).

The MOU is a document by which the signatories obligate themselves to implement the urban water conservation practices identified in the MOU. The goal of the practices in the MOU is to reduce long-term urban water demands and to provide practices that may be implemented during occasional water supply shortages (Council, 2004). The urban water conservation practices identified in the MOU are called the Best Management Practices (BMPs) and range from water audits to toilet replacements. There are 14 practices that also coincide with the 14 demand management measures (DMMs) identified in the Act.

Each agency that is a signatory to the MOU is required to file reports on the implementation of the BMPs identified in the MOU. For the purposes of the UWMP, the reports filed with the Council on the BMPs that are implemented or under implementation can be substituted for the reporting requirements of Section 10631 (f) (1). The UWMP uses the reports filed with the Council in addition to any necessary analysis as described in Section 10631.

Public Utility Commission Policy Changes

Concurrent with the finalization of this document, the CPUC is considering the adoption of policy changes and objectives that would be applicable to GSWC and all other regulated water utilities. The CPUC's draft "Water Action Plan" (WAP) has established the following objectives:

1. Maintain highest standards of water quality;
2. Strengthen water conservation programs to a level comparable to those of energy utilities;
3. Promote water infrastructure investment;
4. Assist low income ratepayers;
5. Streamline CPUC regulatory decision-making; and
6. Set rates that balance investment, conservation, and affordability.

The WAP is a general policy document. Specific implementation policies and programs, along with necessary modifications to CPUC ratemaking policies, will be developed based

on the final WAP and other programs including conservation, long term planning, water quality and drought management programs developed in conjunction with the CPUC.

GSWC has been actively involved with the CPUC in suggesting optimal approaches to the WAP. In particular, the GSWC has suggested specific implementation measures and modifications to certain CPUC ratesetting practices so that regulated utilities are able as a practical matter to achieve the policy objectives of the WAP. The exact implementation details have not yet been determined, but if successful, are expected to have a significant impact on GSWC approaches to the planning and management of resources. These efforts may include further investment in local resource optimization, reduced reliance on imported supplies, enhanced conservation and intensification of company-wide efforts to optimize water resource mix, including planned water supply projects and programs to meet the long term water supply needs of GSWC's customers.

In another example, the Urban Water Management Planning Act requires public water suppliers to have in place predetermined actions to be undertaken during water shortage conditions. GSWC has developed actions to be undertaken in response to water supply shortages, including up to a 50 percent reduction in water supply. However, implementation of the actions is dependent upon CPUC approval, particularly where mandatory water use restrictions may be required. As an element of the WAP and related policy improvements, GSWC has requested the CPUC adopt water shortage allocation policies that will facilitate appropriate drought response activities and associated cost recovery mechanisms.

Finally, as part of the Water Action Plan process and otherwise, GSWC is seeking parity with public water agencies in key areas that will impact its long term supply planning and reliability, namely, 1) access to state bond money on behalf of its customers, and 2) full participation in integrated regional water planning mechanisms to ensure that utility customers have a voice in planning outcomes, and, equal access to available funding to implement agreed planning objectives on behalf of their customers.

This UWMP presents an assessment of GSWC's demand projections and water supply availability and reliability under currently established CPUC regulations and conditions. While GSWC has detailed approaches to providing its customers with a reliable supply of water in accordance with UWMP criteria, adoption and implementation of the WAP and other policy objectives mentioned above will likely result in changes in the resource mix described in this UWMP which will likely further improve water supply reliability.

Agency Coordination

Water Code Section 10620 details the coordination requirements of the Act and provides guidance on how the UWMP can be prepared. The text of this section states:

Section 10620

(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d)

(1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

GSWC initiated agency coordination with a mailing of letters to cities and counties within its service area, as well as to wholesale agencies, wastewater agencies, and agencies with which GSWC has emergency connections. The initial letters notified the agencies of GSWC intent and requested data for the preparation of the UWMPs. All identified agencies received a follow-up telephone call. Notices of public meeting and intent to adopt were submitted with a copy of the draft report to all above-mentioned agencies. Table 1-1 lists the agencies contacted during the preparation of this UWMP.

Table 1-1
Coordination with Agencies

Agency	Participated in UWMP Development	Commented on the Draft	Attended Public Meetings	Contacted for Assistance	Received Copy of the Draft	Sent Notice of Intent to Adopt	Not Involved/ No Information
City of Orange				✓		✓	
City of Tustin						✓	
East Orange County Water District (EOCWD)				✓	✓	✓	
Metropolitan Water District of Southern California (Metropolitan)				✓		✓	
Municipal Water District of Orange County (MWDOC)				✓		✓	
Orange County Sanitation District				✓		✓	
Southern California Association of Governments (SCAG)				✓			

Notes
1. This table is based on DWR's *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan* (DWR Guidebook) Table 1.

Public Participation and Plan Adoption

Public participation and plan adoption requirements are detailed in the following section of the Act:

Section 10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

For this update of the UWMP, a public hearing was held on November 16, 2006 at GSWC Anaheim Office for the Cowan Heights System. This public session was held for review and comment on the draft plan before approval by GSWC. Legal public notices for the public hearing were published in the local newspapers in accordance with Government Code Section 6066. Copies of the draft plan were available to the public at GSWC Los Alamitos and Placentia Customer Service Offices, California. Appendix B contains a copy of the hearing notice from a local newspaper and the meeting minutes from the public pertaining to the UWMP. Appendix C contains comments received, if any, and Appendix H contains responses to public comments.

The final UWMP, as adopted by GSWC, will be submitted to the DWR within 30 days of adoption. This plan includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning). Adopted copies of this plan are available to the public at GSWC's Placentia office.

UWMP Preparation

GSWC prepared this UWMP with the assistance of its consultant, CH2M HILL, as permitted by the following section of the Act.

Section 10620

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

During the preparation of the UWMP, documents that have been prepared over the years by GSWC and other entities were reviewed and results of those documents incorporated, as applicable, into this UWMP. The list of the documents is provided in Chapter 11.

The adopted plans are available for public review at GSWC's Placentia Customer Service Office. Copies of the plan were submitted to DWR, cities and counties within the service area, the State Library, and other applicable institutions within 30 days of adoption as required by Sections 10644 and 10645.

UWMP Implementation

GSWC is committed to the implementation of this UWMP as required by Section 10643 of the Act. Each region of GSWC has a conservation coordinator that oversees the implementation of DMM via GSWC participation in the Council's MOU.

Content of the UWMP

This UWMP addresses all subjects required by Section 10631 of the Act as defined by Section 10630, which permits "levels of water management planning commensurate with the numbers of customers served and the volume of water supplied." All applicable sections of the Act are discussed in this UWMP, with chapters of the UWMP cross-referenced against the corresponding provision of the Act in Table 1-2.

Table 1-2
Summary of UWMP Chapters and Corresponding Provisions of the California Water Code

Chapter	Corresponding Provisions of the Water Code	
Chapter 1. Introduction and Overview	10642	Public participation
	10643	Plan implementation
	10644	Plan filing
	10645	Public review availability
	10620 (a)–(e)	Coordination with other agencies; document preparation
	10621 (a)–(c)	City and county notification; due date; review
	10620 (f)	Resource optimization
	10630	Level of planning
	10641	Coordination
Chapter 2. Service Area	10631 (a)	Demographics and climate
Chapter 3. Water Supply	10631 (b)–(d), (h), (k)	Water sources, reliability of supply, transfers and exchanges, supply projects, data sharing
Chapter 4. Water Use	10631 (e), (k)	Water use, data sharing
Chapter 5. Demand Management Measures	10631 (f)–(g), (j)	DMM
	10631.5	DMM implementation status
Chapter 6. Desalination	10631 (i)	Desalination
Chapter 7. Water Shortage Contingency Plan	10632	Water shortage contingency plan
Chapter 8. Recycled Water Plan	10633	Recycled water
Chapter 9. Water Quality	10634	Water quality impacts on reliability
Chapter 10. Quarter Service Reliability	10635	Water service reliability

Resource Optimization

Section 10620 (f) asks urban water suppliers to evaluate water management tools and options to maximize water resources and minimize the need for imported water from other regions.

While GSWC is fully committed to optimizing its available water resources and implementation of BMPs and DMMs, GSWC is currently limited in its ability to do so by certain ratesetting practices. As noted in the introduction, GSWC is working with the CPUC in the shaping of the Water Action Plan so that it assists regulated water utilities in implementing measures that optimize water resource programs.

Chapter 2. Service Area

Service area requirements are detailed in the following section of the Act:

Section 10631

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

Chapter Two summarizes the Cowan Heights System's customer service area (CSA) and presents an analysis of available demographics, population growth projections, and climate data to provide the basis for estimating future water requirements.

Area

The Cowan Heights CSA is located in the eastern part of Orange County. The Cowan Heights CSA serves part of the City of Orange and unincorporated areas of Orange County, unincorporated communities of Cowan Heights, Lemon Heights and Tustin. Figure 2-1 illustrates the customer service area of Cowan Heights System. The service area is primarily characterized by residential land use.

Demographics

The City of Tustin was chosen as demographically representative of the Cowan Heights CSA. According to 2000 US census data, the median age of Tustin's residents is 31.8 years. Tustin has average household size of 2.81 and a median household income of approximately $55,985.

A General Plan or land use information was not available for the Cowan Heights CSA. Based on the Cowan Heights' CSA map, it appears to be near "build-out", i.e. the planning area has reached its maximum population. There are only few undeveloped individual parcels in the system and any growth occurring will be a combination of urban expansion and in-fill. In a built-out or nearly built-out area, changes are minor and difficult to predict.

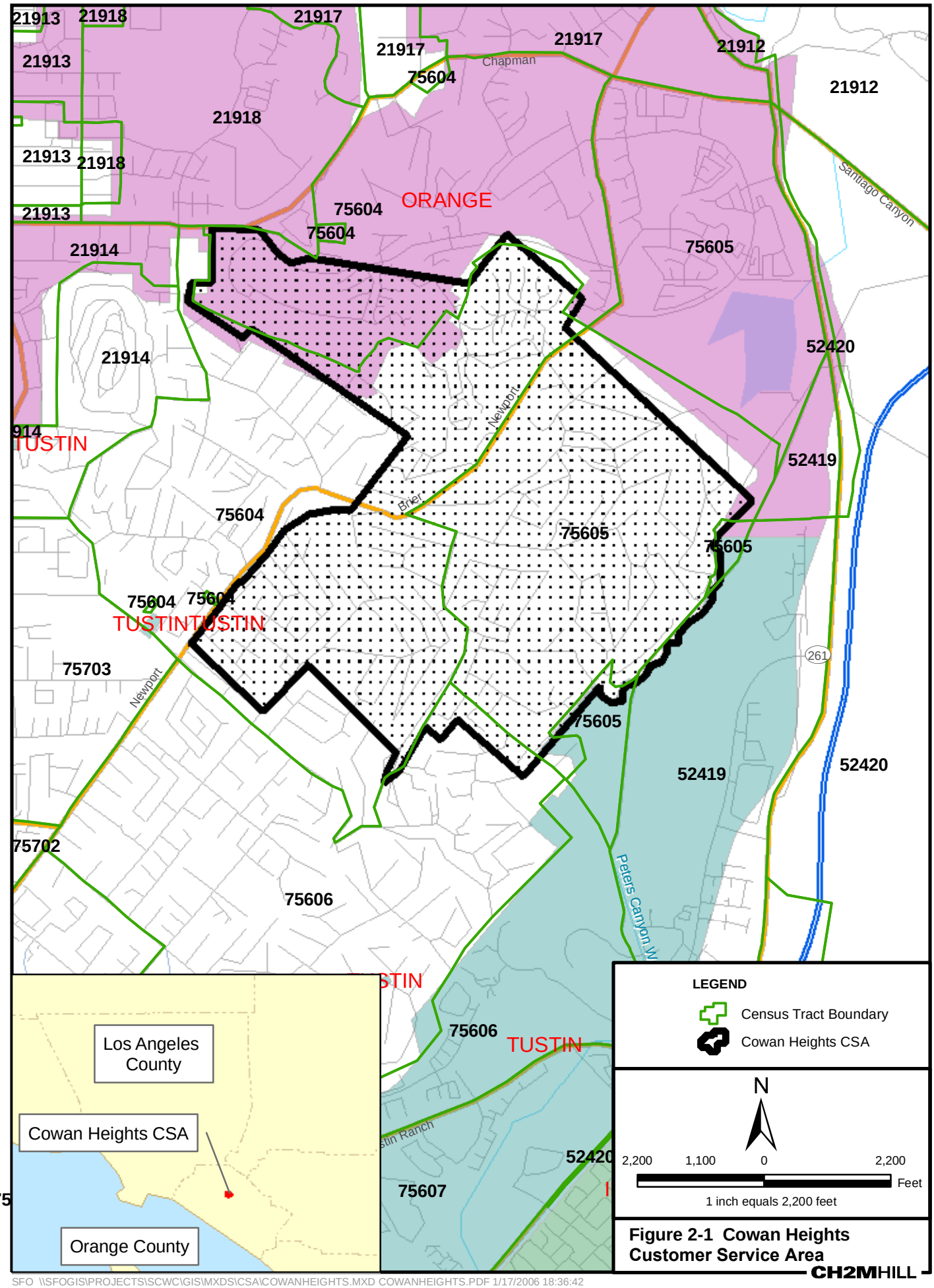

Figure 2-1 Cowan Heights Customer Service Area

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Population, Housing and Employment

Population, housing, and employment projections were developed for the Cowan Heights System using the Southern California Association of Governments (SCAG) population, housing and employment data. SCAG recently updated its projections for population, household, and employment growth through the year 2030 using 2000 U.S. Census data. SCAG's methodology is described below, followed by the derivation of population projections for the Cowan Heights System. The current population projections differ from previous projections developed in 2000 primarily by the use of the 2000 U.S. Census data. Previous projections utilized 1990 U.S. Census data.

SCAG Population Projection Development Methodology

The 2000 population, housing, and employment data is derived from the 2000 U.S. Census, which forms a baseline for local data projections. SCAG applies a statistical cohort-component model and the headship rate to the 2000 U.S. Census data for regional, county, and household demographic projections. The cohort model projects population by adding increases in population (births and relocation into the region) and subtracting decreases in population (deaths and relocation out of the region). The cohort model uses a group quartered population, meaning it is broken down by sex, age, and ethnicity. Headship rate is the proportion of a population cohort that forms the household as specified by age and ethnicity. SCAG uses headship rate to project regional and county households by multiplying the projected civilian resident population by projected headship rates.

The forecasts and projections are grouped into many geographical categories, including regional, county, city, unincorporated areas, census tract, and transportation analysis zones. To evaluate the Cowan Heights System, SCAG data was used in census tract form, the smallest geographic division of data that SCAG provides. SCAG projects subcounty and census tract demographic trends using the housing unit method. This is the most widely used method for estimating and projecting local-area households and population for planning purposes. It projects the number of occupied housing units (households) and persons per household. Households are extrapolated from past trends in occupied housing units. Population per household is estimated by multiplying the number of occupied households by the projected average household size.

SCAG regional employment projections utilize a top-down approach, starting with a U.S. forecast followed by a California then a (SCAG) regional forecast. Employment projections are based on population and household projections, labor force participation rates, long-range unemployment rates, the ratio of total jobs to employed residents, and historical employment growth trends.

SCAG's demographic forecasting section works closely with California Department of Finance (DOF), and the Plans and Programs Technical Advisory Committee, which consists of members from subregions, local jurisdictions, the public and other major stakeholders to produce, review, and refine the socioeconomic projections for population, housing, and employment. The SCAG's socioeconomic projections were compared with regional independent projections and adjustments are made accordingly before public release.

The detailed explanation of the population projection process employed by SCAG is provided in Final 2004 RTP Technical Appendix, Appendix A: Growth Forecast, 2004 (SCAG Projections, 2004).

Cowan Heights CSA Population Projections

SCAG-derived census-tract projections were used to determine population from 2000 to 2030. The Cowan Heights System service area boundaries often contain multiple census tracts, many of which have boundaries that do not coincide exactly with service area boundaries. The population projection analysis consisted of superimposing service area boundaries over census tract boundaries, identifying the applicable overlapping census tracts, and developing a percentage estimate for each overlapping area. For a census tract 100 percent within the service area boundaries, it was assumed that 100 percent of the associated census tract population data was applicable to the Cowan Heights System. For areas where the overlap was not exact, the area of overlap as a percentage was applied to the data to develop an estimate of applicable population. Appendix J, Table J-1 lists the census tracts with a corresponding estimate of what percent of each tract lies within the Cowan Heights System. It was typically assumed that the various types of housing and employment distributed within a census tract are distributed uniformly within all parts of that census tract, unless maps indicated non-uniform concentrations. In these cases, population estimates were either increased or decreased as applicable to match the existing land use. Appendix J, Table J-2 contains all of the SCAG's historic and projected demographic data for each census tract number from 2000 through 2030. Figure 2-1 details the census tracts within the Cowan Heights System.

As concluded from analysis of SCAG demographic data, the Cowan Heights System has an estimated population of 5,441 people in 2005. This population is expected to reach 5,763 by 2030. A summary of historic and projected population, households, and employment within the Cowan Heights System (based on SCAG data) is presented in Table 2-1 and illustrated in Figure 2-2**.**

In summary, from 2000 to 2005 the Cowan Heights population increased 3 percent, which is a growth rate[1] of approximately 0.7 percent per year. By 2030, population is expected to increase by a total of 6 percent, from 5,441 in 2005 to 5,763 in 2030, which is a 0.2 percent growth rate per year. The number of households is expected to grow 2 percent during the same period, which equates to an annual household growth rate of 0.1 percent. Employment is expected to grow 8 percent during the same period, which equates to an annual employment growth rate of 0.3 percent. Areas with the highest projected growth increases are also the areas that will see the largest increase in water use. SCAG does not project a year for build-out in their demographic analysis.

[1] Growth rate: The number of persons added to (or subtracted from) a population in a year due to natural increase or net migration; expressed as percentage of population at the beginning of the time period. (Source: http://www.prb.org)

Table 2-1
Cowan Heights Customer Service Area Historical and Projected Population

Year	Service Area Population	Service Area Household	Service Area Employment
2000[2]	5,259	1,811	658
2005	5,441	1,838	673
2010	5,563	1,828	687
2015	5,623	1,837	700
2020	5,672	1,849	711
2025	5,718	1,862	719
2030	5,763	1,873	728

Notes
1. This table is based on the DWR Guidebook Table 2.
2. Based on fiscal year.
3. Dashed line represents division between historic and projected data

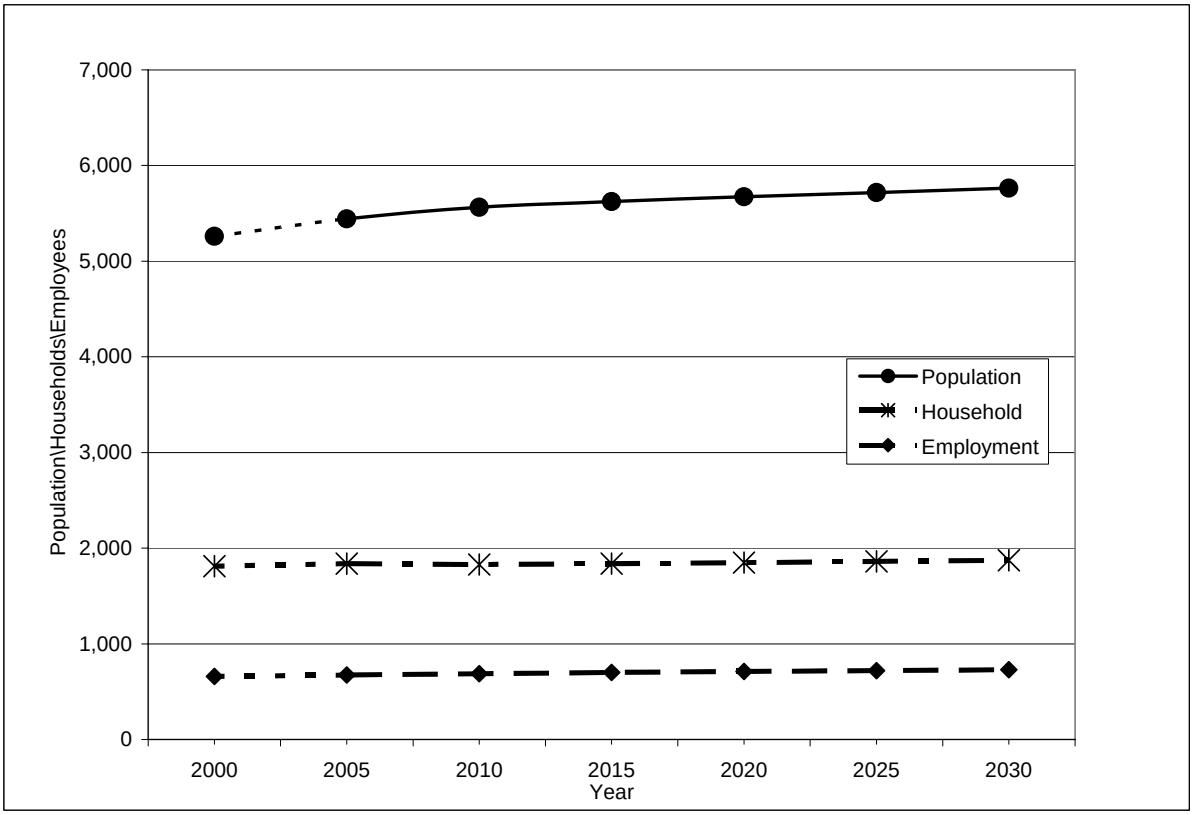

Figure 2-2 Historical and Projected Population, Household and Employment Growth within the Cowan Heights CSA.

Climate

Cowan Heights CSA has cool, humid winters and warm, dry summers. The Western Regional Climate Center (WRCC) maintains 30 years of historic climate data for some cities only. The WRCC doesn't have a station at the Cowan Height CSA and therefore the Santa Ana station, 7 miles from the Cowan Heights CSA, is utilized for the climate data analysis.

The Western Regional Climate Center web site (www.wrcc.dri.edu) maintains historical climate records for the past 30 years for Santa Ana. Table 2-2 presents the monthly average climate summary based on 30 year historical data for the Cowan Heights CSA. In winter, the lowest average monthly temperature is approximately 45 degrees Fahrenheit while the highest average monthly temperature reaches approximately 85 degrees Fahrenheit in the summer. Figure 2-3 presents the monthly average precipitation based on 30 year historical data. The rainy season is from November to March. Monthly precipitation during the winter months ranges from 2 to 3 inches. Low humidity occurs in the summer months from May to October. The moderately hot and dry weather during the summer months typically results in moderately high water demand.

Similar to the Western Regional Climate Center in the Cowan Heights CSA, the California Irrigation Management Information System (CIMIS) web site (http://www.cimis.water.ca.gov) tracks and maintains records of evapotranspiration (ETo) for few cities only. ETo statistics used for this system come from Long Beach station, which is the closest station (27 miles) to the Cowan Heights CSA. ETo is a standard measurement of environmental parameters that affect the water use of plants. ETo is given in inches per day, month, or year and is an estimate of the evapotranspiration of a large field of well-watered, cool-season grass that is four- to seven-inches tall. The monthly average ETo is presented in inches in Table 2-2. As the table indicates, a greater quantity of water evaporated during July and August in correlation to high temperatures and low humidity, which may result in high water demand.

Table 2-2
Monthly Average Climate Data Summary for Cowan Heights CSA.

Month	Standard Monthly Average ETo[2] (inches)	Average Total Rainfall (inches)	Average Temperature (degrees Fahrenheit) Max	Min
January	2.2	3.06	68.1	45.1
February	2.5	2.86	69.4	46.4
March	3.4	2.16	70.3	48.2
April	3.8	0.93	72.8	51.3
May	4.8	0.21	74.7	55.1
June	5.0	0.07	77.8	58.6
July	5.3	0.01	82.8	62.0
August	4.9	0.07	84.2	63.0
September	4.5	0.24	83.7	61.2
October	3.4	0.33	79.3	56.5
November	2.4	1.33	73.7	49.5
December	1.9	1.76	68.8	45.1

Notes
1. This table is based on the DWR Guidebook Table 3.
2. Evapotranspiration Overview (ETo) from http://www.cimis.water.ca.gov/cimis/welcom.jsp

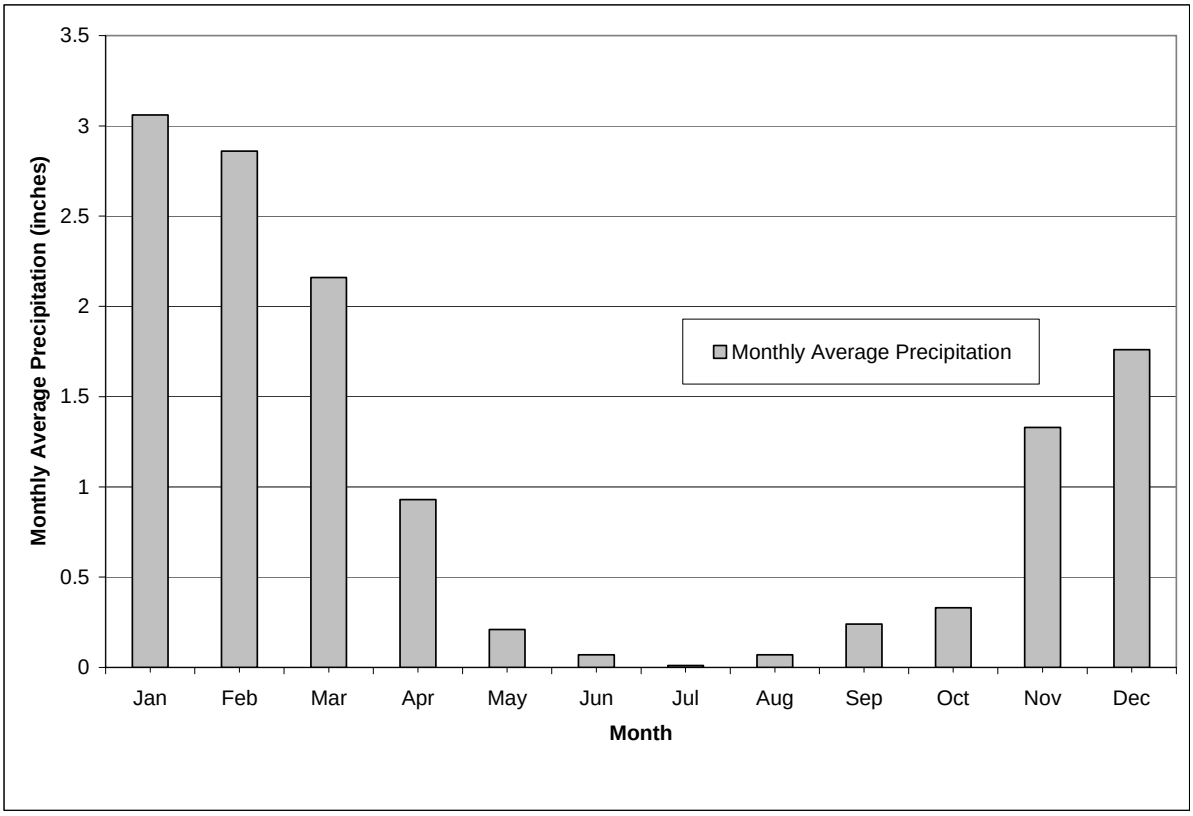

Figure 2-3 Monthly Average Precipitation in the Cowan Heights CSA based on 30 Years Historical Data

Chapter 3. Water Supply

A detailed evaluation of water supplies is requested by the Act. Sections 10631 (a) through (d) and (h) require the following:

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.

For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.

(2) A single dry water year.

(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established

pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single dry, and multiple dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

This chapter addresses the water supply sources of the Cowan Heights System. The following sections provide details in response to those requirements of this portion of the Act.

Water Sources

The Golden State Water Company (GSWC) currently obtains its water supply for the Cowan Heights System from local groundwater, and imported water obtained through EOCWD. EOCWD obtains its imported supply from MWDOC. MWDOC gets its imported supply from Metropolitan Water District of Southern California (Metropolitan). GSWC operates several groundwater wells within the Orange County Groundwater Basin (Basin). The Basin is managed by the Orange County Water District (OCWD). The OCWD regulates the amount of groundwater pumped from the Basin and sets the Basin Production Percentage (BPP) for all pumpers. GSWC pumps groundwater from the Basin for four of its systems including the Cowan Heights System.

Table 3-1 summarizes the current and planned water supplies available to GSWC for the Cowan Heights System that will meet their projected demands. This water supply summary is based on an analysis of local groundwater supplies and data provided by MWDOC.

Historically, groundwater has comprised between 33 percent and 57 percent of the total water supply for the Cowan Heights System and the remainder has been provided by imported water from EOCWD. In the future, groundwater is expected to be approximately 54 percent of the Cowan Heights System's total supply. Pipeline capacity currently limits the use of groundwater in the Cowan Heights System to about 1,800 ac-ft/yr. There is no direct use of recycled water for this system.

Table 3-1
Current and Planned Water Supplies for the Cowan Heights System in ac-f/yr

Source	Year					
	2005	2010	2015	2020	2025	2030
Water supplies from EOCWD	1,561	1,481	1,502	1,527	1,552	1,575
Orange County Groundwater Basin[2,3]	1,726	1,800	1,800	1,800	1,800	1,800
Recycled water	0	0	0	0	0	0
Total	3,287	3,281	3,302	3,327	3,352	3,375

Notes
1. Based on projected average Baseline Pumping Percentage (BPP) of 70 percent of total water supply for GSWC's systems in Orange County Groundwater Basin.
2. Water supply for 2005 based on BPP of 64 percent
3. Table format based on DWR Guidance Document Table 4

GSWC's water supply is projected to increase by approximately 3 percent from 2005 to 2030 to meet associated project water demands, with this demand being met by imported water from MWDOC and increased groundwater extractions. Water demand projections are documented in Chapter 4.

Imported Water

Water purchased from the EOCWD is delivered to the Cowan Heights System through the following connections:

- Fox Run connection with a capacity of 2,000 gallons per minute (gpm)
- Lemon Heights connection with a capacity of 800 gpm
- Newport connection with a capacity of 700 gpm
- Peacock connection with a capacity of 900 gpm
- Skyline connection with a capacity of 700 gpm.

These connections have a combined active design capacity of 5,100 gpm. In addition, the Cowan Heights System has two emergency interconnections with local water systems:

- City of Tustin connection with a capacity of 500 gpm
- City of Orange connection with a capacity of 500 gpm.

These emergency connections have a combined design capacity of 1,000 gpm. Seven reservoirs with a total volume of 4.0 million gallons serve as storage in the Cowan Heights System.

Under Section 135 of the Metropolitan Act, preferential rights to imported water are determined by each agency's total historic payments to Metropolitan from property taxes, stand-by charges, readiness-to-serve charges, and other revenue. Revenue resulting from the purchase of Metropolitan water is excluded, even though a portion of such revenues is used to pay for capital projects. At any time under preferential right rules, Metropolitan may allocate water without regard to historic water use or dependence on Metropolitan.

Metropolitan's preferential rights rules were the subject of litigation seeking clarification regarding the application and legality of Section 135; in July 2004 the State Supreme Court denied an appeal of an appellate court decision that Metropolitan might continue to exclude water purchases from the preferential rights calculation. The decision makes clear how much water any Metropolitan member agency can count on should a member agency invoke its preferential right to water.

Subsequent to the court decision, Metropolitan has stated, consistent with Section 4202 of its Administrative Code, that it is prepared to provide its member agencies with adequate supplies of water to meet expanding and increasing needs in the years ahead. When and as additional water resources are required to meet increasing needs, Metropolitan stated that it will be prepared to deliver such supplies. In its draft 2005 Regional Urban Water Management Plan, Section II.4, Metropolitan also states that as a result of investments made in supply and storage that they have identified a resource management plan that should result in 100 percent reliability for non-discounted non-interruptible demands through 2025.

GSWC is entitled to purchase water from EOCWD if water is available according to the EOCWD's rules and regulations, but has no right to purchase a firm quantity (*See* Water Code § 31024). GSWC does not have a water delivery contract with EOCWD.

Groundwater

Currently, groundwater is pumped from a total of two active wells in the Orange County Groundwater Basin. These wells have a current total active capacity of 2,015 ac-ft/yr and between 2000 and 2004; the actual production averaged 1,549 ac-ft/yr.

The Cowan Heights System is supplied by two wells in the Orange County Groundwater Basin. The Orange County Groundwater Basin has a surface area of approximately 224,000 acres (350 square miles). The Basin is bounded by the Puente and Chino Hills in the north, Santa Ana Mountains on the east, the San Joaquin Hills on the south, and the Pacific Ocean on the west.

The water-bearing units within the Orange County Basin are interbedded marine and continental sand, silt, and clay, with the units fining towards the coast (DWR, 2003). Three primary aquifer systems underlie the Orange County Basin: The Shallow Aquifer system, Principal Aquifer system, and Deep Aquifer System (OCWD, 2004). These three aquifer systems extend over 2,000 feet below ground surface. The Shallow Aquifer System (SAS), comprised of upper Pleistocene to Holocene deposits of unconsolidated sand and gravel, is represented by the La Habra Formation with an average thickness of about 800 feet. The SAS is predominately used for small-system industrial and agricultural uses within the Orange County Basin. The Principal Aquifer System (PAS) includes the lower Pleistocene Coyote Hills and San Pedro Formations. These formations typically average 1,600 feet in thickness and consist of sand, gravel, and minor amounts of clay. Well yields for the PAS typically average 2,000 to 3,000 gpm. The PAS provides approximately 90 to 95 percent of the groundwater for the Basin (OCWD, 2004). The Deep Aquifer System (DAS) includes the upper Pliocene aged Upper Fernando Group and consists of 350 feet to 500 feet of sand and gravel. Water within the DAS is not produced extensively. Those aquifers within the Deep Aquifer System have produced colored water or have been too deep to economically construct production wells (OCWD, 2004).

Recharge to the Basin is generally from the Santa Ana River, precipitation, and injection via wells along the Talbert Barrier, a seawater intrusion barrier. Most of the recharge for the Basin occurs in the forebay, located along the eastern margin of the basin, which is characterized by highly permeable sands and gravels with few discontinuous clay and silt deposits (OCWD, 2004). Little recharge occurs in the pressure area, which is characterized by an area where there are abundant clays and slits that prevent significant recharge (OCWD, 2004).

Orange County Groundwater Basin Management

The Basin is managed by the Orange County Water District (OCWD). The District has the power to set production limits, regulate and control the storage of water and use of underground storage space, and control conditions in in-lieu contracts.

The Basin is managed through financial incentives, based on uniformly establishing the Basin Production Percentage (BPP) for all pumpers in the Basin. The BPP is the ratio of groundwater production to total water demand, expressed as a percentage. OCWD evaluates groundwater conditions in the Basin and sets the BPP annually, for the following fiscal year (July 1 – June 30). Over the last 25 years, the BPP has ranged from 66 percent to 80 percent, averaging approximately 70 percent. Historically, the BPP has been raised if drought conditions affected the reliability or increased price of imported water and it has been lowered to prevent the threat of seawater intrusion resulting from lowered groundwater levels in the Basin (OCWD, 2004).

OCWD uses groundwater-level elevations from November 1969 as the baseline to represent near-full conditions within the Basin. OCWD has estimated that 63,000,000 ac-ft of fresh water are stored in the Orange County Basin aquifer systems when the Basin is full (OCWD, 2004). In 2002, groundwater levels were lower than the 1969 levels and OCWD estimated that that there was 426,000 ac-ft of available storage in the Basin (OCWD, 2003). OCWD estimates that the Basin can be operated with an accumulated storage reduction (from 1969 levels) of 500,000 ac-ft without causing irreversible seawater intrusion and land subsidence. Groundwater levels tend to be declining in the pressure area due to the lack of recharge, whereas, groundwater levels tend to be stable in the forebay (DWR, 2003). To help stabilize declining water levels in the Basin by reducing groundwater extractions, the BPP was reduced from 70 percent to 66 percent in FY 2003 and from 66 percent to 64 percent for FY 2005.

Table 5 from the DWR Guidance Document has been omitted because the Orange County Water District does not set specific pumping rights for the Basin, but instead annually adjusts the BPP for the Basin. Groundwater supply projections for all of GSWC's systems within the Orange County Basin are based on data provided by OCWD with a projected BPP of 70 percent of their projected total demand.

Table 3-2 shows GSWC's wells and current well capacities for the Cowan Heights System. The total current active well capacity for GSWC's Cowan Heights System is 1,315 gpm (2,015 ac-ft/yr).

Table 3-2
Wells and Well Capacity in the Cowan Heights System

Well Name	Normal Year Well Capacity (gpm)	Normal Year Well Capacity (ac-ft/yr)	Status
Fairhaven No. 1	715	1,096	Active
Fairhaven No. 2	600	919	Active
Total Capacity	1,315	2,015	
Active Capacity	1,315	2,015	

Notes
1. Active wells are part of the current water supply system.

Table 3-3 shows the pumping history for the Cowan Heights System for calendar years 2000 to 2004 (January 1, 2000 – December 31, 2004). The groundwater was pumped from two well located in the Orange County Groundwater Basin. Approximately 50 percent of the water supply for the Cowan Heights System was obtained from groundwater 2000 to 2004, except for 2002. In 2002, 33 percent of the water supply was groundwater. The pumping decreases resulted from GSWC's volunteer participation an in-lieu program that allowed them to purchase additional Metropolitan import water at the same rate as it costs GSWC to pump groundwater. The purpose of this program was to temporarily reduce pumping to allow the groundwater basin to refill.

Table 3-3
Groundwater Pumping History by Cowan Heights System (2000 to 2004) in ac-ft

Basin Name	2000	2001	2002	2003	2004
Orange County	1,969	1,540	1,105	1,534	1,595
Percent Total Water Supply	57	50	33	49	48

Notes
1. Table format based on DWR Guidance Document Table 6
2. Years are reported in calendar years (January 1 – December 31)

The projected groundwater pumping amounts for the Cowan Heights System from 2005 to 2030 are shown in Table 3-4. MWDOC is projecting that planned and future water supply projects in the basin will allow pumpers to operate reliably with a BPP of approximately 70 percent beyond 2005 through 2030. The BPP applies to all GSWC owned systems in the Orange County Groundwater Basin. The percentage of groundwater used in the Cowan Heights System will be lower as a result of limited transmission main capacity.

Table 3-4
Projected Groundwater Pumping Amounts by Cowan Heights System to 2030 in ac-ft

Basin Name	2005	2010	2015	2020	2025	2030
Orange County	1,561	1,481	1,502	1,527	1,552	1,575
Percent Total Water Supply	52	54	55	54	54	53

Notes
1. Table format based on DWR Guidance Document Table 7
2. Years are reported in calendar years (January 1 – December 31)

Reliability of Supply

The Cowan Heights System gets its water supply from two sources, purchased water via EOCWD and groundwater. As mentioned earlier, EOCWD is a member agency of and obtains its water supply from MWDOC, which obtains its imported water supply from Metropolitan. Therefore, conditions in local and distant areas can impact the reliability of supplies. The following discussion summarizes the reliability of GSWC's water supply sources. In general, GSWC's supply is expected to be 100 percent reliable through 2030. This reliability is a result of the projected reliability of MWDOC, a member agency of Metropolitan, which expects to provide reliable imported water supplies. In addition, OCWD is implementing projects to ensure reliability of the Orange County Groundwater Basin. Following is a summary of the basis of this reliability.

Metropolitan Water Supply Reliability

EOCWD the local imported water wholesaler, currently obtains nearly all its imported water from Metropolitan, directly or indirectly. Metropolitan's plan for resource management is intended to optimize the use of its available resources during surpluses and shortages to minimize the probability of severe shortages and eliminate the possibility of extreme shortages and shortage allocations.

With the experience of the droughts of 1977-78 and 1989-92, Metropolitan undertook a number of planning initiatives to ensure supply reliability. Those initiatives included the Integrated Resources Plan (IRP), the Water Surplus and Drought Management Plan (WSDM Plan) and local resource investments. Together, these initiatives provided the policy framework for Metropolitan and its member agencies to manage their water resources to meet the needs of a growing population even under recurrences of the worst historical hydrologic conditions, locally and in the key distant watersheds that supply southern California. Metropolitan has stated that it expects to be 100 percent reliable in meeting all non-discounted, non-interruptible demands through the year 2030, as summarized below (see Metropolitan's UWMP for details). In addition, MWDOC is considering a number of projects to ensure reliability of water supplies as discussed below.

Metropolitan Integrated Resource Plan (IRP)

The objective of the 2003 IRP Update was to determine the appropriate combination of water resources to provide 100 percent reliability for full service demands over the next

twenty years (from 2005 to 2025). With the support of its member agencies, Metropolitan developed a preferred supply mix that included conservation, local supplies (recycled and brackish water desalination), State Water Project (SWP) supplies, Colorado Aqueduct supplies, groundwater banking, and water transfers to meet projected water demands under severe shortage conditions. Additional objectives included: (1) review of the goals and achievements of the 1996 IRP, (2) identification of changed conditions for water resource development, and (3) update of the resource targets through 2025. The 2003 IRP Update revealed a decrease in the region's reliance on imported supplies from the Colorado River and SWP compared to the 1996 IRP, while continuing to provide 100 percent reliability through the year 2025.

To reduce the likelihood of shortfalls due to implementation risk and water quality issues, the 2003 IRP Update also includes a planning buffer of up to ten percent of regional demands. This planning buffer calls for identification of an additional 500,000 ac-ft of contingency supplies above that needed to meet demands in 2030. The buffer supplies would include an equal proportion of local and imported supplies.

Metropolitan Water Surplus and Drought Management Plan (WSDM Plan)

In 1999 Metropolitan adopted the WSDM plan to integrate planned operational actions with respect to both surplus and shortage situations (for further details on the WSDM Plan actions, refer to MWD's 2005 UWMP). While a specific allocation plan was not developed as part of the WSDM Plan, the guiding principle of the WSDM Plan is to manage Metropolitan's water resources and management programs to maximize management of wet year supplies and minimize adverse impacts of water shortages to retail customers. The WSDM Plan states that, except in extreme shortages or emergencies, Metropolitan resource management will allow shortages to be mitigated without impacting retail municipal and industrial customers. The key guiding principles of the WSDM Plan include:

- Encouraging efficient water use and economical local resource programs
- Coordinating operations with member agencies to make as much surplus water as possible available for use in dry years
- Pursuing innovative transfer and banking programs to secure more imported water for use in dry years
- Increasing public awareness about water supply issues

The WSDM Plan contains the following considerations that would go into an equitable allocation of imported water:

- Population growth
- Changes and/or losses in local supplies
- Impact on retail consumers and regional economy
- Investments in local resources, including recycling and conservation
- Investment in Metropolitan's facilities

Metropolitan Local Resource Investments

Metropolitan has made significant investments in local resource projects to optimize local supplies. These investments have been made in conservation, water recycling, storage, and supply. Metropolitan's objective is that its resource management plan results in 100 percent reliability for non-discounted, non-interruptible demands through 2025. Metropolitan's resource management strategy deals with several supply resources:

Local Resource Investment. Metropolitan has co-funded more than 74 local supply projects that provided an annual contract yield of 118,000 ac-ft in 2004. Projects developed by the member agencies without Metropolitan funding provided an additional 155,000 ac-ft. In addition, between 1990 and 2003 Metropolitan and its member agencies invested a total of $290 million in conservation programs. Metropolitan estimates that conservation reduced the region's 2003 demand by 654,000 ac-ft, compared to the 1996 IRP goal of 571,000 ac-ft. As a large purchaser of Metropolitan water, GSWC has helped fund many of these programs.

Colorado River Region. Under the existing agreement, over 800,000 ac-ft of water is currently available to Metropolitan's service area in dry-years from the Colorado River region. This amount includes 30,000 ac-ft of the eventual 200,000 ac-ft transfer agreement between the San Diego County Water Authority and the Imperial Irrigation District. Additional programs are currently being studied.

State Water Project Region. Metropolitan has continued to explore out-of-region water storage and transfer programs. Current water storage agreements provide for dry-year supplies of almost 400,000 ac-ft. Transfer programs provide additional water, but this amount varies from year-to-year. Additional programs that could supply 125,000 ac-ft are under development. In addition, Metropolitan's SWP contract allows it to store up to 220,000 ac-ft of carryover water in SWP storage reservoirs.

Regional Storage. Metropolitan has undertaken a number of projects to increase the level of in-region water storage to compensate for the reduced availability of its imported water supply. The key projects are summarized below:

- Diamond Valley Lake was filled for the first time by early 2002. Completion of this project added 800,000 ac-ft of storage to Metropolitan's mix of resources, of which 400,000 ac-ft are available for use as regulatory/carryover storage.
- In 1995, Metropolitan entered into an agreement with Calleguas Municipal Water District (MWD) to jointly develop the North Las Posas Conjunctive Use Program. Phases 1 and 2 of this program are expected to be operational and come on-line by 2005, with facilities to manage the full 210,000 ac-ft of storage due to be operational by 2010.
- Metropolitan has expanded groundwater storage in the region. Five contractual storage programs signed to date will provide 181,000 ac-ft of storage. Three additional contracts (City of Compton, Three Valleys Municipal Water District, and the City of Long Beach) currently being finalized may provide an additional 8,900 ac-ft for a total of` approximately 190,000 ac-ft of dry-year storage capacity. The legal standing of the Long Beach storage agreement has not yet been acknowledged by DWR as Watermaster in the Central Basin but is expected to be resolved in accordance with amendments to the court

Judgments that are anticipated to be filed after agreements are reached as part of ongoing discussions with DWR. GSWC also expects to enter into agreements for contractual storage programs in the Central and West Coast Basins.

- Metropolitan is also continuing to work with its member agencies in the Pasadena area to develop an additional 66,000 ac-ft of storage in the underlying Raymond Basin.

Together these programs will provide capability to store 866,000 ac-ft of supplies for dry years.

EOCWD's Water Supply Reliability

In addition to Metropolitan's reliability initiatives, MWDOC has proposed projects to increase reliability within its service area (see MWDOC 2005 UWMP for details). MWDOC participates in various efforts including, (1) Integrated Regional Water Management Plan, (2) Water Use Efficiency Program, (3) Orange County Water Reliability Plan, (4) South Orange County Water Reliability Study, (5) Metropolitan's Local Resources Incentive Program, (6) Cooperative Agreement with Orange County Water District, (7) Ocean Water Desalination Feasibility Investigation, and (8) Southern California Comprehensive Water Reclamation and Re-Use Study.

GSWC's Groundwater Supply Reliability

GSWC can pump the BPP annually as set by OCWD. Annually, OCWD evaluates hydrologic conditions in the Basin, including groundwater levels and amount of groundwater in storage, and sets the BPP. MWDOC, with input from OCWD, has completed reliability analyses for each of the 5-year projection periods from 2010 through 2030 for GSWC's groundwater supply and projects an average BPP of 70 percent. One of OCWD's water management goals in the Basin is to set the BPP as high as possible, while responsibly managing the groundwater supply. A high BPP reduces the demand on imported water supplies and offers pumpers a less expensive water supply alternative than imported water (OCWD, 2004).

Five agencies, in addition to the pumpers, work cooperatively together to ensure that a reliable water supply is available to be pumped by the pumpers in the Orange County Basin. These agencies include the OCWD, Metropolitan, Water Replenishment District (WRD), Los Angeles County Department of Public Works (LACDPW), and the Orange County Sanitation District (OCSD). Current and planned projects designed to increase groundwater reliability in the Orange County Basin include seawater intrusion barriers, in-lieu groundwater replenishment, diverted surface water flows recharged at spreading basins, and the Groundwater Replenishment System (GWRS) which involves the use of highly treated wastewater for groundwater recharge.

OCWD's Talbert Barrier is a seawater intrusion barrier that consists of 26 injection wells across the 2.5-mile-wide Talbert Gap between the Newport and Huntington mesas. The Talbert Barrier has been in operation since 1975. The water used for injection has consisted of highly treated wastewater, colored groundwater, and imported water. The Talbert Barrier is being expanded as a part of the GWRS to increase the quantity of water injected along the barrier and to increase the use of highly treated wastewater for recharge.

Metropolitan, in cooperation with MWDOC and OCWD, operates an in-lieu replenishment program in the Orange County Basin. When excess supplies and treatment capacity are available from Metropolitan, pumpers turn off their wells and receive Metropolitan water in-lieu of pumping groundwater. This program reduces the amount of water pumped from the Basin. The in-lieu program has many advantages, including providing an energy-efficient method of recharging the Basin, providing a neutral cost alternative to the pumpers, preserving OCWD's recharge capacity to be preserved for Santa Ana River flows, and the program can target definitive areas in the Basin (OCWD, 2004) to raise groundwater levels.

The Alamitos Barrier is operated by the LACDWP in cooperation with OCWD and WRD. The seawater intrusion barrier is consists of a series of injection wells that span the Los Angeles/Orange County line in the Seal Beach/Long Beach area. Currently, Metropolitan provides potable water for injection at the Barrier. WRDSC plans to reduce imported water use at the Alamitos Barrier by 3,000 ac-ft/yr by replacing it with the delivery of recycled water through WRDSC's Leo Vander Lans Recycling facilities in Long Beach (CBMWD, 2005).

The Orange County Groundwater Basin's primary source of water for groundwater recharge is the Santa Ana River (SAR). OCWD diverts flows from the Santa Ana River and Santiago Creek for recharge at spreading facilities located in the cities of Anaheim and Orange. The majority of the baseflow of the SAR, especially in the summer months, consists of tertiary-treated wastewater discharges from wastewater treatment facilities upstream of the Prado Dam. OCWD is allotted, by court decision, a minimum SAR baseflow of 42,000 ac-ft/yr. Baseflow in the SAR between 1970 and 2002 ranged from 47,000 ac-ft/yr and 170,000 ac-ft/yr. Currently, OCWD is able to capture and percolate all of the SAR baseflow during non-storm events. In addition to the baseflow, OCWD captures SAR stormflow. OCWD captures and percolates approximately 50,000 ac-ft/yr of stormflows from the SAR (OCWD, 2004).

In conjunction with the OCSD, the Orange County Water District is in the process of implementing the GWRS. The GWRS will result in the reuse of up to 130 mgd of highly treated wastewater. Advanced treatment processes will include microfiltration, reverse osmosis, and ultra-violet and hydrogen peroxide disinfection. The GWRS will augment existing groundwater supplies through indirect potable reuse, providing a reliable, high-quality source of recharge water for the Basin (OCWD, 2004). Additionally, the GWRS will provide water for direct injection at the Talbert Barrier, reducing the dependence on imported water for injection.

The first phase of the GWRS will increase the reliability of local groundwater by producing a total of 72,000 ac-ft/yr of water for recharge. The first phase of the GWRS is expected to be operational by mid-2007. The completion of the GWRS is expected to be completed by 2020, providing a total annual recharge capacity of 140,000 ac-ft/yr.

Cowan Heights System's Water Supply Reliability

Supply reliability for the Cowan Heights System depends upon local groundwater supplies and the reliability of imported water from MWDOC, as discussed above.

MWDOC, working with the Orange County Water District, has provided imported water and groundwater reliability information to assist their retail agencies in completing their long term water supply analyses for the 2005 UWMP. MWDOC and OCWD evaluated the basin's historical hydrology from 1922 to 2004. The reliability analyses provided by MWDOC analyzed GSWC's Placentia, Cowan Heights, Yorba Linda, and West Orange County systems together. In each of the respective UWMPs for GSWC's systems listed above, the individual system projections have been extracted from the totals provided by MWDOC.

Table 3-5 presents water supply projections for imported and groundwater (note that groundwater includes the indirect reuse of highly treated wastewater through capture of SAR flow and implementation of OCWD's GWRS) sources during a normal year, single-dry year, and multiple-dry years for the Cowan Heights System for year 2030. The normal-year supply represents the expected supply under average hydrologic conditions, the dry-year supply represents the expected supply under the single driest hydrologic year, and the multiple-dry year supply represents the expected supply during a period of three consecutive dry years. Water supply reliability projections for imported water and groundwater for the 5-year periods from 2010 through 2030 are presented in Chapter 10.

For water supply reliability in a single-dry year and multiple-dry year periods, MWDOC provided the projected available water supplies to their retail agencies to be used in the 2005 UWMPs. The projections of water supply reliability included imported water and groundwater.

Table 3-5
Supply Reliability for the Cowan Heights System for Year 2030 in ac-ft/yr

Source	Normal Water Year	Single-Dry Water Year	Multiple-Dry Water Years		
			Year 1	Year 2	Year 3
Purchased Water	1,575	2,792	2,169	2,592	2,792
Percent of Normal		177.3	137.7	164.6	177.3
Groundwater(2)	1,800	1,361	1,683	1,408	1,361
Percent of Normal		75.6	93.5	78.2	75.6
Total	3,375	4,153	3,852	4,000	4,153
Percent of Normal		123	114	119	123

Notes
1. Based on analyses of projected 2030 demand for GSWC's Cowan Heights System as provided by MWDOC for inclusion in 2005 UWMP.
2. Table format based on DWR Guidance Document Table 8

MWDOC will meet projected water demands under all anticipated hydrologic conditions. During a single-dry and multiple-dry years, MWDOC is expected to increase their imported demand to make up for the decrease in local supplies. Metropolitan, MWDOC, and OCWD will continue to implement projects to ensure the imported water and groundwater demands can be met under normal, single-dry year, and multiple-dry years. As discussed

earlier, Metropolitan plans on 100 percent supply reliability to MWDOC, which in turn provides 100 percent reliability of imported water supply to the Cowan Heights System. [Update with info from EOCWD's plan]

The Orange County Groundwater Basin has substantial storage capacity to provide a buffer during droughts and to accept recharge of surplus waters during times of available supplies (e.g., storm water, highly treated recycled water, and imported water). Continued diligence by the GSWC and other groundwater users, OCWD, and MWDOC are expected to help maintain the reliability of the Orange County Groundwater Basin groundwater supply. MWDOC has provided all of its member agencies, including GSWC, with groundwater reliability analyses from 2010 to 2030. MWDOC has assured GSWC that any remaining water demands not met by local groundwater for each year will be met with imported water that will be 100 percent reliable.

GSWC's reliance upon information provided by OCWD and MWDOC does not represent an endorsement of any or all of the future projects or programs to be undertaken to enhance water availability. GSWC, in making its projections of reliable future water supply, bases such on MWD's assertion that it will provide 100 percent reliable supply through 2030.

Table 3-6 lists single-dry year and multiple-dry year periods for both groundwater and imported water supplies. MWDOC has provided purchased water and groundwater information to assist their member agencies in completing their long term water supply analyses for the 2005 UWMP. MWDOC, in coordination with OCWD, evaluated the basin's historical hydrology from 1922 to 2004. The annual average hydrology, including precipitation and stream runoff data, over this period was used to calculate the available reliable groundwater supply for GSWC's West Orange County, Yorba Linda, Cowan Heights, and Placentia Systems. MWDOC and OCWD selected the basin's single dry year and multiple dry year period to be 1961 and 1959 to 1961, respectively. Again, the Orange County Groundwater Basin storage is used and the basin is operated to store surplus waters (storm water, recycled water, and imported water) when these waters are available and then to draw down the basin in drier years.

Table 3-6
Basis of Water Year Data

Water Year Type	Base Year(s)	Historical Sequence
Purchased water and Groundwater		
Normal Water Year	Average of Historical Hydrology	1922 - 2004
Single-Dry Water Year	1961	1922 – 2004
Multiple-Dry Water Years	1959 – 1961	1922- 2004

Notes
1. MWDOC presents data on average over all of the historic hydrologies
2. Data was evaluated and provided by MWDOC for inclusion in 2005 UWMP.
3. Table format based on DWR Guidance Document Table 9

Factors Resulting in Inconsistency of Supply

Table 3-7 presents factors that could potentially result in inconsistency of supply for the Cowan Heights System.

There is no seasonal vulnerability to the groundwater supply for the Cowan Heights System. The climatic vulnerability for the groundwater supply is only based on the change of the basin production percentage of the Orange County Groundwater Basin. During dry years, historically, OCWD has slightly reduced the basin production percentage for the Basin

Table 3-7
Factors Resulting in Inconsistency of Supply

Name of Supply	Legal	Environmental	Water Quality	Climatic
MWDOC	N/A	N/A	N/A	N/A
Groundwater, Orange County Groundwater Basin	Managed by the Orange County Water District (OCWD). OCWD controls the amount allowable water pumped from the Basin.	N/A	There are no foreseeable water quality factors affecting inconsistency of supply.	N/A

Notes
1. Table format based on DWR Guidance Document Table 10

Transfers and Exchanges

There are no planned transfer and/or exchange opportunities in the Cowan Heights System at this time; therefore, Table 3-8 has been left blank.

Table 3-8
Transfer and Exchange Opportunities

Source Transfer Agency	Transfer or Exchange	Short Term	Proposed Quantities	Long term	Proposed Quantities
GSWC	N/A	N/A	N/A	N/A	N/A

Notes
1 Table format based on DWR Guidance Document Table 11

Planned Water Supply Projects and Programs

There are no planned water supply projects and programs in the Cowan Heights System at this time; therefore, Table 3-9 has been left blank. GSWC, as a part of its normal maintenance and operations, will construct new wells, pipelines, and treatment systems as needed as a part of its ongoing Capital Investment Program to maintain its supply and meet distribution system requirements.

MWDOC is participating in a number of water supply development programs, the details of which can be found in MWDOC's 2005 Urban Water Management Plan. MWDOC's dependence on imported water may decrease with the expansion of these alternative resources.

Table 3-9
Future Water Supply Projects in ac-ft

Project Name	Normal Year	Single Dry Year	Multiple Dry Years		
			Year 1	Year 2	Year 3
N/A	N/A	N/A	N/A	N/A	N/A

Notes
1. This table is based on the DWR Guidebook Table 17.

Wholesale Agency Supply Data

Table 3-10 provides MWDOC's existing and planned water sources available to the Cowan Heights System. These supplies are expected to meet the projected imported water demands.

Table 3-10
Existing and Planned Water Sources Available to the Cowan Heights System as Identified by EOCWD in ac-ft/yr

Wholesaler Sources	2010		2015		2020		2025		2030	
	Existing	Planned	Existing	Planned	Existing	Planned	Existing	Planned	Existing	Planned
EOCWD (Imported Water)	1,481	N/A	1,502	N/A	1,527	N/A	1,552	N/A	1,575	N/A

Notes
1. Table format based on DWR Guidance Document Table 20

Table 3-11 demonstrates the reliability of wholesale water supply to meet annual water demand of the Cowan Heights System. The table includes a single-dry year and multiple-dry year supplies for 2030. The available supply from MWDOC is higher than the supply needed to meet demands during various hydrologic conditions. For 2030, the MWDOC's supply for a single dry-year is 177 percent of supply in normal water year, whereas it is 138, 165 and 177 percent of normal year supply for year 1, 2 and 3 of multiple-dry years, respectively (MWDOC's UWMP, 2005). These percentages were used to calculate the water supplies for a single-dry and multiple-dry years.

MWDOC is assured by Metropolitan of 100 percent reliability to meet the water demand through 2030. It should also be noted that the available active connection capacity for imported water is much more than the supply quantities required to meet the projected water demands during various hydrologic conditions.

Table 3-11
Reliability of Wholesale Supply for Year 2030 in ac-ft/yr

		Multiple-Dry Water Years		
Wholesaler	**Single-dry**	**Year 1**	**Year 2**	**Year 3**
EOCWD	2,792	2,169	2,592	2,792
Percent of Normal	177.3	137.7	164.6	177.3

Notes
1. Table format based on DWR Guidance Document Table 21

As mentioned above, OCSD in conjunction with OCWD is in the process of implementing the GWRS. The GWRS will result in the reuse of up to 130 mgd of highly treated wastewater. The GWRS will augment existing groundwater supplies through indirect potable reuse, providing a reliable, high-quality source of recharge water for the Basin (OCWD, 2004). Additionally, the GWRS will provide water for direct injection at the Talbert Barrier, reducing the dependence on imported water for injection.

The first phase of the GWRS will increase the reliability of local groundwater by producing a total of 72,000 ac-ft/yr of water for recharge. The first phase of the GWR System is expected to be operational by mid-2007. The completion of the GWR System is expected to be completed by 2020, resulting in a total recharge capacity of 140,000 ac-ft/yr.

Table 3-12 lists factors affecting wholesale supply for the Cowan Heights System. Metropolitan plans on 100 percent supply reliability to MWDOC, which in turn provides 100 percent reliability of supply to the Cowan Heights System.

Table 3-12
Factors Affecting Wholesale Supply

Name of Supply	Legal	Environmental	Water Quality	Climatic
EOCWD[(1)]	N/A	N/A	N/A	N/A

Notes
1. No further constraints affecting wholesale supply. Metropolitan supplies already accounted for these factors (see Metropolitan's UWMP)
2. Table format based on DWR Guidance Document Table 22

Chapter 4. Water Use

Section 10631 (e) of the Act requires that an evaluation of water use be performed for the Cowan Heights System. The Act states the following:

Section 10631

(e)

(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water- use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential

(B) Multifamily

(C) Commercial

(D) Industrial

(E) Institutional and governmental

(F) Landscape

(G) Sales to other agencies

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof

(I) Agricultural.

(2) The water-use projections shall be in the same five-year increments described in subdivision (a).

In addition, Section 10631 (k) directs urban water suppliers to provide existing and projected water-use information to wholesale agencies from which water deliveries are obtained. The Act states the following:

Section 10631

(k) Urban water suppliers that rely upon a wholesale agency for a source of water, shall provide the wholesale agency with water-use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c), including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

As part of the Urban Water Management Plans, California regulation requires water suppliers to quantify past and current water use and to project the total water demand for the water system. Projections of future water demand allow a water supplier to analyze if future water supplies are adequate, as well as help the agency when sizing and staging future water facilities. Water use and production records, combined with population and employment projections, provide the basis for estimating future water requirements. This chapter presents an analysis of water use data and the resulting projections for future water needs in the Cowan Heights System.

Historical and Projected Water Use

Historical water use data from 1984 to 2004 was analyzed in order to estimate the future water demands for the Cowan Heights System. Projections for the number of service connections and future water use were calculated for the year 2005 through 2030 in five-year increments. Future water demands were estimated using two different methods, a population-based approach and a historical-trend approach, in order to present a projection range. The range established between these two approaches is intended as supplemental information; all recommendations are based on the population-based projections. The historical-trend projections are provided as ancillary information only. Detailed descriptions of how the population-based and historical-trend projections were calculated are provided below.

Figure 4-1 shows the historical and projected number of metered service connections for the Cowan Heights System from 1984 through 2030. Figure 4-2 shows the historical and projected water use for the Cowan Heights System from 1984 until 2030.

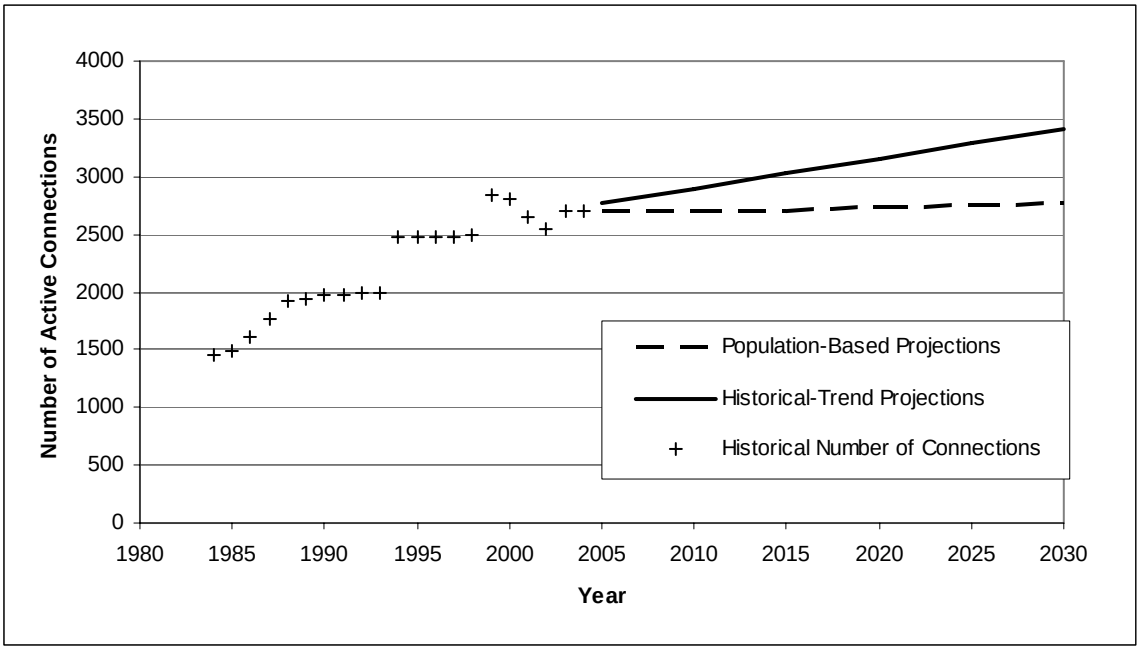

Figure 4-1 Historical and Projected Number of Metered Service Connections

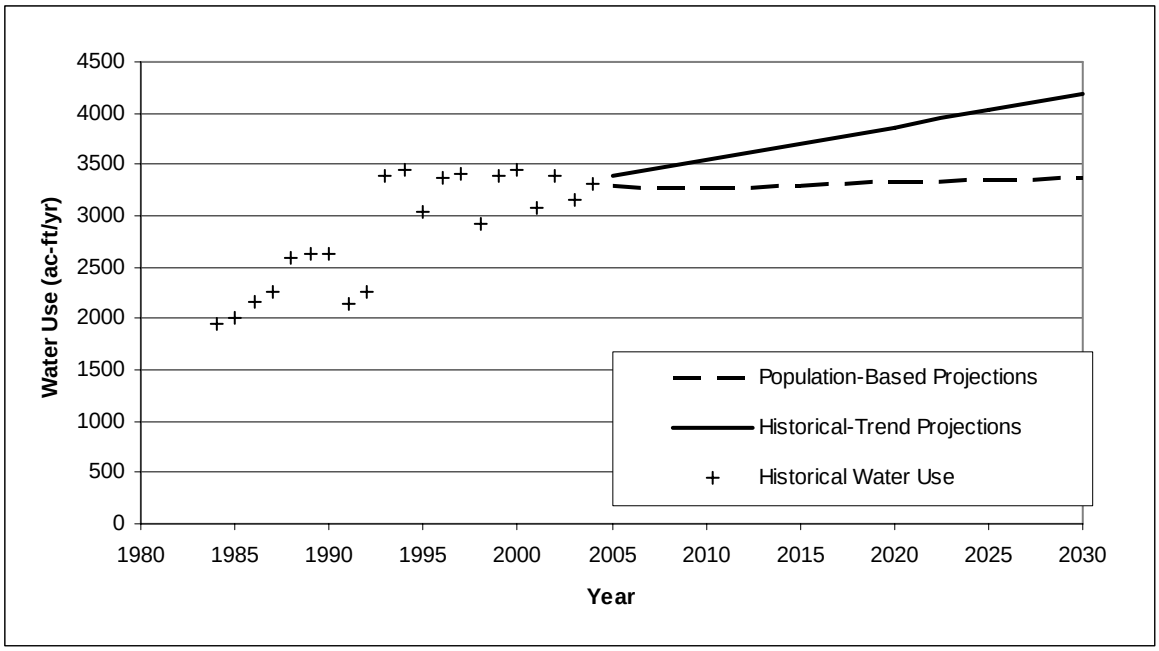

Figure 4-2 Historical Water Use and Future Water Use Projections

In order to generate estimates of future water demands, historical water use records from 1984 through 2004 were analyzed. The customer billing data for the system consists of annual water sales data. The water sales data was sorted by customer type using the assigned North American Industry Classification System (NAICS) codes. Then the sorted water sales data was further grouped into the following 8 categories: single family, multi-family, industrial, commercial, institutional/government, landscape, agriculture, and others.

For each category, a water use factor was calculated in order to quantify the average water used per metered connection. For a given customer type, the unit water use factor is calculated as the total water sales for the category divided by the number of active service connections for that category. The unit water use factors for each customer type were averaged over the data range from 1999 through 2004 in order to obtain a representative water use factor that can be used for water demand projections by customer type.

The population-based water use projections are based on the population, housing, and employment projections developed for the Cowan Heights System using the Southern California Association of Governments (SCAG) data. SCAG recently updated its projections for population, household, and employment growth through the year 2030 using 2000 U.S. Census data. SCAG's methodology and the derivation of population projections for the Cowan Heights System are discussed in more detail in Chapter 2.

SCAG household projections were used to determine the growth in single-family and multi-family service connections for the years 2005, 2010, 2015, 2020, 2025, and 2030. For example, the ratio between the household projections for the year 2015 and the year 2004 was multiplied by the number of service connections in 2004 to obtain a projection of the number

of connections in the year 2015. Similarly, employment growth projections were used to determine the growth for commercial, industrial, institutional/government, landscape, and agriculture service connections. The population-based projected water use was then calculated by multiplying the number of projected active service connections for each customer category with the corresponding customer average water use factor calculated above.

The historical-trend water use projections are not based on SCAG projections but are instead based on a linear projection of the historical number of metered service connections. To establish the historical trend, the data from 1994 through 2004 was used because the number of service connections increased abruptly in 1994 (refer to Figure 4-1).

The average growth rate established by this historical trend was applied to the number of connections in each customer category to project the future number of service connections. The historical-trend projected water use was then calculated by multiplying the number of projected active service connections for each customer category with the corresponding customer average water use factor calculated above.

Figure 4-3 shows the average of the population-based and historical-trend water use projections by customer type, as well as the total water demand. The error bars provide the range of the total water demand projections for that year. The population-based and historical-trend projections of the number of service connections, and the resulting water demand, are provided in Table 4-1 and Table 4-2, respectively.

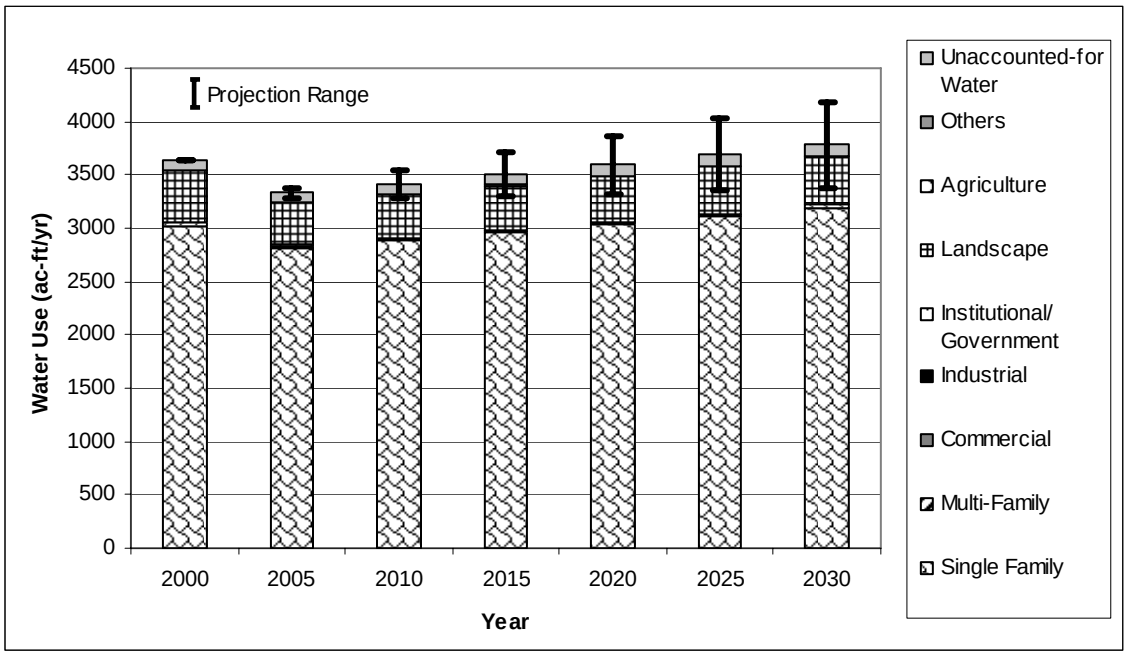

Figure 4-3 Water Use by Customer Type

Table 4-1
Population-Based and Historical-Trend Projections of the Number of Metered Service Connections for the Cowan Heights System

		Accounts by Type								
Year	**Projection Type**	**Single Family**	**Multifamily**	**Commercial**	**Industrial**	**Institutional/ Government**	**Landscape**	**Agriculture**	**Other[3]**	**Total**
2000[2]	*N/A*	2,701	0	0	4	7	88	0	3	2,804
2005	*Population-Based*	2,616	0	0	5	5	79	0	3	2,708
	Historical-Trend	2,661	0	0	4	7	87	0	3	2,762
2010	*Population-Based*	2,602	0	0	6	6	80	0	3	2,696
	Historical-Trend	2,788	0	0	4	7	91	0	3	2,893
2015	*Population-Based*	2,614	0	0	6	6	82	0	3	2,710
	Historical-Trend	2,914	0	0	5	8	95	0	3	3,024
2020	*Population-Based*	2,631	0	0	6	6	83	0	3	2,729
	Historical-Trend	3,040	0	0	5	8	99	0	3	3,156
2025	*Population-Based*	2,649	0	0	6	6	84	0	3	2,747
	Historical-Trend	3,167	0	0	5	8	104	0	3	3,287
2030	*Population-Based*	2,665	0	0	6	6	85	0	3	2,765
	Historical-Trend	3,293	0	0	5	9	108	0	3	3,418

Notes
1. This table is based on the DWR Guidebook Table 12.
2. Based on calendar year.
3. Other accounts for any service connections not included in any other category, including idle or inactive connections.

Table 4-2
Population-Based and Historical-Trend Projections of Water Deliveries for Service Connections for the Cowan Heights System in Ac-ft/yr

		Accounts by Type								
Year	**Projection Type**	**Single Family**	**Multifamily**	**Commercial**	**Industrial**	**Institutional/ Government**	**Landscape**	**Agriculture**	**Other[3]**	**Total**
2000[2]	*N/A*	3,011	0	0	8	30	490	0	0	3,539
2005	*Population-Based*	2,796	0	0	6	20	372	0	3	3,196
	Historical-Trend	2,844	0	0	4	25	412	0	3	3,289
2010	*Population-Based*	2,781	0	0	6	20	380	0	3	3,190
	Historical-Trend	2,979	0	0	4	26	432	0	3	3,445
2015	*Population-Based*	2,794	0	0	6	20	387	0	3	3,210
	Historical-Trend	3,114	0	0	5	27	451	0	3	3,601
2020	*Population-Based*	2,812	0	0	6	21	393	0	3	3,235
	Historical-Trend	3,250	0	0	5	29	471	0	3	3,757
2025	*Population-Based*	2,831	0	0	6	21	398	0	3	3,259
	Historical-Trend	3,385	0	0	5	30	491	0	3	3,913
2030	*Population-Based*	2,849	0	0	6	21	403	0	3	3,282
	Historical-Trend	3,520	0	0	5	31	510	0	4	4,070

Notes
1. This table is based on the DWR Guidebook Table 12.
2. Based on calendar year.
3. Other accounts for any service connections not included in any other category, including idle or inactive connections.

Sales to Other Agencies

There are no sales to other agencies for the Cowan Heights System; therefore, Table 4-3 has intentionally been left blank.

Table 4-3
Sales to Other Agencies in ac-ft/yr

Water Distributed	2000 (2)	2005	2010	2015	2020	2025	2030
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes
1. This table is based on the DWR Guidebook Table 13.
2. Based on calendar year.

Other Water Uses and Unaccounted-for Water

In order to accurately predict total water demand, other water uses, as well as any water lost during conveyance, must be added to the customer demand. California regulation requires water suppliers to quantify any additional water uses not included as a part of water use by customer type (Table 4-4). There are no other water uses in addition to those already reported in the Cowan Heights System.

Unaccounted-for water must be incorporated when projecting total water demand. Unaccounted-for water is defined as the difference between annual production and supply and annual sales. Included in the unaccounted-for water are system losses (due to leaks, reservoir overflows, or inaccurate meters), and water used in operations. In the Cowan Heights System, from 1999 through 2004, unaccounted-for water has averaged 2.77 percent of the total production. Table 4-4 provides a summary of unaccounted-for water in the Cowan Heights System.

Table 4-4
Additional Water Uses and Losses in ac-ft/yr

Water-Use Type	2000 (2)	2005	2010	2015	2020	2025	2030
Other Water Uses	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Unaccounted-for System Losses(3)	101	91	91	92	92	93	94
Total	101	91	91	92	92	93	94

Notes
1. This table is based on the DWR Guidebook Table 14.
2. Based on calendar year.
3. Unaccounted-for water includes system losses due to leaks, reservoir overflows, and inaccurate meters, as well as water used in operations.

Total Water Demand

As mentioned above, other water uses, as well as any water lost during conveyance, must be added to the customer demand in order to project water demand for the Cowan Heights

System. Although there are no other water uses contributing to the total water demand in the Cowan Heights System, unaccounted-for water must be incorporated into the total water demand (refer to the previous section for a definition of unaccounted-for water). Table 4-5 summarizes the projections of water sales, unaccounted-for water, and total water demand through the year 2030. The projected water sales in the remainder of the analysis, including Table 4-5, are calculated using the population-based projections for water use.

The water demand projections below do not include any reduction due to future implementation of Demand Management Measures (DMM). More information regarding the status of demand reduction measures is available in Chapter 5.

Table 4-5
Projected Water Sales, Unaccounted-for System Losses, and Total Water Demand (ac-ft/yr)

Year	Projected Water Sales	Unaccounted-for System Losses	Total Water Demand
2000[(2)]	3,539	101	3,640
2005	3,196	91	3,287
2010	3,190	91	3,281
2015	3,210	92	3,302
2020	3,235	92	3,327
2025	3,259	93	3,352
2030	3,282	94	3,375

Notes
1. This table is based on the DWR Guidebook Table 15.
2. Based on calendar year.

Data Provided to Wholesale Agency

GSWC provided the following projected water use data to the East Orange County Municipal Water District (EOCMWD), its wholesale water supplier for the Cowan Heights System, as summarized in Table 4-6.

Table 4-6
Summary of Cowan Heights System Data Provided to EOCMWD in ac-ft/yr

Wholesaler	2010	2015	2020	2025	2030
EOCMWD	1,481	1,502	1,527	1,552	1,575

Notes
1. This table is based on the DWR Guidebook Table 19.

Chapter 5. Demand Management Measures

The evaluation of Demand Management Measures (DMMs) occupies a significant portion of the Act. The Act states:

Section 10631

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.

(B) Residential plumbing retrofit.

(C) System water audits, leak detection, and repair.

(D) Metering with commodity rates for all new connections and retrofit of existing connections.

(E) Large landscape conservation programs and incentives.

(F) High-efficiency washing machine rebate programs.

(G) Public information programs.

(H) School education programs.

(I) Conservation programs for commercial, industrial, and institutional accounts.

(J) Wholesale agency programs.

(K) Conservation pricing.

(L) Water conservation coordinator.

(M) Water waste prohibition.

(N) Residential ultra-low-flush (ULF)toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(j) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that Council in accordance with the ''Memorandum of Understanding Regarding Urban Water Conservation in California,'' dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

Section 10631.5. The department shall take into consideration whether the urban water supplier is implementing or scheduled for implementation, the water demand management activities that the urban water supplier identified in its urban water management plan, pursuant to Section 10631, in evaluating applications for grants and loans made available pursuant to Section 79163. The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities.

This chapter presents a summary of Golden State Water Company's (GSWC) past, current and future water conservation activities for the Cowan Heights System in compliance with the above listed sections of the Act.

The water conservation practices, as defined by the Act, are comprised of 14 DMMs. The DMMs are functionally equivalent to urban water conservation best management practices (BMPs) administered by the California Urban Water Conservation Council (Council). Table 5-1 lists the BMPs.

The Council was formed as part of an effort by the Department of Water Resources (DWR) working jointly with water utilities, environmental organizations, and other interested groups to develop and administer urban best management practices (BMPs) for conserving water. In 1991 the Council issued a Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) which formalized the agreement to implement BMPs to reduce the consumption of California's water resources. As a signatory of the MOU, GSWC has agreed to implement the BMPs that are determined to be cost beneficial to its ratepayers and to complete such implementation in accordance with the schedule assigned to each BMP. GSWC files bi-annual reports with the Council on BMPs implementation progress.

Table 5-1
Water Conservation Best Management Practices

1	Water Survey Programs for Single-Family Residential and Multifamily Residential Customers
2	Residential Plumbing Retrofits
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 (1)
8	School Education Programs (1)
9	Conservation Program for Commercial, Industrial, Institutional (CII) Accounts
10	Wholesale-Agency Assistance Programs (1)
11	Conservation Pricing (1)
12	Water Conservation Coordinator (1)
13	Water Waste Prohibition (1)
14	Residential Ultra-Low-Flush-Toilet (ULFT) Replacement Programs

Notes
1. Economic benefits of these BMPs are considered nonquantifiable.

BMP Implementation Status

GSWC implements water conservation programs by district or customer service area (CSA) rather than for each individual system. Because of this, water conservation was evaluated for the entire Orange County District, which consists of the Cowan Heights, Placentia, West Orange County, and Yorba Linda systems.

The BMPs implementation status was assessed based on information provided in BMP activity reports for the years 2001 to 2004 that were filed with the Council. Historically, the BMP forms for the Orange County District have been 100 percent complete, including the reports filed for 2001 to 2004. In addition, the BMP coverage reports were used to assess whether the target implementation schedule, as defined by the Council, for each BMP is met. The 2004 Activity Report and Coverage Report are included in Appendix E. Based on Section 10631 (j) the Council reports meet the requirements of Water Code Section 10631 (f) and (g). A summary of these reports is presented in Table 5-2 and Table 5-3.

Table 5-2 presents a summary of the past water conservation activities in the Orange County District. It should be noted GSWC takes credit for water conservation activities completed under programs jointly offered by GSWC and other agencies in its service area.

Table 5-3 presents a description of the offered programs and implementation status in the Orange County District for all BMPs. GSWC is currently not meeting coverage requirements as defined by the Council for BMPs 1, 2, 5, 6, and 9. In order to determine if implementation of these BMPs for the Orange County District should continue, a benefit-cost analysis was performed on these BMPs.

Table 5-2
Summary of Water Conservation Activities[1]

Year	BMP 1: Residential Surveys	BMP 2: Residential Retrofits	BMP 3: Pre-Screening System Water Audit	BMP 5: Large Landscape Surveys	BMP 6: High Efficiency Washing Machine Rebate	BMP 7: Public Information Programs	BMP 8: School Programs Students Reached	BMP 9: CII Surveys	BMP 14: Residential ULFT
Pre 2000	5765	5603	Yes	2		Yes	30		5699
2000		1918	Yes			Yes	2045		823
2001	1593	3648	Yes	2		Yes	2045		1892
2002			Yes			Yes	2045		2420
2003			Yes		267	Yes	1580		404
2004	1694	5082	No		499	Yes	3560		349
Meeting Coverage Requirements	No	No	Yes	No	No	Yes	Yes	No	Yes

Notes
1. BMPs 4, 11, 12, and 13 are fully implemented. BMP 10 is not applicable as this district does not provide wholesale water to other agencies.

Table 5-3
Summary of Best Management Practice Implementation

	BMP	Summary of Activities	Coverage Implementation [2] Status
1	Residential Water Surveys	GSWC participates in Water Wise School Education that is accepted by Council as "at least as effective" measure for this BMP.	Coverage requirements are not met.
2	Residential Plumbing Retrofits	GSWC participates in Water Wise School Education that is accepted by Council as "at least as effective" measure for this BMP. Rebates for High-Efficiency Toilets are offered through the Metropolitan Residential Rebate Program.	Coverage requirements are not met.
3	System Water Audits, Leak Detection, and Repair	GSWC completed annual distribution system pre-screening system audits to assess water losses in the distribution system prior to 2004. Historically, the distribution system water losses were less than 10 percent.	Coverage requirements are being met.
4	Metering	All accounts in the Orange County District are metered and are billed by volume.	Fully implemented.
5	Large-Landscape-Conservation Program	Program currently not offered.	Coverage requirements are not met.
6	High-Efficiency-Washing-Machine Rebate Program	Rebates for high-efficiency washers are offered by energy utility providers (Southern California Gas Company) and Metropolitan through the MWDOC. GSWC encourages its customers to participate.	Coverage requirements are not met.
7	Public Information Program [1]	Orange County District has a public information program. GSWC participates in adult education programs offered by Metropolitan ("Protector del Agua") and is a member of Water Education Water Awareness Committee (WEWAC).	Coverage requirements are being met.
8	School Education Program [1]	GSWC participates in Water Wise School Education that is accepted by CUWCC as "at least as effective" measure for this BMP.	Coverage requirements are being met.
9	Conservation Program CII Accounts	GSWC participates in Metropolitan "Save-a-Buck" rebate program tailored for commercial sector.	Coverage requirements are not met.
10	Wholesale-Agency Program [1]	Not applicable.	Not applicable
11	Conservation Pricing [1]	GSWC has adopted conservation pricing, including using water rates that are developed to recover the cost of providing service and billing customers for metered water use. GSWC has uniform water rate structure (i.e. no rate increase/decrease based on the quantity of water used).	Fully implemented.
12	Water Conservation Coordinator [1]	GSWC has a full time water conservation coordinator on staff for all of Region III service areas.	Coverage requirements are being met.
13	Water Waste Prohibition [1]	There is a water waste prohibition ordinance in effect in the Orange County District (CPUC Tariff Rule No. 14.1).	Fully implemented.
14	Residential-Ultra-Low-Flush-Toilet-Replacement Program	GSWC participates in a ULFT replacement program managed by the MWDOC CBO	Fully implemented.

Notes
1. Benefits of these DMM's are considered non-quantifiable.
2. "Implementation" means achieving and maintaining the staffing, funding, and priority levels necessary to achieve the level of activity required to satisfy the target commitment as described in the MOU.

Cost Benefit Analysis

A benefit-cost economic analysis was completed for the quantifiable BMPs that are not meeting coverage requirements (BMP 2, 5, 6, and 9). BMP 1 was not included in this analysis, because the Orange County District is on schedule to meet the 10-year coverage requirement even though it did not meet the coverage requirements for 2003-2004. The benefit-cost analysis was completed with the consideration of economic factors. Noneconomic factors, including environmental, social, health, customer impacts, and new technology, are not believed to be significant and were not considered in the analysis.

The basis and assumptions used in the economic analysis of each BMP, as well as detailed calculations are included in Appendix D. Common assumption for all BMPs is the value of conserved water. Based on information provided by GSWC, the value of water for the Orange County District is $482 per ac-ft. This value was estimated based on the cost of developing new water supply and the real discount rate of 6.71 percent. The analysis assumes that BMPs 1 and 2 (Residential Water Surveys and Plumbing Retrofits) would be done concurrently. Other assumptions with supporting references are described in Table D-1 (Appendix D).

The economic analysis was performed using a spreadsheet program developed by the Council. A separate, customized worksheet for each BMP is presented in Table D-2 (Appendix D). 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 fully implementing a particular BMP. The definition of terms and formulas that are common to all worksheets are presented in Table D-3 (Appendix D).

Table 5-4 summarizes the results of the economic analysis. The table presents the total discounted costs and benefits, the benefit-cost 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.

The economic analysis shows that three BMPs yield benefit-cost ratios greater than one, which indicates that the conservation measures are cost effective. Based on this, GSWC should continue efforts to implement BMPs 5, 6, and 9 that appear to be cost effective.

BMP 2 (Residential Plumbing Retrofits) results in slightly higher costs when compared to the value of water that is saved, and benefit cost ratio of less than one. Signatories of the MOU are not required to implement BMPs that are not cost beneficial. Therefore, GSWC is not required to continue implementation of BMP 2, and should pursue an exemption from implementing this measure with the Council.

Based on the results of the benefit-cost analysis an implementation program was developed for the cost effective BMPs.

Table 5-4
Results of Economic Analysis for BMPs Currently not Meeting Coverage Requirements

	BMP Description	Total Discounted Cost (1)	Total Discounted Benefits (2)	Total Water Saved (ac-ft) (3)	Benefit/ Cost Ratio (4)	Simple Payback Analysis (years) (5)	Discounted Cost/Water Saved ($/ac-ft) (6)	Net Present Value/ Water Saved ($/ac-ft) (7)
2	Residential Plumbing Retrofits	$187,126	$186,332	404	0.996	7	$463	-$2
5	Large Landscape Conservation Programs and Incentives	$580,210	$1,785,009	4,116	3.1	3	$141	$293
6	High-efficiency Washing Machine Rebate Program	$190,488	$241,873	698	1.3	12	$273	$74
9	Conservation Program for CII Accounts	$149,410	$397,272	857	2.7	2	$174	$289

Notes
1. Present value of the sum of financial incentives and operating expenses - using discount rate of 6.71%.
2. Present value of the sum of avoided energy and purchased water costs - using discount rate of 6.71%.
3. Achieved water savings for the implemented BMP.
4. Total discounted benefits divided by total discounted costs.
5. Time horizon in years required for benefits to pay back costs of the BMP.
6. Total discounted costs divided by total water saved.
7. Total of discounted benefits less discounted costs divided by total water saved.

Recommended Conservation Program

GSWC should continue efforts to implement BMPs that are assessed to be cost beneficial (benefit-cost ratio equal or greater than one), and to achieve the target implementation coverage by the end of the implementation period assigned to each BMP.

BMPs 5, 6, and 9 were identified as cost beneficial in the Orange County District; therefore, an implementation program was developed for these BMPs. The program is based on achieving the target coverage requirements, as per the MOU.

Table 5-5 presents the proposed implementation program, including the number of annual interventions required for each BMP to comply with defined coverage requirements; the total annual expenditures necessary to support the interventions; and the estimated annual water savings. The expenditures for BMPs take into consideration the existing programs offered by other agencies in the service area, and reflect only the incremental cost to GSWC to implement BMPs to meet the coverage requirements.

BMPs 7, 8, 10, 11, 12, and 13 were not included in the proposed implementation program because they are considered non-quantifiable. These BMPs have no specific level of effort defined in the MOU, therefore water savings and costs associated with these BMPs were not included in the analysis. The cost for BMP 12 is contained in GSWC overhead. BMPs 3, 4, 11, and 14 are already implemented, and, therefore, have no additional cost associated with them. BMP 13 has no associated cost unless initiated by a water shortage condition.

When implementing water conservation programs, GSWC is subject to economic and legal constraints that need to be considered as they may affect the proposed BMPs implementation schedule.

Economic Considerations

As a private utility, GSWC is subject to the rules and regulations of the California Public Utilities Commission (CPUC). The CPUC approves GSWC's water rate structure and the capital and operating budget, including the budget for implementation of water conservation measures. GSWC is often constrained in the funding available to implement programs. GSWC implements cost effective water conservation programs that have been approved by the CPUC.

While GSWC is fully committed to optimizing its available water resources and implementation of BMPs and DMMs, the Company is currently limited in its ability to do so by certain ratesetting practices of the CPUC. As noted above, the CPUC's draft "Water Action Plan" has as one of its major objectives strengthening water conservation programs to a level comparable to those of energy utilities. While implementation measures have not yet been identified by the CPUC, GSWC has proposed specific changes to current CPUC ratesetting practices which will, as a practical matter, support implementation of the WAP conservation objectives and greatly enhanced DMM's.

The cost of water is an important economic factor that needs to be considered when implementing conservation programs. Higher cost of water increases the attractiveness of BMPs implementation. Currently there are no water projects planned in the Orange County District that would result in higher unit cost of water, thus increasing the feasibility of implementing water conservation measures. However, the marginal cost of water is based on purchased water from the Municipal Water District of Orange County (MWDOC), which is likely to increase with time.

Legal Considerations

GSWC has the legal authority to implement cost beneficial BMPs that were approved by the CPUC in its capital/operating budget. When developing programs that advance water conservation, GSWC can offer financial incentives, information or educational programs in its service area; however, GSWC has no legal authority to enforce urban codes or plumbing codes for new or existing connections that pertain to implementation of efficient devices, or reduction of water use.

Ordinances that prohibit water waste (BMP 13) are jointly developed by CPUC and GSWC. Ordinances are enacted by the CPUC only during water shortage. As a water retailer, GSWC has no legal authority to enact or enforce waste water prohibition ordinances without CPUC approval.

Cost Share Partners

In an effort to expand the breadth of offered programs GSWC partners with wholesale suppliers, energy utilities, and other agencies that support conservation programs. Joint participation offers opportunity for cost sharing and development of more effective conservation strategies.

GSWC obtains water from the Metropolitan Water District of Southern California (Metropolitan) through the MWDOC and actively participates in programs offered by this wholesaler. Metropolitan has a mandate to provide financial incentives or other resources, as appropriate, to the retail water agency customers to further cost effective water conservation efforts. Metropolitan offers the following conservation programs in the Orange County District that provide GSWC an opportunity for cost sharing:

- Rebate program for high-efficiency toilets (BMP 2)
- Rebates for high-efficiency clothes washers, in cooperation with energy utilities (BMP 6)
- Adult education programs (BMP 7)
- Financial incentives for CII sector under its "Save-a-Buck" program (BMP 9)

The GSWC participates in these programs by providing additional funding or resources to implement offered programs. The additional funding may include additional rebate offers, program advertising, or sharing of costs related to organizing events in its service area.

GSWC is a member of the Water Education Water Awareness Committee (WEWAC). WEWAC, which is comprised of local water agencies, forms partnerships with educators and institutions within its service territory and assists in incorporating the water conservation message into the regular curriculum, development of education workshops and other tools.

GSWC is committed to continue efforts to implement cost effective BMPs that are approved by the CPUC, and to achieve, to the extent possible, target implementation coverage by the end of the implementation period assigned to each BMP.

Table 5-5
Summary of Required Interventions, Implementation Cost and Estimated Water Saved for BMPs Not Meeting Coverage Requirements

	BMP 5: Large Landscapes			BMP 6: Washing Machine Rebates			BMP 9: CII Conservation			Total		
Year	Interven-tions	Water Saved (ac-ft/Yr)	Cost ($/Yr)	Interven-tions	Water Saved (ac-ft/Yr)	Cost ($/Yr)	Interven-tions	Water Saved (ac-ft/Yr)	Cost ($/Yr)	Interven-tions	Water Saved (ac-ft/Yr)	Cost ($/Yr)
2006	513	510	$312,163	1311	25	$98,336	101	107	$77,130	1925	642	$487,629
2007	513	1020	$312,163	1311	50	$98,336	101	214	$77,130	1925	1285	$487,629
2008	42	1024	$6,347	0	50	$0	0	214	$0	42	1288	$6,347
2009	42	1027	$6,347	0	50	$0	0	214	$0	42	1291	$6,347
2010	16	518	$2,441	0	50	$0	0	107	$0	16	675	$2,441
2011	16	8	$2,441	0	50	$0	0	0	$0	16	58	$2,441
2012	0	5	$0	0	50	$0	0	0	$0	0	55	$0
2013	0	2	$0	0	50	$0	0	0	$0	0	52	$0
2014	0	1	$0	0	50	$0	0	0	$0	0	51	$0
2015	0	0	$0	0	50	$0	0	0	$0	0	50	$0
2016	0	0	$0	0	50	$0	0	0	$0	0	50	$0
2017	0	0	$0	0	50	$0	0	0	$0	0	50	$0
2018	0	0	$0	0	50	$0	0	0	$0	0	50	$0
2019	0	0	$0	0	50	$0	0	0	$0	0	50	$0
2020	0	0	$0	0	25	$0	0	0	$0	0	25	$0
2021	0	0	$0	0	0	$0	0	0	$0	0	0	$0
2022	0	0	$0	0	0	$0	0	0	$0	0	0	$0
2023	0	0	$0	0	0	$0	0	0	$0	0	0	$0
2024	0	0	$0	0	0	$0	0	0	$0	0	0	$0
2025	0	0	$0	0	0	$0	0	0	$0	0	0	$0
2026	0	0	$0	0	0	$0	0	0	$0	0	0	$0
2027	0	0	$0	0	0	$0	0	0	$0	0	0	$0
2028	0	0	$0	0	0	$0	0	0	$0	0	0	$0
2029	0	0	$0	0	0	$0	0	0	$0	0	0	$0
2030	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Total	1143	4116	$641,903	2622	698	$196,672	201	857	$154,260	3966	5671	$992,835

Chapter 6. Desalination

The Act requires that desalination opportunities be discussed in the UWMP. The Act states:

Section 10631 (i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

Per requirements of California Water Code section 10631(i), this chapter presents opportunities to use desalinated water as a future water supply source for the Cowan Heights System. The reliability of water supply for the Cowan Heights System could be further augmented by the desalination of seawater plans of the Metropolitan Water District of Southern California (Metropolitan) and the local wholesaler, Municipal Water District of Orange County (MWDOC).

Water available from desalination of seawater may increase the reliability of water supply for the System because these projects increase total available water supply for the wholesalers. However, it is not possible at this point to quantify the amount of water from desalination projects that will be available for the GSWC's Cowan Heights System. The following discussion summarizes Metropolitan's and MWDOC's desalination plans.

Metropolitan and its member agencies view seawater desalination as a future component of a diversified water supply portfolio. Recent and continuous breakthroughs in membrane technology have helped to reduce desalination costs, warranting consideration among alternative resource options outlined in Metropolitan's 2003 Integrated Resources Plan (IRP) Update. Metropolitan's IRP Update includes a target goal of up to 150,000 acre-feet per year (ac-ft/yr) of seawater desalination by 2025. This is an important component of the total estimated water supply production for the region.

To achieve the long term goals, Metropolitan initiated the Seawater Desalination Program (SDP) in 2001. As part of the program, Metropolitan is providing support for projects in its service area that would deliver desalted water up to 50,000 ac-ft/yr, including committed financial assistance of up to $250 per ac-ft of water for supplies developed and delivered to the Metropolitan's distribution system for a period of up to 25 years. In addition, Metropolitan has an established a desalination research program. As part of this program, the agency is providing $250,000 to five member agencies to conduct research and investigation in various aspects of seawater desalination. Metropolitan is also involved in efforts to assess current desalination projects and to compare project features and applicability to Southern California. Furthermore, Metropolitan, in association with member agencies, is involved in assessing established and emerging desalination treatment technologies, pretreatment alternatives, and brine disposal issues, as well as the permitting and regulatory approvals associated with the delivery of desalinated seawater to regional and local distribution systems.

The MWDOC is proactively researching new water supplies, and sees ocean water desalination as an economically viable source of future water supply. MWDOC is one of the five agencies (other four agencies are: Los Angeles Department of Water and Power, West

Basin Municipal Water District, Long Beach Water Department, and San Diego County Water Authority) who submitted proposal for meeting Metropolitan's goal of 150,000 ac-ft/yr of water supply from seawater desalinated projects by 2025. In Orange County, there are three proposed seawater desalination projects that could serve MWDOC and its member agencies with additional water supply. These are the Poseidon Resources proposed Huntington Beach Seawater Desalination Project, the joint San Diego County Water Authority (SDCWA) and MWDOC proposed Regional San Onofre Seawater Desalination Project, and the MWDOC proposed Dana Point Ocean Desalination Project.

Under the Poseidon Resources Corporation Proposed Project, it is being planned to provide 50 million gallons per day (mgd) of desalinated water supply for distribution into coastal and south Orange County. In 2003, the City of Huntington Beach disapproved the project citing that project would cause unacceptable environmental impacts according to the California Environmental Quality Act (CEQA). Since then, Poseidon has submitted a revised Draft Environmental Impact Report for reconsideration by the City. At this time, there are no current agreements with water agencies in Orange County for purchase of the product water.

The joint SDCWA and MWDOC proposed Regional San Onofre Seawater Desalination Project is currently being investigated to determine project feasibility. The project size is yet to be determined, but a large facility is being investigated (50 to 150 mgd). A feasibility investigation will be conducted to review the feedwater supply and brine disposal facilities. Delivery of the product water into MWDOC and SDCWA service areas will be explored for investigating pumping requirements and connecting pipelines. This project's time frame has been estimated by SDCWA for implementation in 2020.

MWDOC is currently investigating the feasibility of an ocean water desalination plant in Dana Point adjacent to San Juan Creek. At this time, the overall feasibility investigation is focused in three areas: (1) feedwater supply utilizing a subsurface intake system, (2) concentrated RO reject seawater co-disposal through an existing South Orange County Wastewater Authority ocean outfall, and (3) energy supply. If completed, this project will provide both system and supply reliability to the south Orange County area. According to MWDOC's 2000 feasibility study, the site may be feasible for a 25 mgd desalination project. It was found that utilization of a sub-surface intake system for feedwater supply may be feasible at this location. Due to environmental issues, a decision was made to conduct a more extensive hydrogeology investigation into the feasibility of subsurface intakes at this location. MWDOC has received a California Department of Water Resources Proposition 50 Desalination Research and Development Grant proposal in the amount of $1,000,000 to investigate combining horizontal directional drilling with water well technology for use in constructing long, larger diameter feedwater supply wells in the marine alluvial channel system.

Table 6-1 provides a summary of opportunities for water desalination. As it has been mentioned earlier, the future desalination projects of Metropolitan and MWDOC will collectively increase the reliability of water supply for the region. However, it is not known the exact quantity that will be allotted for the GSWC's Cowan Heights System.

Table 6-1
Summary of Opportunities for Water Desalination

Source of Water	Yield (ac-ft/yr)	Start Date	Type of Use	Other
Seawater (Metropolitan)	150,000	2025	Potable water	N/A
Poseidon Resources Huntington Beach Seawater Desalination	56,000	N/A	N/A	N/A
A joint SDCWA and MWDOC San Onofre Seawater Desalination	56,000 – 168,000	2020	N/A	N/A
Dana Point Ocean Desalination	28,000	N/A	N/A	N/A

Notes
1. Table format based on DWR Guidance Document Table 18

Chapter 7. Water Shortage Contingency Plan

Section 10632 of the Act details the requirements of the water-shortage contingency analysis. The Act states the following:

Section 10632. The plan shall provide an urban water-shortage contingency analysis that includes each of the following elements that are within the authority of the urban water supplier:

(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions, which are applicable to each stage.

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(d) Additional, mandatory prohibitions against specific water-use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water-use reduction consistent with up to a 50 percent reduction in water supply.

(f) Penalties or charges for excessive use, where applicable.

(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(h) A draft water shortage contingency resolution or ordinance.

(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

This chapter documents GSWC's Water Shortage Contingency Plan for the Cowan Heights System per requirements of Section 10632 of the Act. The Water Shortage Contingency Plan is based on Rule No. 14.1 Mandatory Water Conservation, Restrictions and Ratings Program adopted by GSWC. Appendix F contains the full text of the rule.

The purpose of the Water Shortage Contingency Plan is to provide a plan of action to be followed during the various stages of a water shortage. The plan includes the following elements: action stages, estimate of minimum supply available, actions to be implemented during a catastrophic interruption of water supplies, prohibitions, penalties and consumption reduction methods, revenue impacts of reduced sales, and water use monitoring procedures.

Action Stages

The Act requires documentation of actions to be undertaken during a water shortage. GSWC has developed actions to be undertaken in response to water supply shortages, including up to a 50 percent reduction in water supply. Implementation of the actions is dependent upon approval of the California Public Utilities Commission (CPUC), especially for implementing mandatory water use restriction. CPUC has jurisdiction over GSWC because GSWC is an investor-owned water utility. Section 357 of the California Water Code requires that suppliers that are subject to regulation by the CPUC secure its approval before imposing water consumption regulations and restrictions required by water supply shortage emergencies. GSWC has proposed that the CPUC support implementation of water shortage allocation policies by amending Commission Rule 14.1 to (a) adopt specific rationing rates and restrictor valve removal fees; and (b) provide for a shortened authorization period to implement emergency measures such as mandatory conservation and rationing in order to effectively manage water shortages.

GSWC has grouped the actions to be taken during a water shortage into four stages, I through IV, that are based on the water supply conditions. Table 7-1 describes the water supply shortage stages and conditions. The stages will be implemented during water supply shortages according to shortage level, ranging from 5 percent shortage in Stage I to 50 percent shortage in Stage IV. The stage determination and declaration during a water supply shortage will be made by the Regional Vice President of Customer Service.

Table 7-1
Water Supply Shortage Stages and Conditions

Stage No.	Water Shortage Supply Conditions	Shortage Percent
I	Minimum	5 -10
II	Moderate	10 - 20
III	Severe	20 – 35
IV	Critical	35 - 50

Notes
1. This table is based on the DWR Guidebook Table 23.

The actions to be undertaken during each stage include, but are not limited to, the following:

Stage I (5 - 10 percent shortage) - Water alert conditions are declared and voluntary conservation is encouraged. The drought situation is explained to the public and governmental bodies. GSWC explains the possible subsequent water shortage stages in order to forecast possible future actions for the customer base. The activities performed by GSWC during this stage include, but are not limited to:

- Public information campaign consisting of distribution of literature, speaking engagements, bill inserts, and conversation messages printed in local newspapers
- Educational programs in area schools

- Conservation Hotline, a toll free number with trained Conservation Representatives to answer customer questions about conservation and water use efficiency

Stage II (10 - 20 percent shortage) – Stage II will include actions undertaken in Stage I. In addition, GSWC may propose voluntary conservation allotments and/or require mandatory conservation rules. The severity of actions depends upon the percent shortage. The level of voluntary or mandatory water use reduction requested from the customers is also based on the severity. It needs to be noted that prior to implementation of any mandatory reductions, GSWC must obtain approval from CPUC. If necessary, GSWC may also support passage of drought ordinances by appropriate governmental agencies.

Stage III (20 - 35 percent shortage) – Stage III is a severe shortage that entails or includes allotments and mandatory conservation rules. This phase becomes effective upon notification by the GSWC that water usage is to be reduced by a mandatory percentage. GSWC implements mandatory reductions after receiving approval from CPUC. Rate changes are implemented to penalize excess usage. Water use restrictions are put into effect, i.e. prohibited uses can include restrictions of daytime hours for watering, excessive watering resulting in gutter flooding, using a hose without a shutoff device, use of non-recycling fountains, washing down sidewalks or patios, unrepaired leaks, etc. GSWC monitors production weekly for compliance with necessary reductions. Use of flow restrictors is implemented, if abusive practices are documented.

Stage IV (35 - 50 percent shortage) – This is a critical shortage that includes all steps taken in prior stages regarding allotments and mandatory conservation. All activities are intensified and production is monitored daily by GSWC for compliance with necessary reductions.

Minimum Supply

The Act requires an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for GSWC's water supply.

Table 7-2 summarizes the minimum volume of water available from each source during the next three years based on multiple-dry water years and normal water year. The driest three-year historic sequence is provided in Chapter 3. First, the normal water supply quantities for 2006 to 2008 are calculated by linearly interpolating the projected water supplies of 2005 and 2010 (see Chapter 3 for water supplies for 2005 and 2010). Then, the minimum water supplies were calculated based on the percentages of total normal year water supplies provided by MWDOC. This approach was applied for both imported water and groundwater.

MWDOC has provided analysis that estimates minimum water supplies in multiple dry year periods will be greater than minimum supplies in normal year periods (see MWDOC's 2005 UWMP for details). Increases in water supply during multiple dry year periods result from increased imported water to offset the reduction in groundwater supplies.

GSWC's supply is expected to be 100 percent reliable from 2005 to 2008. This reliability is a result of groundwater supplies and the projected reliability of MWDOC, a member agency

of Metropolitan, which expects to provide reliable imported water supplies. In addition, OCWD is implementing projects to ensure reliability of the Orange County Groundwater Basin (see Chapters 3 and 10 for details).

Table 7-2
Three-Year Estimated Minimum Water Supply in ac-ft/yr

Source	2006	2007	2008	2005 Average year
Purchased water	1,870	2,058	2,041	1,561
Groundwater	1,693	1,520	1,665	1,726
Recycled water	0	0	0	0
Total	3,563	3,578	3,706	3,287

Notes
1. This table is based on the DWR Guidebook Table 24.

Catastrophic Supply Interruption Plan

The Act requires documentation of actions to be undertaken by the water supplier to prepare for, and implement during a catastrophic interruption of water supplies. A catastrophic interruption constitutes a proclamation of a water shortage and could be any event (either natural or man-made) that causes a water shortage severe enough to classify as either a Stage III or Stage IV water supply shortage condition.

In order to prepare for catastrophic events, GSWC has prepared an Emergency Response Plan (ERP) in accordance with other state and federal regulations. The purpose of this plan is to design actions necessary to minimize the impacts of supply interruptions due to catastrophic events.

The ERP coordinates overall company response to a disaster in any and all of its districts. In addition, the ERP requires each district to have a local disaster plan that coordinates emergency responses with other agencies in the area. The ERP also provides details on actions to be undertaken during specific catastrophic events. Table 7-3 provides a summary of actions cross-referenced against specific catastrophes for three of the most common possible catastrophic events: regional power outage, earthquake, and malevolent acts.

In addition to specific actions to be undertaken during a catastrophic event, GSWC performs maintenance activities, such as annual inspections for earthquake safety, and budgets for spare items, such as auxiliary generators, to prepare for potential events.

Table 7-3
Summary of Actions for Catastrophic Events

Possible Catastrophe	Summary of Actions
Regional power outage	• Isolate areas that will take the longest to repair and/or present a public health threat. Arrange to provide emergency water. • Establish water distribution points and ration water if necessary. • If water service is restricted, attempt to provide potable water tankers or bottled water to the area. • Make arrangements to conduct bacteriological tests, in order to determine possible contamination. • Utilize backup power supply to operate pumps in conjunction with elevated storage.
Earthquake	• Assess the condition of the water supply system. • Complete the damage assessment checklist for reservoirs, water treatment plants, wells and boosters, system transmission and distribution. • Coordinate with OES utilities group or fire district to identify immediate fire fighting needs. • Isolate areas that will take the longest to repair and/or present a public health threat. Arrange to provide emergency water. • Prepare report of findings, report assessed damages, advise as to materials of immediate need and identify priorities including hospitals, schools and other emergency operation centers. • Take actions to preserve storage. • Determine any health hazard of the water supply and issue any “Boil Water Order” or “Unsafe Water Alert” notification to the customers, if necessary. • Cancel the order or alert information after completing comprehensive water quality testing. • Make arrangements to conduct bacteriological tests, in order to determine possible contamination.
Malevolent acts	• Assess threat or actual intentional contamination of the water system. • Notify local law enforcement to investigate the validity of the threat. • Get notification from public health officials if potential water contamination • Determine any health hazard of the water supply and issue any “Boil Water Order” or “Unsafe Water Alert” notification to the customers, if necessary. • Assess any structural damage from an intentional act. • Isolate areas that will take the longest to repair and or present a public health threat. Arrange to provide emergency water.

Notes
1. This table is based on the DWR Guidebook Table 25.

Prohibitions, Penalties, and Consumption Reduction Methods

The Act requires an analysis of mandatory prohibitions, penalties, and consumption reduction methods against specific water use practices which may be considered excessive during water shortages. Given that GSWC is an investor owned entity, it does not have the authority to pass any ordinances enacting specific prohibitions or penalties. In order to enact or rescind any prohibitions or penalties, GSWC would seek approval from CPUC to enact or rescind Rule No. 14.1, Mandatory Conservation and Rationing, which is presented in Appendix F. When Rule No. 14.1 has expired or is not in effect, mandatory conservation and rationing measures will not be in force. GSWC has requested that the CPUC support implementation of water shortage allocation policies by amending Commission Rule 14.1 to (a) adopt specific rationing rates and restrictor valve removal fees; and (b) provide for a shortened authorization period to implement emergency measures such as mandatory conservation and rationing in order to effectively manage water shortages.

Rule No. 14.1 details the various prohibitions and sets forth water use violation fines, charges for removal of flow restrictors, as well as establishes the period during which mandatory conservation and rationing measures will be in effect. The prohibitions on various wasteful water uses, include, but are not limited to, the hose washing of sidewalks and driveways using potable water, and cleaning for filling decorative fountains. Table 7-4 summarizes the various prohibitions and the stages during which the prohibition becomes mandatory.

Table 7-4
Summary of Mandatory Prohibitions

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Uncorrected plumbing leaks	II, III, IV
Watering which results in flooding or run-off in gutters, waterways, patios, driveway, or streets	II, III, IV
Washing aircraft, cars, buses, boats, trailers, or other vehicles without a positive shut-off nozzle on the outlet end of the hose	II, III, IV
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	II, III, IV
Irrigation of non-permanent agriculture	II, III, IV
Use of water for street watering with trucks or for construction purposes unless no other source of water or other method can be used	II, III, IV
Use of water for decorative fountains or the filling or topping off of decorative lakes or ponds	II, III, IV
Filling or refilling of swimming pools	II, III, IV

Notes
1. This table is based on the DWR Guidebook Table 26.

In addition to prohibitions during water supply shortage events requiring a voluntary or mandatory program, GSWC will make available to its customers water conservation kits as required by GSWC's Rule No. 20. GSWC will notify all customers of the availability of conservation kits.

In addition to prohibitions, Rule No. 14.1 provides penalties and charges for excessive water use. The enactment of these penalties and charges is contingent on approval of Rule 14.1 implementation by the CPUC. When the rule is in effect, violators receive one verbal and one written warning after which a flow-restricting device may be installed in the violator's service for a reduction of up to 50 percent of normal flow or 6 ccf per month, whichever is greater. Table 7-5 summarizes the penalties and charges and the stage during which they take effect.

Table 7-5
Summary of Penalties and Charges for Excessive Use

Penalties or Charges	Stage When Penalty Takes Effect
Penalties for not reducing consumption	III, IV
Charges for excess use	III, IV
Flat fine; Charge per unit over allotment	III, IV
Flow restriction	III, IV
Termination of Service	III, IV

Notes
1. This table is based on the DWR Guidebook Table 28.

In addition to prohibitions and penalties, GSWC can use other consummation reduction methods to reduce water use up to 50 percent. Based on the requirements of the Act, Table 7-6 summarizes the methods that can be used by GSWC in order to enforce a reduction in consumption, where necessary.

Table 7-6
Summary of Consumption Reduction Methods

Consumption Reduction Method	Stage When Method Takes Effect	Projected Reduction Percentage
Demand reduction program	All Stages	N/A
Reduce pressure in water lines; Flow restriction	III, IV	N/A
Restrict building permits; Restrict for only priority uses	II, III, IV	N/A
Use prohibitions	II, III, IV	N/A
Water shortage pricing; Per capita allotment by customer type	II, IV	N/A
Plumbing fixture replacement	All Stages	N/A

Table 7-6
Summary of Consumption Reduction Methods

Consumption Reduction Method	Stage When Method Takes Effect	Projected Reduction Percentage
Voluntary rationing	II	N/A
Mandatory rationing	III, IV	N/A
Incentives to reduce water consumption; Excess use penalty	III, IV	N/A
Water conservation kits	All Stages	N/A
Education programs	All Stages	N/A
Percentage reduction by customer type	III, IV	N/A

Notes
1. This table is based on the DWR Guidebook Table 27.

Revenue Impacts of Reduced Sales

Section 10632(g) of the Act requires an analysis of the impacts of each of the actions taken for conservation and water restriction on the revenues and expenditures of the water supplier. Because GSWC is an investor owned water utility and, as such, is regulated by the CPUC, the CPUC authorizes it to establish memorandum accounts to track expenses and revenue shortfalls caused by both mandatory rationing and voluntary conservation efforts. Utilities with CPUC-approved water management plans are authorized to implement a surcharge to recover revenue shortfalls recorded in their drought memorandum accounts. Table 7-7 provides a summary of actions with associated revenue reductions; while Table 7-8 provides a summary of actions and conditions that impact expenditures. Table 7-9 summarizes the proposed measures to overcome revenue impacts. Table 7-10 provides a summary of the proposed measures to overcome expenditure impacts.

Table 7-7
Summary of Actions and Conditions that Impact Revenue

Type	Anticipated Revenue Reduction
Reduced sales	Reduction in revenue will be based on the decline in water sales and the corresponding quantity tariff rate
Recovery of revenues with CPUC approved surcharge	Higher rates may result in further decline in water usage and further reduction in revenue

Notes
1. This table is based on a DWR Guidebook table on page 59.

Table 7-8
Summary of Actions and Conditions that Impact Expenditures

Category	Anticipated Cost
Increased staff cost	Salaries and benefits for new hires required to administer and implement water shortage program
Increased O&M[(2)] cost	Operating and maintenance costs associated with alternative sources of water supply
Increased cost of supply and treatment	Purchase and treatment costs of new water supply

Notes
1. This table is based on a DWR Guidebook table on page 59.
2. Operations and maintenance.

Table 7-9
Proposed Measures to Overcome Revenue Impacts

Names of Measures	Summary of Effects
Obtain CPUC approved surcharge	Allows for recovery of revenue shortfalls brought on by water shortage program
Penalties for excessive water use	Obtain CPUC approval to use penalties to offset portion of revenue shortfall

Notes
1. This table is based on the DWR Guidebook Table 29.

Table 7-10
Proposed Measures to Overcome Expenditure Impacts

Names of Measures	Summary of Effects
Obtain CPUC approved surcharge	Allows for recovery of increased expenditures brought on by water shortage program
Penalties for excessive water use	Obtain CPUC approval to use penalties to offset portion of increased expenditures

Notes
1. This table is based on the DWR Guidebook Table 30.

Water-Use Monitoring Procedures

The Act asks for an analysis of mechanisms for determining actual reduction in water use when the Water Shortage Contingency Plan is in effect. Table 7-11 lists the possible mechanisms used by GSWC to monitor water use and the quality of data expected.

Table 7-11
Water-Use Monitoring Mechanisms

Mechanisms for Determining Actual Reductions	Type and Quality of Data Expected
Customer meter readings	Hourly/daily/monthly water consumption data for a specific user depending on frequency of readings
Production meter readings	Hourly/daily/monthly water production depending on frequency of readings; correlates to water use plus system losses

Notes
1. This table is based on the DWR Guidebook Table 31.

In addition to the specific actions that GSWC can undertake to verify level of conservation, GSWC can monitor long-term water use through regular bi-monthly meter readings, which gives GSWC the ability to flag exceptionally high usage for verification of water loss or abuse.

Chapter 8. Recycled Water Plan

Section 10633 details the requirements of the Recycled Water Plan to be included in the Act. The Act states the following:

Section 10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(c) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(e) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(f) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

Coordination

Table 8-1 summarizes the role of the agencies that participate in the development of recycled water plans that affect the Cowan Heights System of the Golden State Water Company (GSWC).

Table 8-1
Role of Participating Agencies in the Development of the Recycled Water Plan

Participating Agencies	Role in Plan Development
Water agencies	GSWC works closely with the Orange County Sanitation District in providing data for planning a potential recycled water distribution system and identifying potential recycled water customers. The Orange County Sanitation District, acting as the recycled water wholesaler, would lead the way in implementing the recycled water plan and distribution network.
Wastewater agencies	The Orange County Sanitation District provides a reliable supply of recycled water that meets California recycled water quality standards set forth in Title 22 of the California Code of Regulations.
Groundwater agencies	The Orange County Sanitation District and the Orange County Water District coordinate and implement the Groundwater Replenishment System.
Planning agencies	GSWC, the Orange County Sanitation District, the Orange County Water District, and the affected city governments, play a key role in conducting data and customer assessments, as well as analyzing community and economic impacts.

Notes
1. This table is based on the DWR Guidebook Table 32.

Wastewater Quantity, Quality, and Current Uses

Wastewater in the Cowan Heights System is collected by a network of gravity sewers and lift stations owned Orange County. The wastewater is then transported by trunk sewers to the Orange County Sanitation District's (OCSD) Plant 1 in Fountain Valley and/or Plant 2 in Huntington Beach.

Plants 1 and 2 provide primary and secondary treatment for an average dry weather flow (DWF) of 87 and 151 million gallons of wastewater per day (mgd), respectively. Plant 1 has a design capacity of 174 mgd, and Plant 2 has a design capacity of 276 mgd. The plants operated by the OCSD serve residential and commercial customers in 21 cities and three special districts. Currently, the majority of the treated effluent is discharged into the Pacific Ocean through a one-mile diffuser section, five miles offshore. The OCSD treats 10 mgd to meet recycled water standards. This water is used throughout the region for landscape irrigation as well as for groundwater recharge to increase the seawater intrusion barrier; however, there are no recycled water uses within the boundaries of the Cowan Heights System.

Because the OCSD Plants 1 and 2 treat wastewater for a larger population than is accounted for in the Cowan Heights System, an estimated per capita wastewater generation factor was used to calculate the volume of wastewater generated by the customers in the Cowan Heights System. The wastewater generation factor is based on the population served and the combined average DWF for the two treatment plants. The OCSD serves 2.4 million residents and treats a total of 238 mgd, making the average per capita wastewater generation factor 99 gallons per day (gpd). This per capita wastewater generation factor was

used to estimate the wastewater generation in the Cowan Heights System; Table 8-2 summarizes the estimates of existing and projected volumes of wastewater collected and treated in the Cowan Heights System. In addition, of the 238 mgd treated at Plants 1 and 2, the OCSD treats 10 mgd to meet recycled water quality standards, or 4.2 percent. The same percentage was used to estimate the fraction of the wastewater from the Cowan Heights System that is treated to meet recycled water standards up until the year 2010 (refer to Table 8-2). As discussed below, in 2007 the OCSD, in conjunction with the Orange County Water District, plans to implement a groundwater recharge program, treating up to 70 mgd (or 29.4 percent) to meet recycled water standards. Therefore, starting in the year 2010, Table 8-2 reflects an increase in the volume of wastewater treated to meet recycled standards.

Because 10 mgd (4.2 percent) of the wastewater collected by OCSD is treated to meet recycled water standards, the remaining effluent (228 mgd or 95.8 percent) is discharged into the Pacific Ocean through a diffuser pipe offshore (refer to Table 8-3). As discussed below, in 2007 the OCSD plans to implement a groundwater recharge program, treating up to 70 mgd (29.4 percent) and using it to replenish the groundwater basin. Therefore, the volume of treated water that is discharged into the Pacific Ocean is reduced to 70.6 percent after the year 2010 and is reflected in Table 8-3**.**

Table 8-4 was intentionally left blank because there are no existing recycled water sales in the Cowan Heights System.

Table 8-2
Estimates of Existing and Projected Wastewater Collection and Treatment in ac-ft/yr (mgd) for the Cowan Heights System

	2000[(2)]	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Projected population in service area	5,259	5,441	5,563	5,623	5,672	5,718	5,763
Wastewater collected & treated in service area	586 (0.52 mgd)	606 (0.54 mgd)	620 (0.55 mgd)	626 (0.56 mgd)	632 (0.56 mgd)	637 (0.57 mgd)	642 (0.57 mgd)
Quantity that meets recycled water standard	25 (0.02 mgd)	26 (0.02 mgd)	182 (0.16 mgd)	184 (0.16 mgd)	186 (0.16 mgd)	187 (0.17 mgd)	188 (0.17 mgd)

Notes
1. This table is based on the DWR Guidebook Table 33.
2. Based on actual year.
3. Values of wastewater collected and treated are estimated. For a description of the methodology, refer to the text.

Table 8-3
Estimates of Existing and Projected Disposal of Wastewater In ac-ft/yr (mgd) for the Cowan Heights System

Method of Disposal	Treatment Level	2000[(2)]	2005	2010	2015	2020	2025	2030
Discharge into the Pacific Ocean	Secondary	558 (0.50)	581 (0.52)	438 (0.39)	442 (0.40)	446 (0.40)	450 (0.40)	453 (0.40)

Notes
1. This table is based on the DWR Guidebook Table 34.
2. Based on actual year.
3. Volumes of effluent discharged are estimated. For a description of the methodology, refer to the text.

Table 8-4
Existing Recycled Water Use in the Cowan Heights System

Type of Use	Treatment Level	2004 Use (ac-ft/yr)
N/A	N/A	N/A

Notes
1. This table is based on the DWR Guidebook Table 35a.

Potential and Projected Use

In conjunction with the OCSD, the Orange County Water District (OCWD) is in the process of implementing a Groundwater Replenishment (GWR) System that will result in the reuse of 70 mgd. The wastewater will be treated using microfiltration, reverse osmosis, and ultra-violet and hydrogen peroxide disinfection. The first phase of the project will be completed by 2007. The recycled water treatment plant was designed so that it can be expanded in order to increase the treatment capacity; however, any capacity expansion would require approval by the OCWD Board. Because this stage has not been reached, this UWMP assumes that the recycled water capacity is 70 mgd through the year 2030. Future UWMPs will need to confer with OCWD and OCSD to obtain more information on plant expansion plans.

However, OCSD does not have any plans to distribute recycled water to the Cowan Heights System. Therefore, Table 8-5 and Table 8-6 were intentionally left blank because they are not applicable for this system. Finally, in the UWMP for the Cowan Heights System (2000), there were no projections of recycled water by the year 2005. Therefore, Table 8-7 has intentionally been left blank.

Table 8-5
Potential Future Recycled Water Uses in ac-ft/yr

Type of Use	Treatment Level	2010	2015	2020	2025	2030
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes
1. This table is based on the DWR Guidebook Table 35b.

Table 8-6
Projected Future Recycled Water Use in Service Area in ac-ft/yr

Type of Use	2010	2015	2020	2025	2030
N/A	N/A	N/A	N/A	N/A	N/A

Notes
1. This table is based on the DWR Guidebook Table 36.

Table 8-7
Comparison of Recycled Water Uses—Year 2000 Projections versus 2005 Actual

Type of Use	2000 Projection for 2005	2005 Actual Use
N/A	N/A	N/A

Notes
1. This table is based on the DWR Guidebook Table 37.

Optimization and Incentives for Recycled Water Use

As the owner and operator of Plants 1 and 2, OCSD is responsible for determining the technical and economic feasibility of supplying recycled water to the Cowan Heights System. Because there are currently no plans to provide recycled water to the Cowan Heights System, there are no actions in place at this time by which GSWC is encouraging the use of recycled water in their system. Therefore, Table 8-8 is not applicable for this system and has been intentionally left blank. Indirect water reuse through groundwater recharge does not necessitate incentives. Groundwater recharge increases the available potable water supply, keeping the cost of water to consumers lower by decreasing the need to develop new water supply sources.

Table 8-8
Methods to Encourage Recycled Water Use and the Resulting Projected Use in ac-ft/yr

Actions	2010	2015	2020	2025	2030
N/A	N/A	N/A	N/A	N/A	N/A

Notes
1. This table is based on the DWR Guidebook Table 38.

Chapter 9. Water Quality

Section 10634 of the Act requires an analysis of water quality issues and their impact to supply reliability. The Act states as follows:

Section 10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631 and the manner in which water quality affects water management strategies and supply reliability.

GSWC Measures for Water Quality Regulation Compliance

To facilitate full compliance with water quality laws and regulations, GSWC maintains a water quality department that has independent lines of reporting authority within the organization. The water quality department is headed by a company officer specifically assigned to oversee and manage the company's water quality program. The Vice President of Water Quality has a staff of three managers, located in each of the company's regional offices. Water quality managers, in turn, manage a staff of water quality engineers and technicians that are assigned to district offices. Each district office is assigned one water quality engineer and at least one water quality technician to provide direct support to the local drinking water systems within the district.

The district water quality engineer is the main point of contact for the Department of Health Services as well as other regulatory agencies. The water quality engineer also is responsible for coordinating compliance measures through scheduling required sample collection, preparing water quality related plans, maintaining a water quality database, providing training to operations, implementing a cross connection control program, and preparing and submitting monitoring reports, permit applications and other regulatory related correspondence.

As a whole, the water quality department monitors and participates in the development of new water quality related laws and regulations. Through routine department meetings and training, the district water quality engineers are kept up to date with changing water quality regulations and related technology. These efforts contribute towards maintaining a pool of trained water quality professionals that can be utilized throughout the company. This provides the company the ability to respond to a wide variety of water quality issues or emergencies.

Current and Proposed Water Quality Regulations

Environmental Protection Agency (EPA) and the State of California have established, or will develop, the following key primary water quality regulations under the Safe Drinking Water Act (SDWA). The Current and proposed water quality regulations listed below are discussed in the following paragraphs. These regulations apply to community and non-community water systems, which includes those of Golden State Water Company (GSWC)

and may affect the GSWC water treatment facilities, treatment processes used, and monitoring requirements. See Table 9-1 for the status of current and proposed water quality regulations.

- Total Coliform Rule (TCR)
- Surface Water Treatment Rules
  - Surface Water Treatment Rule (SWTR)
  - *Cryptosporidium* Action Plan
  - Interim Enhanced SWTR (IESWTR)
  - Long Term 1 Enhanced SWTR (LT1ESWTR)
  - Long Term 2 Enhanced SWTR (LT2ESWTR)
- Disinfectant/Disinfection By-Product Rules
  - Total Trihalomethanes (TTHMs) Rule
  - Disinfectant/Disinfection By-Product (D/DBP) Rule Stage 1
  - Disinfectant/Disinfection By-Product (D/DBP) Rule Stage 2
- Volatile Organic, Synthetic Organic and Inorganic Chemical Rules
  - Volatile Organic Chemicals Rule
  - Phase IIA Fluoride Rule
  - Phase IIA Synthetic Organic Chemicals and Inorganic Chemicals Rule
  - Phase V Synthetic Organic Chemicals and Inorganic Chemicals Rule
- Groundwater Rule
- Filter Backwash Rule
- Lead and Copper Rule
- Arsenic Rule
- Radionuclide Rule
- Radon Rule
- Drinking Water Candidate Contaminant List

Safe Drinking Water Act (SDWA)

Under the federal SDWA of 1974, EPA established drinking water regulations for 23 contaminants. The SDWA Amendments of 1986 required EPA to set maximum contaminant levels (MCLs) for 83 specific constituents and to set MCLs for an additional 25 constituents every 3 years, indefinitely. The 1996 SDWA amendments retained the requirement to regulate the 83 contaminants imposed by the 1986 amendments but removed the requirement for 25 additional contaminants every 3 years and established a different process for selecting contaminants for regulation.

Under the 1996 SDWA amendments, EPA must:

- Publish a list of contaminants that may require regulation under the SDWA no later than February 6, 1998, and every 5 years thereafter
- Consult with the scientific community, including the Science Advisory Board, when preparing the list
- Provide notice and opportunity for public comment on the list

- Establish an occurrence database to be considered when EPA makes decisions to regulate contaminants that are known or anticipated to occur in public water systems
- Decide whether to regulate no fewer than five listed contaminants, no later than August 6, 2001, and every 5 years thereafter

To regulate a contaminant, EPA must find that the contaminant has an adverse effect on human health, that it occurs or is likely to occur in public water systems at a frequency and at concentrations of public health concern, and that regulation of the contaminant presents a meaningful opportunity to reduce health risks for those served by public water systems.

The status of the regulations, including the final rules and those that are still being formulated, are discussed below and summarized in Table 9-1. The current national primary drinking water standards, which are those standards related to health, are shown in Table 9-2. EPA considers compliance with secondary standards, which are those standards related to the aesthetic quality of water, to be optional; but, in California, secondary standards are mandatory unless the population served consents otherwise. The California secondary drinking water standards are shown in Table 9-3

Primacy

EPA has delegated primary enforcement responsibility for drinking water program implementation and enforcement to the state of California. To maintain primacy (authority to enforce drinking water regulations) under the SDWA, the state must adopt drinking water regulations at least as stringent as the federal regulations and meet other relevant criteria. State drinking water regulations may be more stringent than the federal regulations, but not less stringent. In California, the California Department of Health Services (CDHS) is the primacy agency for drinking water regulations.

Table 9-1
Status of Drinking Water Regulations

Regulation	Contaminants	Status
Final Rules		
NIPDWR	18 original contaminants	Rule final 1975
Interim Radionuclides	4 additional radionuclides	Rule final 1976
Total Trihalomethanes	Sum of four trihalomethanes	Rule final 1979
Revised Fluoride	Fluoride	Rule final 1986
VOCs (Phase I)	8 VOCs	Rule final 1987
SWTR	Treatment tech. (*Giardia* and viruses)	Rule final 1989
TCR	Total coliforms, fecal coliforms, *E. coli*	Rule final 1989
Lead and Copper Rule	Lead, copper	Rule final 1991
SOCs, IOCs (Phase II)	36 IOCs, SOCs, and pesticides	MCLs final 1991
SOCs, IOCs (Phase IV)	5 IOCs, 18 SOCs	MCLs final 1992
D/DBP Rule Stage 1	Disinfectants, disinfection by-products	Rule final 1998
IESWTR	Treatment Tech. (*Cryptosporidium*)	Rule final 1998
Radionuclides	Radionuclides (other than Radon)	Rule final 2000
Arsenic[1]	Arsenic	Rule final 2001, new MCL of 10 µg/L effective January 23, 2006

Table 9-1
Status of Drinking Water Regulations

Regulation	Contaminants	Status
LT1ESWTR	Extends IESWTR to small utilities	Rule final 2001
Filter Backwash Rule	Regulate Filter Backwash recycle	Rule final 2001
Methyl Tertiary Butyl Ether	MTBE	Rule final 2001
Drinking Water Contaminant Candidate List[1]	No less than 5 Contaminants	Decision to regulate in 2001, revised DWCCL in 2003 and every 5 years thereafter
Proposed Rules		
LT2ESWTR[1]	Revision of IESWTR to control *Cryptosporidium*	Proposed August 2003, missed May 2002 SDWA deadline. Final rule expected 2005
D/DBP Rule Stage 2[1]	Revision of D/DBP Rule Stage 1 for distribution system monitoring	Proposed August 2003, missed May 2002 SDWA deadline. Final rule expected 2005
Groundwater Rule[1]	Virus, groundwater disinfection	Proposed May 2000, missed May 2002 SDWA deadline. Final rule expected 2005
Future Rules		
Radon[1]	Radon	Proposed November 1999, EPA has not indicated a final schedule for promulgation
TCR Revisions[1]	Distribution System Issues	Potentially proposed mid-2006, final rule by 2008

Notes
1. Regulation with potential future impact to GSWC.

Table 9-2
Current Federal Drinking Water Standards

Parameter	mg/L (except as noted)
Inorganic Contaminants	**MCL**
Antimony	0.006
Arsenic[1]	0.05
Asbestos	7×10^6 Fibers/L
Barium	2
Beryllium	0.004
Bromate	0.010
Cadmium	0.005
Chlorite	0.8
Chromium	0.1
Cyanide	0.2
Fluoride	4
Mercury	0.002
Nickel	0.1
Nitrate (as N)	10
Nitrite (as N)	1
Nitrate plus Nitrite (both as N)	10
Selenium	0.05
Thallium	0.002
Inorganic Contaminants	**Treatment Technique**
Copper	1.3 (Action Level)
Lead	0.015 (Action Level)
Organic Contaminants	**MCL**
Alachlor	0.002
Benzene	0.005
Benzo (a) pyrene	0.0002
Carbon Tetrachloride	0.005
Carbonfuran	0.04
Chlordane	0.002
2,4-D	0.07
Dalapon	0.2
Di (2-ethylhexyl) adipate	0.4
Di (2-ethylhexyl) phthalate	0.006
1,2-Dibromo-3-chloropropane (DBCP)	0.0002
p-Dichlorobenzene	0.075
o-Dichlorobenzene	0.6
1,2-Dichloroethane	0.005
1,1-Dichloroethylene	0.007
cis-1,2-Dichloroethylene	0.07
trans-1,2-Dichloroethylene	0.1
Dichloromethane	0.005

Table 9-2
Current Federal Drinking Water Standards

Parameter	mg/L (except as noted)
1,2-Dichloropropane	0.005
Dinoseb	0.007
Diquat	0.02
Endothall	0.1
Endrin[h]	0.002
Ethylbenzene	0.7
Ethylene Dibromide	0.00005
Glyphosate	0.7
Haloacetic Acids (sum of 5 [HAA%])	0.060
Heptachlor	0.0004
Heptachlor epoxide	0.0002
Hexachlorobenzene	0.001
Hexachlorocyclopentadiene	0.05
Lindane	0.0002
Methoxychlor	0.04
Monochlorobenzene	0.1
Oxamyl (vydate)	0.2
Pentachlorophenol	0.001
Picloram	0.5
Polychlorinated biphenyls (PCBs)	0.0005
Simazine	0.004
Styrene	0.1
2,3,7,8-TCDD (dioxin)	5×10^{-8}
Tetrachloroethylene	0.005
Toluene	1
Toxaphene (revised)[f]	0.003
2,4,5-TP (silvex)	0.05
1,2,4-Trichlorobenzene	0.07
1,1,1-Trichloroethane	0.20
1,1,2-Trichlororethane	0.005
Trichloroethylene	0.005
Trihalomethanes (sum of 4 [TTHM])	0.080
Vinyl Chloride	0.002
Xylenes (total)	10
Organic Contaminants	**Treatment Technique**
Acrylamide	Restrictions in polymer use
Epichlorohydrin	Restrictions in material use
Microorganisms	**Standard**
Cryptosporidium	Treatment Tech (99% removal/inactivation)
Escherichia coli	Treatment Tech (0 cfu/100 mL)
Fecal Coliforms	Treatment Technique (0 cfu/100 mL)

Table 9-2
Current Federal Drinking Water Standards

Parameter	mg/L (except as noted)
Giardia lamblia	Treatment Tech (99.9% removal/inactivation)
Heterotrophic Bacteria	Treatment Tech (500 cfu/mL at end of distribution system or measurable chlorine residual)
Legionella	Treatment Tech
Total Coliforms	5% (presence/absence)
Turbidity	Performance Std (0.3 NTU, 95%)
Viruses	Treatment Tech (99.99% removal/inactivation)
Radionuclides	**MCL**
Beta-particle and photon emitters	4 mrem
Alpha emitters	15 pCi/L
Radium 226 + 228	5 pCi/L
Uranium	0.030

Notes
1. Arsenic has been proposed at 10 µg/L in the new rule that is currently being reviewed.

Table 9-3
Current State Secondary Drinking Water Regulations

Parameter	mg/L (except as noted)		
Contaminants	**SMCL or SMCL Ranges**		
Aluminum	0.2		
Color	15 Color Units		
Copper	1.0		
Corrosivity	Noncorrosive		
Foaming Agents (MBAs)	0.5		
Iron	0.3		
Manganese	0.05		
Methyl tertiary butyl ether (MTBE)	0.005		
Odor	3 Threshold Odor Number		
Silver	0.1		
Thiobencarb (Bolero)	0.001		
Turbidity	5 units		
Zinc	5		
	Recommended	**Upper**	**Short Term**
Total Dissolved Solids	500	1,000	1,500
Specific Conductance, micromhos	900	1,600	2,200
Chloride	250	500	600
Sulfate	250	500	600

Total Coliform Rule (TCR)

The TCR is the latest version of one of the oldest drinking water regulations. Coliform bacteria are organisms that have one or more biochemical reactions similar to Esherichia coli (E. coli). E. coli are bacteria that are commonly found in the digestive tract of warm-blooded animals. The total coliform test, then, is a test for bacteria, with similar biochemistry to E. coli, but which are capable of growing at 35 degrees Celsius (°C). The total coliform group includes several genera of bacteria belonging to the family Enterobacteriaciae. Some of these bacteria are not pathogenic. Total coliform testing is commonly used in drinking water treatment to determine the effectiveness of source water, treatment, and distribution system barriers to bacterial contamination.

The TCR was promulgated by the EPA in 1989 and DHS enacted its companion TCR that became effective on June 30, 1992. The TCR changed the basic principle of regulating bacterial quality. Instead of having an MCL based on average concentrations, total coliforms are now regulated based on presence/absence. For systems that collect 40 or more samples per month (more than 33,000 population) to be in compliance, no more than 5 percent of the samples taken for coliforms in a month can be coliform positive. A sample is considered positive if 1 of the 10 tubes is positive.

Other significant provisions of the TCR are:

- In the event of a coliform-positive sample, the utility must resample that location as well as the nearest upstream and downstream services for coliforms the following day and continue to analyze on consecutive days until either all three samples are negative, or the TCR is violated.
- Coliform-positive samples must be further examined for the presence of fecal coliforms or *E. coli*.
- If two consecutive samples from the same sample point are positive and one of those samples is positive for fecal coliforms, the system is out of compliance for that month.

All distribution system zones must be included in the routine sampling program, and some of the sample locations must be rotated throughout the year.

TCR Potential Revisions and Distribution System Requirements

The 1996 amendments to the SDWA require EPA to review and revise, as appropriate, each national primary drinking water regulation at least every 6 years. EPA published as part of its National Primary Drinking Water Regulation (NPDWR) Review its decision to revise the TCR in July, 2003.

EPA is in the process of reviewing available data and research on distribution system risks. These efforts will result in the review and possible revision of the TCR, as well as the potential for requirements for finished water quality in the distribution system. The potential rule revisions could be proposed in 2006 with the rule final by 2008.

EPA has been working with distribution system experts to compile existing information regarding potential health risks that may be associated with distribution systems in “white papers” on the following nine distribution system issues:

- Intrusion
- Cross-connection control
- Aging infrastructure and corrosion
- Permeation and leaching
- Nitrification
- Biofilms/growth
- Covered storage
- Decay in water quality over time
- New or repaired watermains

EPA is also involved in the development of a series of ten TCR issue papers on the following issues:

- Distribution system indicators of water quality
- The effectiveness of disinfectant residuals in the distribution system
- Analysis of compliance and characterization of violations of the TCR
- Evaluating HACCP strategies for distribution system monitoring, hazard assessment and control
- Inorganic contaminant accumulation in distribution systems
- Distribution system inventory and condition assessment
- Optimization of distribution system monitoring strategies
- Effect of treatment on nutrient availability
- Causes of Total Coliform positive samples and contamination events in distribution systems
- Total Coliform sample invalidation

Distribution system white papers and TCR issue papers are intended to inform EPA and stakeholders of areas of potential TCR revisions and distribution system requirements.

Surface Water Treatment Rules

A series of rules has been or is currently being developed to provide control of microbial contaminants from surface water or groundwater that is under the direct influence of surface water.

The Surface Water Treatment Rule (SWTR)

The SWTR is primarily a microbiological regulation and codified the use of the multiple barrier concept for control of pathogenic organisms. The SWTR became effective in June 1993, and required all but the most pristine water sources to provide filtration of their surface water (or groundwater under the direct influence of surface water). It also required all systems having a surface water source to provide some level of disinfection.

In further defining the physical barrier of filtration, the SWTR reduced the MCL for finished water turbidity from 1 NTU to 0.5 NTU (95 percent of the monthly samples, measured daily), and set a limit of 5 NTUs on the maximum finished water turbidity.

For disinfection, the SWTR required 99.9 percent (3-logs) for the combination of removal and inactivation of *Giardia* cysts and 99.99 percent (4-logs) for the combination of removal and inactivation of enteric viruses. The SWTR gave credit for 99.7 percent (2½-logs) removal of *Giardia* cysts and 99 percent (2-logs) removal of viruses in a "well-operated" conventional surface water treatment plant. The SWTR, then, required an additional ½-log of inactivation of *Giardia* cysts and an additional 2-logs of inactivation of viruses. Credit for the inactivation (or disinfection) requirements for *Giardia* and viruses was given for chlorine, chloramines, ozone, and chlorine dioxide. The credit was based upon achieving the product of disinfectant concentration and contact time, known as CT. The concentration (C) used was normally the concentration exiting the reactor used for primary disinfection and the time (T) was the time it took for 10 percent of the influent flow to exit the reactor (T_{10}). T_{10} was to be determined using tracer testing in the plants using different flow rates. Tables of CT required for each of the disinfectants at different temperatures, and in some cases, different pH values were published in the *Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources* (American Water Works Association, Denver, CO, 1991).

As an additional barrier to organisms, the SWTR required that a measurable disinfectant residual be present or heterotrophic plate counts be less than 500 colony-forming units at the farthest ends of the distribution system. The measurable residual was defined as a minimum of 0.2 mg/L of free or combined chlorine.

Cryptosporidium Action Plan

In April 1995, the California DHS adopted a *Cryptosporidium* Action Plan that is intended to facilitate comprehensive compliance with the SWTR. The plan does not include any requirements beyond the existing regulations but, instead, clarifies the existing requirements to optimize the treatment process and reduce the risk of a waterborne illness outbreak. The plan includes six elements:

1. Conduct watershed sanitary surveys
2. Submission of available data to CDHS
3. Review of alternative technologies
4. Prepare operations plan/optimized treatment
5. Prepare reliable removal treatment processes
6. Inform the public

The plan acknowledges that seasonal raw water turbidity and coliform data are a necessary part of any watershed sanitary survey. If cattle, sheep, or other livestock are allowed on a watershed, the survey must identify their location and number as well as steps that are taken to prevent contamination from the animal waste. Measures that will prevent runoff from any animal containment site reaching the water source should also be identified.

As part of the plan, the DHS completed a comprehensive review of the operations by water systems that use an alternative treatment system. The review focused on compliance with the turbidity standard during normal operations and after backwashing or other interrup-

tions in service. It also included a review of the engineering report required 60 days after the first year of operation.

The *Cryptosporidium* Action Plan states that DHS "agrees with and endorses" the American Water Works Association (AWWA) goal of 0.1 NTU for effluent turbidity from all surface water treatment plants. The plan recommends that all water systems with a surface water supply "adopt a philosophy of always optimizing their surface water treatment plant operations in a manner designed to achieve the maximum turbidity removal." CDHS believes that, by striving to meet these goals, water systems will be minimizing their customers' risk of exposure to pathogens, including *Cryptosporidium*. The plan identifies the following elements that should be included in the operations plan of a system for treatment optimization:

- Including a statement at the beginning of the operations plan stating that it is the goal of the water utility to optimize plant performance and maximize turbidity removal.
- Monitoring all unit processes closely and responding immediately to any malfunction.
- Operating unit processes at hydraulic loading rates to meet optimization goals.
- Establishing procedures to optimize coagulation, flocculation, and sedimentation to enable maximum turbidity removal in the pretreatment units with a turbidity goal of 1 to 2 NTUs in the sedimentation basin effluent at all times. The proper pretreatment chemical and dose should be determined from results of jar tests or particle counters.
- Expanding turbidity monitoring of individual filters on both a continuous basis and intermittent grab samples and, if possible, turbidity monitoring of all sedimentation processes.
- Calibrating turbidimeters frequently.
- Establishing procedures for optimizing filter operations to avoid turbidity spikes after service interruptions and attempting to achieve turbidity values of 0.3 NTU or less after backwash.
- Operating the plant to avoid sudden increases in flow through a filter.
- Optimizing the performance of backwash water recovery systems. Establishing a goal of less than 2.0 NTUs for the reclaimed backwash water and sludge reclamation system effluent.

The *Cryptosporidium* Action Plan states that all water treatment plants should install a continuous turbidity analyzer and chart recorder to monitor the plant effluent. The monitor should be inspected and standardized regularly. Additionally, all water utility systems should be capable of quickly replacing or repairing failed equipment including:

- Filter media and filter underdrains
- Backwash pumps and surface wash systems
- Pretreatment chemical feed and mixing facilities
- Turbidity monitoring units

Finally, the CDHS suggests that water utilities should provide an informational notification to its customers if they do not have a treatment process in place that provides for physical removal of pathogens. Those plants that are hydraulically overloaded or unable to achieve the effluent turbidity goals until improvements are made may also inform the customers of the system.

Interim Enhanced Surface Water Treatment Rule

The two main purposes of the IESWTR are to improve control of microbial pathogens in drinking water, particularly for the protozoan, *Cryptosporidium*, and to guard against significant increases in microbial risk that might otherwise occur when systems implement the Stage 1 D/Disinfectant By-Product (DBP) Rule (discussed below). The IESWTR was finalized in December 1998, but enforcement began in 2002.

Because of the resistance of *Cryptosporidium* oocysts to inactivation by chlorine and chloramine and a lack of data concerning other disinfectants, the IESWTR concentrated its efforts on improving the physical barrier (filtration). This was done by further reducing the MCL for finished water turbidity from 0.5 NTU to 0.3 NTU and the maximum single sample finished water turbidity limit was reduced to 1 NTU. A facility is deemed to be in compliance with the MCL if 95 percent of the daily values per month are at or below 0.3 NTU. Since the limit is 0.3 NTU and not 0.30 NTU, the plant is in compliance as long as the values stay at or below 0.34 NTU. Additionally, individual filter monitoring was required and exception reports to the state are required for:

- Any individual filter with a turbidity level greater than 1.0 NTU based on two consecutive measurements 15 minutes apart, and
- Any individual filter with a turbidity greater than 0.5 NTU at the end of the first 4 hours of filter operation based on the two consecutive measurements 15 minutes apart

Also, if an individual filter turbidity level is greater than 1.0 NTU, based on two consecutive measurements 15 minutes apart at any time in each of 3 consecutive months, the system must provide an exceptions report (within 30 days of the exceedance) and conduct a self-assessment of the filter (according to the EPA guidance for Comprehensive Performance Evaluation). And, if an individual filter has turbidity greater than 2.0 NTU, based on two consecutive measurements 15 minutes apart at any time in each of 2 consecutive months, the system must provide an exceptions report (within 30 days of the exceedance) and arrange for a Comprehensive Performance Evaluation (CPE) by the state or a third party approved by the state.

To guard against an increase in microbial risk due to implementation of the DBP Rule, disinfectant profiling and benchmarking are required. Systems having total trihalomethane (TTHM) concentrations exceeding 0.064 mg/L or total haloacetic acid (HAA5) concentrations exceeding 0.048 mg/L are required to produce disinfectant profiles for 3 years of existing data showing the CT that was actually achieved, divided by the CT required for inactivation of *Giardia* and viruses. If the data do not exist, the system was required to collect 1 year of data by March 16, 2000. The data were analyzed; and the month having the lowest ratio of CT to CT required became the "critical period," and the average value of the ratio became the "benchmark." Systems have to consult with the state before

changing disinfection practices, which could result in a log inactivation less than the benchmark value.

Long Term 1 Enhanced Surface Water Treatment Rule

The LT1ESWTR extends the IESWTR to systems serving fewer than 10,000 people.

Long Term 2 Enhanced Surface Water Treatment Rule

The LT2ESWTR is also designed to control risk from *Cryptosporidium*. An Agreement in Principle was reached by the Federal Advisory Committee for this rule and the Disinfectant/Disinfection By-Product Rule Stage 2 (discussed below) in August 2003. In this Agreement, the major microbial issues were addressed as follows:

- Monitoring for Bin Classification. A two year monitoring program is required for systems serving 10,000 or more people for *Cryptosporidium*, *E. coli*, and turbidity. The water system will be classified into a bin for *Cryptosporidium* risk based upon this monitoring.
- Action Bins. Table 9-4 illustrates the bin classification system for *Cryptosporidium* risk.
- Toolbox. A toolbox approach was recommended that would receive log-credit given in Table 9-5.
- Reassessment and Future Monitoring. Systems that provide a total of 2.5-logs of treatment (99.7 percent) for *Cryptosporidium* in addition to conventional treatment are exempt from reassessment and future monitoring. Six years after initial bin characterization, another round of monitoring will be held.
- Unfiltered Systems. Unfiltered systems must continue to meet filtration avoidance criteria, provide 4-log virus inactivation, 3-log *Giardia* inactivation, and 2-log *Cryptosporidium* inactivation.

Table 9-4
Bin Requirements Table (from Microbial/Disinfection Byproducts [M/DBP] Federal Advisory Committee Stage 2 M-DBP Agreement in Principle)

Bin Number	Average *Cryptosporidium* Concentration	Additional treatment requirements for systems with conventional treatment that are in full compliance with the IESWTR
1	*Cryptosporidium* <0.075/L	No Action
2	0.075/L ≤ *Cryptosporidium*< 1.0/L	1-log treatment (systems may use any technology or combination of technologies from toolbox as long as total credit is at least 1-log)
3	1.0/L ≤ *Cryptosporidium* < 3.0/L	2.0-log treatment (systems must achieve at least 1-log of the required 2-log treatment using ozone, chlorine dioxide, UV, membranes, bag/cartridge filters, or in-bank filtration)
4	*Cryptosporidium* ≥ 3.0/L	2.0-log treatment (systems must achieve at least 1-log of the required 2.5-log treatment using ozone, chlorine dioxide, UV, membranes, bag/cartridge filters, or in-bank filtration)

Disinfectant/Disinfection By-Product Rules

Total Trihalomethanes (TTHM) Rule

The TTHM Rule was the first rule to recognize that a risk of cancer may be connected to the use of chlorine to inactivate pathogenic organisms. The TTHM Rule was effective in 1981.

Chlorine reacts with naturally occurring organic matter (NOM) present in water to form chlorinated organic compounds. Four of these—chloroform, dichlorobromo-methane, dibromochloromethane, and bromoform—were selected to serve as indicators for the cancer risk due to chlorinated disinfection by-products. The MCL for the total of these four compounds was set at 0.1 mg/L. This historic rule changed the manner in which many water plants in the U.S. performed disinfection. Prior to the rule, chlorine was added liberally to raw water to improve plant operations which maximized contact time available through the treatment plant. After this rule took effect, many utilities changed to applying chlorine after much of the NOM had been removed through coagulation, flocculation, and sedimentation. Also, the use of chloramines, which limit the formation of trihalomethanes, was increased as a disinfectant for the distribution system.

Table 9-5
Microbial Toolbox Components (from Microbial/Disinfection Byproducts [M/DBP] Federal Advisory Committee Stage 2 M-DBP Agreement in Principle)

	Potential Log Credit			
APPROACH	**0.5**	**1**	**2**	**>2.5**
Watershed Control				
Watershed Control Program (1)	X			
Reduction in oocyst concentration (3)		As Measured		
Reduction in viable oocyst concentration (3)		As Measured		
Alternative Source				
Intake Relocation (3)		As Measured		
Change to Alternative Source of Supply (3)		As Measured		
Mgmt. of Intake to Reduce Capture of Oocysts in Source Water (3)		As Measured		
Managing Timing of Withdrawal (3)		As Measured		
Managing Timing of Withdrawal in Water Column (3)		As Measured		
Pretreatment				
Off-Stream Raw Water Storage w/Detention ~ X days (1)	X			
Off-Stream Raw Water Storage w/Detention ~ Y weeks (1)		X		
Presettling Basin w/Coagulant (1)	X	--►		
Lime Softening (1)	----------►			
In-Bank Filtration (1)		X	---------►	
Improved Treatment				
Lower Finished Water Turbidity (0.15 NTU 95%tile Combined Filter Effluent)	X			
Slow Sand Filters (1)				X
Roughing Filters (1)	X	----------►		
Membranes (MF, UF, NF, RO) (1)				X

Table 9-5
Microbial Toolbox Components (from Microbial/Disinfection Byproducts [M/DBP] Federal Advisory Committee Stage 2 M-DBP Agreement in Principle)

	Potential Log Credit			
APPROACH	**0.5**	**1**	**2**	**>2.5**
Bag Filters (1)		X	---------►	
Cartridge Filters (1)			X	
Improved Disinfection				
Chlorine Dioxide (2)	X	X		
Ozone (2)	X	X	X	
UV (2)				X
Peer Review/Other Demo./Validation or System Performance				
Peer Review Program (ex. Partnership Phase IV)		X		
Performance Studies demonstrating reliable specific log removals for technologies not listed above. This provision does not supersede other inactivation requirements.		As demonstrated		

Notes

X Indicates potential log credit based on proper design and implementation in accordance with EPA guidance. Arrow indicates estimation of potential log credit based on site-specific or technology-specific demonstration of performance.

1. Criteria to be specified in guidance to determine allowed credit
2. Inactivation dependent on dose and source water characteristics
3. Additional monitoring for *Cryptosporidium* after this action would determine new bin classification and whether additional treatment is required.

Disinfectant/Disinfection By-Product (D/DBP) Rule Stage 1

Stage 1 of the D/DBP Rule was enacted to reduce the health risk due to disinfection practice. To accomplish this, the Rule reduced the MCL for TTHM, enacted MCLs for haloacetic acids (HAA5) (Table 9-6), bromate (an ozone by-product), and chlorite (a chlorine dioxide by-product), enacted maximum residual disinfectant levels (MRDLs) for chlorine, chloramines, and chlorine dioxide (Table 9-7), and enacted a treatment technique called "enhanced coagulation" (EC) to limit the amount of unknown by-products that may be formed during chlorination.

Table 9-6
Disinfection By-Product MCLs from Stage 1 of the D/DBP Rule

Compound or Group	MCL, mg/L
Trihalomethanes (TTHM)	0.08
Haloacetic Acids (HAA5)	0.06
Bromate	0.01
Chlorite	1.0

Table 9-7
Disinfectant MRDLs from Stage 1 of the D/DBP Rule

Compound or Group	MCL, mg/L
Chlorine	4.0
Chloramines	4.0
Chlorine Dioxide	0.8

EC defines a requirement for removal of total organic carbon (TOC) in the coagulation, flocculation, sedimentation portion of the conventional treatment plant. A system does not have to implement enhanced coagulation if any of the following are true:

1. Source water TOC is less than 2.0 mg/L.
2. Treated water TOC is less than 2.0 mg/L.
3. Source water TOC < 4.0 mg/L, raw water alkalinity > 60 mg/L as $CaCO_3$, distribution system TTHM and HAA5 concentrations are less than or equal to 40 mg/L and 30 mg/L, respectively.
4. Distribution system TTHM and HAA5 concentrations are less than or equal to 40 mg/L and 30 mg/L, respectively, and the system uses only free chlorine for disinfection.
5. Source-water-specific ultraviolet absorbance (SUVA) is less than 2.0 L/mg-m. SUVA is calculated by dividing UV absorbance (m^{-1}) at 254 nm by the concentration (mg/L) of dissolved organic carbon (DOC).
6. Treated water SUVA is less than 2.0 L/mg-m.

If none of these conditions are met, Step 1 of EC takes effect. Step 1 establishes targets for additional precursor removals to be achieved based on raw water TOC and alkalinity. These targets are shown in Table 9-8. If a utility can satisfy the TOC percent removals specified in Step 1, the EC criterion for Stage 1 is satisfied.

Table 9-8
Required Removal of TOC by Enhanced Coagulation, Step 1

	Source Water Alkalinity , mg/L as $CaCO_3$		
Source Water TOC mg/L	0 to 60	>60 to 120	>120
>2.0 to 4.0	35	25	15
>4.0 to 8.0	45	35	25
>8.0	50	40	30

If a system is unable to meet the Step 1 TOC removal requirements, an alternative percent TOC removal requirement may be selected by Step 2 procedures as follows:

1. Bench or pilot tests are performed in which alum or an equivalent dose of ferric coagulant is added in 10 mg/L increments until the pH is lowered to the target pH value. The target pH values are given in Table 9-9 for varying source water alkalinity.
2. Once the bench or pilot test is complete, the TOC removal (mg/L) is then plotted versus coagulant dose (mg/L).
3. The alternative TOC removal percentage is set at the point on the TOC versus coagulant dose plot where the slope changes from greater than 0.3 mg TOC/L / 10 mg alum/L to less than 0.3/10 and remains less than 0.3/10.

If the TOC removal versus coagulant dose plot does not reach this point of diminishing returns, the water is considered not amenable to enhanced coagulation; and a waiver from the enhanced coagulation requirements must be obtained from the state.

Table 9-9
Target pH Values for Enhanced Coagulation, Step 2 Bench Testing

Raw Water Alkalinity, mg/L as $CaCO_3$	Target pH
0 to <60	5.5
60 to <120	6.3
120 to <240	7.0
240	7.5

D/DBP Rule Stage 2

Stage 2 of the D/DBP Rule is designed to reduce DBP occurrence peaks in the distribution system. An Agreement in Principle was reached by the Federal Advisory Committee for this rule and the Long Term 2 Enhanced Surface Water Treatment Rule (discussed above) in August 2003. This rule is expected to be finalized in 2005. In this Agreement, the major DBP issues were addressed as follows:

- Compliance monitoring will be preceded by an initial distribution system monitoring study to select optimal sampling points for capturing peaks.
- Compliance with each MCL (TTHM and HAA5) will be determined based upon a Locational Running Annual Average (a running annual average calculated at each sample location).
- Systems will comply with the Stage 2 D/DBP Rule in two phases—3 years after promulgation all systems must comply with a 120 µg/L TTHM / 100 µg/L HAA5 locational running annual average based on Stage 1 monitoring sites and continue to comply with the 80 µg/L TTHM / 60 µg/L HAA5 system running annual average from Stage 1.
- Six years after rule promulgation (with an additional 2-year extension available for systems requiring capital improvements) large and medium systems must comply with

an 80 μg/L TTHM / 60 μg/L HAA5 based upon the new sample sites identified in the initial distribution system monitoring described above.

- Small systems must comply with the 80 μg/L TTHM / 60 μg/L HAA5 locational running annual average in either 7.5 or 8.5 years (with an additional 2-year extension available for systems requiring capital improvements) depending upon whether the system is required to do *Cryptosporidium* monitoring as part of the LT2ESWTR.
- The bromate MCL will remain at 0.010 mg/L. EPA commits to review the bromate MCL as part of the 6-year review to determine whether the bromate MCL should be reduced to 0.005 mg/L or a lower concentration.

Volatile Organic, Synthetic Organic and Inorganic Chemical Rules

Volatile Organic Chemicals Rule

The Phase I Volatile Organic Chemicals (VOCs) Rule established MCLGs and MCLs for eight VOCs. The rule was promulgated in July 1987 and became effective in January 1989. All public water systems (PWS) were required to complete initial VOC monitoring by December 1991. Monitoring requirements include sampling at each entry point to the distribution system. If no VOCs were detected during the initial monitoring, repeat monitoring is required every three to five years, depending on the vulnerability of the source. If VOCs are detected, quarterly samples must be analyzed. Compliance requires that VOC levels be lower than the MCLs, based on the annual average of quarterly samples.

The Phase I VOC Rule also required monitoring of 51 additional unregulated VOCs. All systems were required to complete the initial monitoring for these contaminants by December 1991. Repeat monitoring is required every five years; however, USEPA revises the list of unregulated contaminants thereby changing the constituents to be monitored. Monitoring requirements for Phase I contaminants were revised in the Phase II Synthetic Organic Chemicals and Inorganic Chemicals Rule (Phase II SOC/IOC Rule) to conform with the standardized monitoring.

The Phase IIA Fluoride Rule applies to all public water systems. The rule was finalized in April 1986 and became effective in October 1987. The primary purpose of the Phase IIA Fluoride Rule was to protect the public from crippling skeletal fluorosis. The rule established an MCLG and MCL for fluoride at 4 mg/L. A secondary contaminant level (SMCL) of 2 mg/L was established to protect against dental fluorosis. Monitoring of fluoride concentration is required yearly for surface water sources and every three years for groundwater sources. For systems practicing fluoridation, daily monitoring of fluoride at the entrance to the distribution system is recommended.

Phase II Synthetic Organic Chemicals and Inorganic Chemicals Rule

The Phase II SOC/IOC Rule applies to all public water systems. The rule was promulgated in June 1991 (33 contaminants) and July 1991 (5 contaminants). This rule established MCLs and treatment techniques for 38 contaminants. Monitoring for the Phase II contaminants occurs in a standardized 3 year cycle, which began in January 1993. Compliance with the Phase II MCLs is based on the average of quarterly samples.

Phase V Synthetic Organic Chemicals and Inorganic Chemicals Rule

The Phase V Rule was promulgated in July 1992 and set MCLGs and MCLs for 23 contaminants. Compliance monitoring for these contaminants follows the same standardized monitoring framework introduced with the Phase II rule. Some of the Phase V contaminants were previously on the unregulated contaminants monitoring (UCM) lists under other rules. To eliminate duplication, these contaminants were withdrawn from the UCM lists.

Groundwater Rule

The EPA is currently in the process of developing the Groundwater Rule (GWR), formerly known as the Groundwater Disinfection Rule. The rule name was changed to reflect a more holistic regulatory approach to addressing ground water issues. The rule applies to public ground water systems and to systems that mix surface water and ground water if the ground water is added directly to the distribution system and provided to consumers without treatment. This includes untreated stand-alone ground water wells and untreated ground water plants that have their own entry points to the distribution system as well as untreated groundwater blended with treated surface water prior to the entry point to the distribution system. Treatment in this case is defined as 4-log inactivation/removal of viruses.

The proposed Groundwater Rule was published in the Federal Register on May 10, 2000. The final rule is expected in late 2005. Specific requirements proposed in the rule include:

1. System sanitary surveys conducted by the state and identification of significant deficiencies.
2. Hydrogeologic sensitivity assessments for undisinfected systems.
3. Source water microbial monitoring by systems that do not disinfect and draw from hydrogeologically sensitive aquifers or have detected fecal indicators within the system's distribution system.
4. Corrective action by any system with significant deficiencies or positive microbial samples indicating fecal contamination.
5. Compliance monitoring for systems which disinfect to ensure that they reliably achieve 4-log inactivation or removal of viruses.

EPA missed the May 2002 deadline to promulgate, and the final rule was expected in early 2005, but was withdrawn for further review. The schedule for the release of the final GWR is uncertain at this time.

Filter Backwash Rule

The Filter Backwash Rule is a regulation for filtered surface water supplies that recycle some or all of filter backwash into the plant. The purpose of the rule is to require systems to review their recycle practices and, where appropriate, work with the State to make any necessary changes to current practices that may compromise microbial control. The proposed rule was published in April 2000, with the final rule promulgated in April 2001. It

will apply to all systems that use filter recycle streams. The final rule contained the following key provisions:

1. Return of all recycled flows prior to the point of the primary coagulant addition.
2. Direct filtration plants to provide information to the state on their current recycle practice.
3. A requirement for systems meeting criteria to perform a one-time self assessment of their recycle practice and consult with their primacy agency to address and correct high risk recycle operations.

The first element would require that all systems using surface water or groundwater under the direct influence of surface water return all recycle flows to the process prior to the point of the primary coagulant addition. Waivers to this requirement would be available from state primacy agencies for unique treatment conditions.

The second element would require all direct filtration plants to report to the state primacy agency whether flow equalization or treatment is provided for recycle flow prior to its return to the treatment process. The state would use that information to determine the plants that need to change their current recycle practice in order to provide additional public health protection.

The third element would require that all plants using 20 or fewer filters and directly recycling flows to the treatment process without any form of treatment on the recycle flow complete a self-assessment. The self-assessment would be used to determine the effect of untreated recycle flows to the plant process. The State primacy agency would use the results of the self-assessment to determine the appropriate level of treatment of recycle flows.

Systems were to notify the State of their recycle practices by October 2003, modify their recycle return location as required by June 2004, and complete the necessary capital improvements to comply with all rule requirements by June 2006.

Lead and Copper Rule

The Lead and Copper Rule was promulgated in June 1991 and went into effect in December 1992, with minor revisions released in April 2000. The rule applies to all community and non-transient non-community water systems. The rule developed MCLGs and action levels for both lead and copper in drinking water. The major difference between this regulation and most others is that the water is to be monitored at the customer's tap, not the treatment plant discharge point. Lead and copper must be monitored at the customer's taps every 6 months and twice each calendar year at the highest risk locations. The highest risk locations are defined as:

- Piping with lead solder installed after 1982,
- Lead water service lines,
- Lead interior piping.

For compliance, the samples at the customer's tap must not exceed the following action levels:

- Lead concentration of 0.015 mg/L detected in the 90th percentile of all samples.
- Copper concentration of 1.3 mg/L detected in the 90th percentile of all samples.

If action levels are exceeded, water systems must collect source water samples and submit all data to the state with a treatment recommendation to reduce concentrations below the action level. In addition, the water system must also provide a public education program to its customers within 60 days of the action level exceedance. The education program must be continued until the samples are found to be below the lead action levels.

All water systems that exceed the lead or copper action levels are also required to conduct a corrosion control study. Corrosion control studies must compare the effectiveness of pH and alkalinity adjustment, calcium adjustment, and addition of a phosphate or silica-based corrosion inhibitor. Large and medium systems are also required to monitor many other water quality parameters at the plant discharge and customer's tap.

After a corrosion control study is completed, a water system must develop a corrosion control program and submit it for approval to the primacy agency. Once approval of the plans is received, water systems have 24 months to install and implement the treatment methods for corrosion control and 12 additional months to collect follow-up samples. After this time, the water system must comply with the action levels for both lead and copper.

In 2000, minor revisions to the lead and copper rule were promulgated to streamline requirements and reduce some burdens on water systems. No changes to the MCLs or the MCLGs were made. Small changes were made to reduce the frequency of monitoring for systems with low lead and copper tap levels and to update the analytical methods used for compliance. Further revisions to the lead and copper rule are expected to be proposed in late 2005, but no information as to what will be included in the potential revisions to the rule has been released.

Arsenic Rule

The original arsenic MCL of 50 µg/L was set by the EPA in 1975 based on Public Health Service Standard originally published in 1942. A new proposed Arsenic Rule was released in June 2000. The EPA was originally under a court-imposed deadline to promulgate this rule by November 1992. However, the EPA has received extensions to examine health effects and occurrence data. EPA succeeded in finalizing the Arsenic Rule on January 16, 2001, during the final days of the Clinton administration. The final rule was published in the Federal Register on January 22, 2001 and became effective on February 22, 2002.

The following is a summary of the major provisions and requirements of the rule:

- A MCLG for arsenic in drinking water is set at zero.
- The MCL for arsenic is revised from 50 µg/L down to 10 µg/L by January 23, 2006.
- Beginning with Consumer Confidence Reports (CCRs) due by July 1, 2002, all community water systems (CWSs) will begin providing health information and arsenic concentrations in the annual reports for water that exceeds 5 µg/L (one half of the MCL).

- Both CWSs and non-transient non-community water systems (NTNCWSs) are required to meet the revised arsenic standard.
- Two compliance requirements for inorganic contaminants (IOCs), volatile organic contaminants (VOCs), and synthetic organic contaminants (SOCs). Specifically, when a system fails to collect the required number of samples, compliance averages will be based on the actual number of samples collected. Also, new public water systems and systems using new sources of water must demonstrate compliance within state-specified time and sampling frequencies. These provisions apply to arsenic.

All CWSs and NTNCWSs that exceed the MCL of 10 µg/L are required to come into compliance 5 years after the publication of the final rule.

Radionuclide Rule

The original Radionuclide Rule was proposed in July 1991, but court action delayed its final promulgation. The final Radionuclides Rule was published in the Federal Register on December 7, 2000. The rule became effective in December 2003. New monitoring requirements have been phased-in the publication date of the final rule and the beginning of the next Standardized Monitoring Framework period on December 31, 2007. "Phased-in monitoring" refers to the fact that States will require some fraction of water systems to complete their initial monitoring requirements each year of the period between the effective date (December 8, 2003) and the beginning of the new cycle (December 31, 2007). Water systems will determine initial compliance under the new monitoring requirements using the average of four quarterly samples or, at state discretion, using appropriate grandfathered data. Compliance will be determined immediately based on the annual average of the quarterly samples for that fraction of systems required by the state to monitor in any given year or based on the results from the grandfathered data. Water systems with existing radionuclides monitoring data demonstrating that the system is out of compliance with new provisions will be out of compliance on the effective date of December 8, 2003.

In the final rule, EPA set the MCL for uranium at 30 micrograms per liter (µg/L), using its authority under the SDWA for the first time to set a standard at a higher than the feasible level based on cost-benefit considerations. The standard for combined radium-226/228 remains at 5 picoCuries per liter (pCi/L). However, the rule requires improved monitoring for radium. The final rule retains the interim standards for gross alpha particles at 15 pCi/L and for beta and photon emitters at 4 millirems (mrem).

A summary of the final Radionuclides Rule is provided below. Table 9-10 also lists the existing (1979) and the revised MCLs of the final Radionuclide Rule.

- Affected Systems: Community Water Systems (CWSs); non-CWSs, including transient and non-transient, are exempt.
- MCL Goals (MCLGs) for radionuclides: MCLGs of zero; includes combined radium-226/228; gross alpha, beta particle and photon radioactivity, and uranium
- Radium MCL: Combined Ra-226 and Ra-228 MCL of 5 pCi/L; based on new risk levels.
- Beta/Photon Radioactivity MCL:

  - ≤ 4 mrem/yr to the total body or any given internal organ except for H-3 and Sr-90
  - H-3 = 20,000 pCi/L; Sr-90 = 8 pCi/L
  - Total dose from co-occurring beta/photon emitters must be ≤ 4 mrem/yr to the total body of any internal organ;
  - This MCL will be reviewed within 2 to 3 years based on a need for further re-evaluation of the risk management issues.

- Gross alpha MCL: 15 pCi/L excluding uranium and radon, but including Ra-226; maintain current MCL.
- Uranium MCL: 30 µg/L; new MCL.
- Polonium-210: Part of gross alpha; monitoring required under the UCMR rule; further action may be proposed at a later date.
- Lead-210: Not regulated; monitoring required under the UCMR rule; further action may be proposed at a later date.

Table 9-10
Existing and Revised MCLs for Radionuclides

Contaminant	1979 MCLs	2000 Radionuclide Rule MCLs
Radium 226/228	5 piC/L	5 piC/L
Uranium	N/A	30 piC/L
Gross Alpha	15piC/L	15 piC/L
Beta Particles and Photon Emitters	4 mrems	4 mrem

Radon Rule

Radon is a naturally occurring, carcinogenic, radioactive gas. Radon in drinking water increases risk to public health, primarily from inhalation of radon discharged through normal household use, such as showering, but also from ingestion of water. The proposed Radon Rule applies to all community water systems that use groundwater or mixed groundwater and surface water supply sources.

On November 2, 1999, the long anticipated and heavily debated Radon Rule was formally proposed, but EPA missed the SWDA deadline of August 2000 promulgation. EPA has not indicated a final schedule for the promulgation of the Radon Rule at this time.

The rule includes a two-option approach that allows states and water suppliers to reduce radon risks in indoor air while protecting public health from the highest levels of radon in drinking water. The proposed rule includes the following provisions:

- MCLG zero
- MCL 300 pCi/L
- Alternative MCL (AMCL) 4,000 pCi/L

The AMCL provision of the rule applies to water systems that adopt and comply with a multimedia mitigation (MMM) program aimed at reducing household indoor/air health risks from the soil as well as the tap water. The AMCL of 4,000 pCi/L is based on the National Research Council recommended estimate of 10,000 to 1 as the transfer factor from water to air and the national average outdoor radon concentration of 0.4 pCi/L in air. Thus, an estimate of 0.4 pCi/L in air would be equivalent to 4,000 pCi/L in water.

If a state develops an MMM program that is approved by the EPA, public water systems in that state will be able to comply with the AMCL rather than the MCL. Alternatively, if a state chooses not to adopt its own MMM program or a state's MMM program does not meet EPA approval, an individual public water supplier can submit an MMM program for approval. The 1996 SDWA Amendments require that the EPA evaluate MMM programs every 5 years.

Drinking Water Contaminant Candidate List

As amended in 1996, the SWDA requires the EPA to establish a list of contaminants that are known or anticipated to occur in public water systems and may require regulation under the SWDA. The first Contaminant Candidate List (CCL) was published in the Federal Register in March 1998 and included 60 contaminants under consideration for regulation. A second version of the CCL was published in February 2005. The second version of the CCL carries forward 51 of the original 60 unregulated contaminants from the first version of the CCL. The CCL includes both microbiological and chemical contaminants. The CCL published in February 2005 includes 42 chemical contaminants and 9 microbiological contaminants/contaminant groups. Table 9-11 lists the contaminants published in the CCL in February 2005.

Contaminants included in the CCL are studied to develop analytical methods for detecting the contaminants, determine whether they occur in drinking water, and evaluate treatment technologies to remove them from drinking water. In addition, the health effects of the contaminants are studied to help determine if actions such as drinking water guidance, health advisories, or regulation need to be developed. The CCL alone does not impose any requirements on public water system.

Table 9-11
Contaminant Candidate List (CCL)

Microbiological Contaminants
Adenoviruses
Aeromonas hydrophila
Caliciviruses
Coxsackieviruses
Cyanobacteria (blue-green algae), other freshwater algae, and their toxins
Echoviruses
Helicobacter pylori
Microsporidia (Enterocytozoon & Septata)

Table 9-11
Contaminant Candidate List (CCL)

Mycobacterium avium intracellulare (MAC)
Chemical Contaminants
1,2,2,2-tetrachloroethane
1,2,4-trimethylbenzene
1,1-dichloroethane
1,1-dichloropropene
1,2-diphenylhydrazine
1,3-dichloropropane
1,3-dichloropropene
2,4,6-trichlorophenol
2,2-dichloropropane
2,4-dichlorophenol
2,4-dinitrophenol
2,4-dinitrotoluene
2,6-dinitrotoluene
2-methyl-Phenol (o-cresol)
Acetochlor
Alachlor ESA & other acetanilide pesticide degradation products
Aluminum
Boron
Bromobenzene
DCPA mono-acid degradate
DCPA di-acid degradate
DDE
Diazinon
Disulfoton
Diuron
EPTC (s-ethyl-dipropylthiocarbamate)
Fonofos
p-Isopropyltoluene (p-cymene)
Linuron
Methyl bromide
Methyl-t-butyl ether (MTBE)

Table 9-11
Contaminant Candidate List (CCL)

Metolachlor
Molinate
Nitrobenzene
Organotins
Perchlorate
Prometon
RDX
Terbacil
Terbufos
Triazines and degradation products of triazines (including, but not limited to Cyanazine, and atrazine-desethyl)
Vanadium

Water Quality Issues

Surface Water Quality

Treated surface water is provided to the Cowen Heights system by the East Orange County Water District (EOCWD). Water has to meet all drinking water standards as it leaves the treatment plant and at the inter-connections. While it is assumed that EOCWD will be responsible for any required water treatment, this may not be the case for parameters monitored in distribution system, such as disinfectant byproducts.

Groundwater Quality

Table 9-12 summarizes water quality issues and recommendations for wells within the Cowen Heights system.

Table 9-12
Summary of Assessment

Well	Capacity (gpm)	Status	Water Quality Issue/Concern	Existing Treatment	Recommendations
Fairhaven Well #1 (West)	715	Active	Radon (427 pCi/L)	None	Multimedia Mitigation
Fairhaven Well #2 (East)	600	Active	Radon (410 pCi/L)	None	Multimedia Mitigation

The USEPA has proposed a radon MCL at 300 pCi/L, with an alternative standard of 4,000 pCi/L, if the state has an approved Multimedia Mitigation program to reduce the indoor

radon risk from soil and rocks underneath homes and buildings. Both of the groundwater wells in the system will be impacted if radon MCL is set at 300 pCi/L. Best available technologies for radon removal include Packed Tower Aeration (PTA) and Granular Activated Carbon (GAC). Due to some critical operation concerns with the use of GAC, PTA is the most common and effective method for radon removal. Installation of treatment facilities at some of the plant sites in this system may be problematic due to lack of available space for treatment footprints. It is expected the state will develop an approved Multimedia Mitigation program thus allow the alternative MCL standard.

Projected Impact of Water Quality

Table 9-13 **s**ummarizes the projected impact on water supply due to water quality issues with wells in the Cowen Heights system.

Table 9-13
Summary of Projected Water Supply Changes Due to Water Quality Issues

Water Source	2005	2010	2015	2020	2025	2030
Fairhaven Well #1 (West) Projected Change (percent)	0	0	0	0	0	0
Fairhaven Well #2 (East) Projected Change (percent)	0	0	0	0	0	0
MWD of SC Projected Change (percent)	0	0	0	0	0	0

Notes
1. Table format based on DWR Guidance Document Table 39

Distribution System Water Quality

Distribution system water quality monitoring is performed for several water quality parameters in the Cowen Heights system, including general physical parameters, presence of coliform bacteria, disinfectant and disinfection by-product levels, and corrosivity of the water by monitoring lead and copper levels at customers' water taps. All monitoring parameters and levels currently meet drinking water standards. The ability to continue to meet these standards is not expected to change in the foreseeable future, with one exception. Drinking water standard levels for disinfection by-products may be lowered in the future in accordance with the Stage 2 D-DBP Rule. It is unknown at this time if the increased levels of disinfection by-products will be at levels of concern.

The Cowen Heights system utilizes an approved Sample Siting Plan for the collection, recording, and reporting of all bacteriological analyses. The Cowen Heights system has also established an aggressive cross-connection control program to reduce the hazard associated with backflow and back-siphonage. These programs are required to comply with DHS regulations on Waterworks Standards and Cross Connection Control.

Emerging Water Quality Issues

Perchlorate. Ammonium perchlorate is used as a main component in solid rocket propellant, and can be found in some types of ammunitions and fireworks. The California Legislature had required the CDHS to adopt a new drinking water standard for perchlorate by January 1, 2004. In advance of the requirement, the Office of Environmental Health Hazard Assessment (OEHHA) set a public health goal for perchlorate at 6 µg/L in March of 2004. The primary health concern related to perchlorate is its effect on the thyroid gland's ability to produce hormones required for normal growth and development. CDHS anticipates it will establish an MCL for perchlorate during 2005.

All source samples have been collected to test for perchlorate and the results are ND for all the wells. Since there are no known sources of the contaminant in the area, the impact of perchlorate could be negligible.

Arsenic. The California Legislature required the CDHS to adopt a new drinking water standard for arsenic by June 30, 2004. In advance of the requirement, the Office of Environmental Health Hazard Assessment (OEHHA) set a public health goal for arsenic at 0.004 µg/L, based on lung and urinary bladder cancer risk. Monitoring results from drinking water sources throughout the state reflect its natural occurrence. They also show that considerably more sources have arsenic detections above the federal 10 µg/L MCL compared to the current MCL of 50 µg/L. Arsenic levels in the water system's water sources are all less than 2.0 µg/L. The CDHS continue to assess where they will set the new state MCL for arsenic MCL.

Chromium 6. In 2000, there was significant interest in the detection and possible health effects of chromium 6 in drinking water supplies throughout the state. In 2001, the OEHHA withdrew their previously established a Public Health Goal (risk assessment level) of 2.5 µg/L for total chromium. The current MCL enforced by the CDHS is 50 µg/L for total chromium, and OEEHA is in the process of establishing a specific Public Health Goal for chromium 6.

The water system initiated sampling of all its water sources for total chromium and chromium 6 in 2002 and 2003. Total Chromium was not detected above 10 µg/L in the groundwater sources. Chromium-6 ranged from below 2 µg/L to 4.6 µg/L.

DSWAP. A requirement from the USEPA called for all utilities to complete a Source Water Assessment for all water sources. The water system completed the Assessments in 2002, and finalized them in 2003.

The groundwater sources were considered most vulnerable to the following activities not associated with any detected contaminants in the water supply as of this time: gas stations, underground storage tanks confirmed leaking, and sewer collection systems.

MTBE. Until recently, MTBE was the primary oxygenate in virtually all gasoline used in California. It was introduced to surface water bodies from motor exhaust of recreational watercraft, and into groundwater supplies by leaking underground storage tanks. The CDHS adopted a primary MCL of 13 µg/L for MTBE based on carcinogenicity studies in animals. They also established a secondary MCL for MTBE at 5 µg/L, based upon taste and odor concerns. MTBE has been non-detectable in all water sources serving the water system

to date. However, this could change in time as known leaking storage tanks and other MTBE plumes find their way into the water system's well water supply.

N-Nitrosodimethylamine. Although NDMA is one of the contaminants released from manufacture of liquid rocket propellants, munitions, and fireworks, the recent findings indicated that low level (ppt) of NDMA may be a byproduct of surface water treatment process and/or formed in the distribution system. The treated recycled water also has been detected with NDMA.

All source samples have been collected to test for NDMA and the results are ND for all the wells. Since there are no known sources of the contaminant in the area, the impact of NDMA could be negligible.

CPUC Interface. One of the four key principles of the CPUC draft Water Action Plan is to provide safe, high quality water to all regulated water utility customers. Water Plan objectives include maintaining the highest standards of water quality and promoting infrastructure investment including investments to protect water quality. Specific proposed actions to support water plan objectives include strengthening inter-agency relations between the CPUC and Department of Health Services, and developing funding mechanisms to address water quality concerns. GSWC has suggested additional steps that can be taken by the CPUC to ensure water quality including assurances of timely recovery of water pollution clean-up costs.

Chapter 10. Water Service Reliability

Section 10635 of the Act requires that an assessment of water service reliability for various climatic conditions be undertaken. The Act states:

Section 10635

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

This chapter provides a water supply and demand assessment for the Cowan Heights System for a normal year, a single-dry year, and multiple-dry years. The following is a summary of the water supply sources and reliability of those sources for the Cowan Heights System. The details of water supply sources and the reliability of these supplies are provided in Chapter 3. Water demand projections are documented in Chapter 4.

The Golden State Water Company (GSWC) currently obtains its water supply for the Cowan Heights System from local groundwater, and imported water obtained through EOCWD. EOCWD obtains its imported supply from MWDOC. MWDOC gets its imported supply from Metropolitan Water District of Southern California (Metropolitan).Groundwater provides about 54 percent of the available supply, whereas the remainder is provided by imported water from EOCWD. MWDOC receives reliability of supplies from Metropolitan and thus, assure reliabilities for the Cowan Heights System. Due to these different sources of supplies, conditions in local and distant areas can impact the reliability of supplies. In general, GSWC's supply is expected to be 100 percent reliable through 2030. This reliability is a result of the projected reliability of MWDOC, a member agency of Metropolitan, which expects to provide reliable imported water supplies. In addition, OCWD is implementing projects to ensure reliability of the Orange County Groundwater Basin.

Reliability and vulnerability of the imported water supply to seasonal or climatic shortages are dependent on the reliability plan of Metropolitan. Metropolitan's plan for resource

management optimizes the use of its available resources during surpluses and shortages to minimize the probability of severe shortages and eliminate the possibility of extreme shortages and shortage allocations. Metropolitan's initiatives to ensure supply reliability are discussed in Chapter 3.

In addition to Metropolitan's reliability initiatives, MWDOC has taken important steps over the past decade to reduce the MWDOC's vulnerability to extended drought or other potential threats. MWDOC, in coordination with local and regional water agencies, is continuing to improve its water reliability by designing programs to protect and ensure water quality, maximize local supplies, promote conservation, encourage recycled water and desalinated water use and meet its demands during shortages. MWDOC's dependence on traditional sources of water (imported) will continue to decrease with the expansion of these alternative resources (see MWDOC's 2005 UWMP for details).

Current and planned projects designed to increase groundwater reliability in the Orange County Basin include seawater intrusion barriers, in-lieu groundwater replenishment, diverted surface water flows recharged at spreading basins, and the Groundwater Replenishment System (GWRS) which involves tertiary treated wastewater used for groundwater recharge.

The Orange County Groundwater Basin has substantial storage capacity to provide a buffer during droughts and to accept recharge of surplus waters during times of available supplies (e.g., storm water, highly treated recycled water, and imported water). Continued diligence by GSWC and other groundwater users, OCWD, and MWDOC are expected to help maintain the reliability of the Orange County Groundwater Basin groundwater supply. MWDOC has provided all of its member agencies, including GSWC, with groundwater reliability analyses from 2010 to 2030. MWDOC has assured GSWC that any remaining water demands not met by local groundwater for each year will be met with imported water that will be 100 percent reliable.

The following sections present the normal water year, single-dry year, multiple-dry year water supply and demand assessments.

Normal Water Year Analysis

Table 10-1 provides the projected water supply from groundwater and imported water in normal water years (see Chapter 3 for details).

Table 10-1
Projected Normal Water Year Supply

	2010	2015	2020	2025	2030
Total Water Supply (ac-ft/yr)	3,281	3,302	3,327	3,352	3,375
Percent of Year 2005	100	100	101	102	103

Notes
1. Table format based on DWR Guidance Document Table 40

Table 10-2 provides water demand projections in normal water years (see Chapter 4 for details).

Table 10-2
Summary of Projected Normal Water Year Demands

	2010	2015	2020	2025	2030
Total Water Demand (ac-ft/yr)	3,281	3,302	3,327	3,352	3,375
Percent of Year 2005	100	100	101	102	103

Notes
1. Table format based on DWR Guidance Document Table 41

Table 10-3 summarizes the service reliability assessment for a normal water year based on water supply and water demand projections. As described in Chapter 3, imported water provided by MWDOC and local groundwater from the Orange County Groundwater Basin are expected to be 100 percent reliable to meet the projected demands through 2030.

Table 10-3
Comparison of Projected Normal Year Supply and Demand

	2010	2015	2020	2025	2030
Water Supply Total (ac-ft/yr)	3,281	3,302	3,327	3,352	3,375
Water Demand Total (ac-ft/yr)	3,281	3,302	3,327	3,352	3,375
Difference (supply minus demand)	0	0	0	0	0
Difference as Percent of Supply	0	0	0	0	0
Difference as Percent of Demand	0	0	0	0	0

Notes
1. Table format based on DWR Guidance Document Table 42

Single Dry-Year Analysis

GSWC, in coordination with local and regional water agencies (e.g., Metropolitan, MWDOC, WRDSC, OCSD, OCWD, and LACDPW) have undertaken a number of planning initiatives to ensure supply reliability over a range of hydrologic conditions. These initiatives are discussed in Chapter 3. Together, these initiatives provided a plan to manage the water resources to meet the needs of a growing population even under recurrences of the worst historical hydrologic conditions locally and in the key distant watersheds that supply water to the Cowan Heights System.

Table 10-4 presents projected single-dry year water supplies to meet the projected demands. For the single-dry years, the supplies were calculated based on the percentages of total normal water supplies provided by MWDOC (MWDOC's UWMP, 2005).

Table 10-4
Projected Single-Dry Year Water Supply

	2010	2015	2020	2025	2030
Water Supply (ac-ft/yr)	3,758	3,904	4,054	4,073	4,153
Percent of Projected Normal Year	115	118	122	122	123

Notes
1. Table format based on DWR Guidance Document Table 43

Table 10-5 provides projected single-dry year water demand.

Table 10-5
Summary of Projected Single-Dry Year Demands

	2010	2015	2020	2025	2030
Water Demand (ac-ft/yr)	3,758	3,904	4,054	4,073	4,153
Percent of Projected Normal Year	115	118	122	122	123

Notes
1. Table format based on DWR Guidance Document Table 44

Table 10-6 demonstrates the reliability of water supplies to meet projected annual water demands for the Cowan Heights System in a single-dry year. MWDOC has determined that they can meet their projected water demands in a single-dry year, so the projected combination of imported water and local groundwater supplies are equal to the projected demands.

Table 10-6
Comparison of Projected Supply and Demand for Single Dry Year

	2010	2015	2020	2025	2030
Supply Total (ac-ft/yr)	3,758	3,904	4,054	4,073	4,153
Demand Total (ac-ft/yr)	3,758	3,904	4,054	4,073	4,153
Difference (supply minus demand)	0	0	0	0	0
Difference as Percent of Supply	0	0	0	0	0
Difference as Percent of Demand	0	0	0	0	0

Notes
1. Table format based on DWR Guidance Document Table 45

Multiple Dry-Year Analysis

Table 10-7 presents the projected multiple-dry year water supply and demand assessment. For multiple-dry years, the supplies were calculated based on the percentages of total normal water supplies provided by MWDOC (MWDOC's UWMP, 2005). The third year of

the multiple-dry year water supply projection represents the end of each 3-year multiple-dry year period as required for the multiple-dry year analysis. MWDOC has determined that they can meet their projected water demands for multiple-dry years, so the water supply is projected to equal the projected demands.

Table 10-7 demonstrates that the water supplies are sufficient to meet the projected water demand for each multiple-dry year period. MWDOC has assured GSWC that any remaining water demands not met by local groundwater for each year will be met with imported water that will be 100 percent reliable. As a result, the total water supplies to meet the demands under multiple-dry years are expected to be 100 percent reliable.

In summary, GSWC, Metropolitan, MWDOC, and OCWD have implemented and will implement projects to ensure that the total water demands can be met under normal, single-dry year, and multiple-dry years. GSWC's reliance upon information provided by OCWD and MWDOC does not represent an endorsement of any or all of the future projects or programs to be undertaken to enhance water availability. GSWC, in making its projections of reliable future water supply, bases such on Metropolitan's assertion that it will provide a 100 per-cent reliable supply through 2030.

Table 10-7
Projected Multiple-Dry Year Water Supply and Demand Assessment

Year	Supply (ac-ft/yr)	Demand (ac-ft/yr)	Difference	Difference as Percent of Supply	Difference as Percent of Demand
2006					
2007					
2008	3,615	3,615	0	0	0
2009	3,660	3,660	0	0	0
2010	3,758	3,758	0	0	0
2011					
2012					
2013	3,768	3,768	0	0	0
2014	3,869	3,869	0	0	0
2015	3,904	3,904	0	0	0
2016					
2017					
2018	3,776	3,776	0	0	0
2019	3,938	3,938	0	0	0
2020	4,054	4,054	0	0	0
2021					
2022					
2023	3,897	3,897	0	0	0
2024	3,958	3,958	0	0	0
2025	4,073	4,073	0	0	0
2026					
2027					
2028	3,852	3,852	0	0	0
2029	4,000	4,000	0	0	0
2030	4,153	4,153	0	0	0

Notes
1. This assessment is based on the 3-year multiple-dry year period ending in 2010, 2015, 2020, 2025, and 2030
2. Table format based on DWR Guidance Document Tables 47 through 57

Chapter 11. References

California Department of Water Resources (DWR). 2005. *Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan*. January 18.

_____. *California's Groundwater: Bulletin 118-2003.*

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Metropolitan Water District of Southern California. 2005. *Draft Regional Urban Water Management Plan*. May.

Municipal Water District of Orange County (MWDOC). 2005. *Draft Regional Urban Water Management Plan*. July.

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Southern California Water Company, California. 2005. *Draft Regional Urban Water Management Plan*. April.

Southern California Association of Governments (SCAG) Projections. 2004. *Growth Forecast*. http://www.scag.ca.gov/rtp2004/2004draft/techappendix/Appendix_A_final.pdf

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Appendix A
Urban Water Management Planning Act

Established: AB 797, Klehs, 1983
Amended: AB 2661, Klehs, 1990
AB 11X, Filante, 1991
AB 1869, Speier, 1991
AB 892, Frazee, 1993
SB 1017, McCorquodale, 1994
AB 2853, Cortese, 1994
AB 1845, Cortese, 1995
SB 1011, Polanco, 1995
AB 2552, Bates, 2000
SB 553, Kelley, 2000
SB 610, Costa, 2001
AB 901, Daucher, 2001
SB 672, Machado, 2001
SB 1348, Brulte, 2002
SB 1384 Costa, 2002
SB 1518 Torlakson, 2002
AB 105, Wiggins, 2003
SB 318, Alpert, 2004

CALIFORNIA WATER CODE DIVISION 6
PART 2.6. URBAN WATER MANAGEMENT PLANNING
CHAPTER 1. GENERAL DECLARATION AND POLICY

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. (a) The Legislature finds and declares all of the following:
(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.
(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.
(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate.
(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years.
(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.
(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.
(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.
(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.
(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.
10610.4. The Legislature finds and declares that it is the policy of the state as follows:
(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.
(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.
(c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

CHAPTER 2. DEFINITIONS
10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.
10611.5. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.
10612. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.
10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.
10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.
10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.
10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.
10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.
10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water

supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

CHAPTER 3. URBAN WATER MANAGEMENT PLANS

Article 1. General Provisions

10620.

(a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d)(1) An urban water supplier may satisfy the requirements of this part by participation in area wide, regional, watershed, or basin wide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation and efficient water use.

(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

10621.

(a) Each urban water supplier shall update its plan at least once every five years on or before December 31, in years ending in five and zero.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

Article 2. Contents of Plans

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:

(1) An average water year.

(2) A single dry water year.

(3) Multiple dry water years.

For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(e)(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:
(A) Water survey programs for single-family residential and multifamily residential customers.
(B) Residential plumbing retrofit.
(C) System water audits, leak detection, and repair.
(D) Metering with commodity rates for all new connections and retrofit of existing connections.
(E) Large landscape conservation programs and incentives.
(F) High-efficiency washing machine rebate programs.
(G) Public information programs.
(H) School education programs.
(I) Conservation programs for commercial, industrial, and institutional accounts.
(J) Wholesale agency programs.
(K) Conservation pricing.
(L) Water conservation coordinator.
(M) Water waste prohibition.
(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower

incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

(j) Urban water suppliers that are members of the California Urban Water Conservation Council and submit annual reports to that council in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, may submit the annual reports identifying water demand management measures currently being implemented, or scheduled for implementation, to satisfy the requirements of subdivisions (f) and (g).

(k) Urban water suppliers that rely upon a wholesale agency for a source of water , shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water -year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).

10631.5. The department shall take into consideration whether the urban water supplier is implementing or scheduled for implementation, the water demand management activities that the urban water supplier identified in its urban water management plan, pursuant to Section 10631, in evaluating applications for grants and loans made available pursuant to Section 79163. The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities.

10632. The plan shall provide an urban water shortage contingency analysis that includes each of the following elements that are within the authority of the urban water supplier:
(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.
(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.
(c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.
(d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.
(e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.
(f) Penalties or charges for excessive use, where applicable.
(g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.
(h) A draft water shortage contingency resolution or ordinance.
(i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.
10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:
(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.
(b) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.
(c) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.
(d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(e) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.
(f) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.
10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

Article 2.5 Water Service Reliability
10635. (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.
(b) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.
(c) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.
(d) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

Article 3. Adoption and Implementation of Plans
10640. Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630). The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.
10641. An urban water supplier required to prepare a plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.
10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to

Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.
10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.
10644. (a) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.
(b) The department shall prepare and submit to the Legislature, on or before December 31, in the years ending in six and one, a report summarizing the status of the plans adopted pursuant to this part. The report prepared by the department shall identify the outstanding elements of the individual plans. The department shall provide a copy of the report to each urban water supplier that has filed its plan with the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans submitted pursuant to this part.
10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

CHAPTER 4. MISCELLANEOUS PROVISIONS
10650. Any actions or proceedings to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:
(a) An action or proceeding alleging failure to adopt a plan shall be commenced within 18 months after that adoption is required by this part.
(b) Any action or proceeding alleging that a plan, or action taken pursuant to the plan, does not comply with this part shall be commenced within 90 days after filing of the plan or amendment thereto pursuant to Section 10644 or the taking of that action.
10651. In any action or proceeding to attack, review, set aside, void, or annul a plan, or an action taken pursuant to the plan by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.
10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the State Water Resources Control Board and the Public Utilities Commission, for the preparation of water management plans or conservation plans; provided, that if the State Water Resources Control Board or the Public Utilities Commission requires additional information concerning water conservation to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan prepared to meet federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.
10654. An urban water supplier may recover in its rates the costs incurred in preparing its plan and implementing the reasonable water conservation measures included in the plan. Any best water management practice that is included in the plan that is identified in the "Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section.
10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.
10656. An urban water supplier that does not prepare, adopt, and submit its urban water management plan to the department in accordance with this part, is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) or Division 26 (commencing with Section 79000), or receive drought assistance from the state until the urban water management plan is submitted pursuant to this article.
10657. (a) The department shall take into consideration whether the urban water supplier has submitted an updated urban water management plan that is consistent with Section 10631, as amended by the act that adds this section, in determining whether the urban water supplier is eligible for funds made available pursuant to any program administered by the department.
(b) This section shall remain in effect only until January 1, 2006, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2006, deletes or extends that date.

Appendix B
Public Hearing Notice and Meeting Minutes

Notice of Public Hearing

In conformance with the California Urban Water Management Planning Act, Golden State Water Company (formerly Southern California Water Company) is hosting a public hearing on Wednesday, November 16, at 7:00 p.m. at the Golden State Water Company Anaheim Office, 1920 W. Corporate Way, Anaheim, CA 92801, to solicit comments on the Urban Water Management Plans (UWMP) for the following water systems: Cowan Height, Placentia, and West Orange County. The UWMPs are available for public review prior to the public hearing and can be reviewed during normal business hours at the Customer Service Offices, located at:

Los Alamitos Customer Service Office

Golden State Water Company
10852 Cherry Street
Los Alamitos, CA 90720

Placentia Customer Service Office

Golden State Water Company
500 Cameron Street
Placentia, CA 92870

Golden State
Water Company
A Subsidiary of American States Water Company

No Meeting Minutes were taken since there was no attendance by the public.

Appendix C
Public Comments on the Draft UWMP

No Public Comments received during Public Review Period.

Appendix D
Economic Analysis of Selected Demand Management Measures

Orange County District
Table D-1. Assumptions Used for Economic Analysis

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

Assumptions:

1. Survey 15% of single- and multi-family units 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.

2. Single-family outdoor water usage = 151 gpd/unit

Single-family water usage was estimated by analyzing annual billing data. The monthly indoor water use is assumed to be equivalent to 60 percent of average monthly water use. Outdoor water is calculated as the difference between annual total use and the assumed annual indoor water use.

3. Multi-family outdoor water usage = 56 gpd/unit

Multi-family water usage was estimated by analyzing annual billing data. The monthly indoor water use is assumed to be equivalent to 70 percent of average monthly water use.

4. Water savings from indoor leak detection, not including toilet leaks = 4.1 gpd per residence

A & N Technical Services report (2003, page 2-38) (12.4 gpd per household repair; 33 percent of households audited have leaks – based on data from GSWC indoor leak detection program).

5. Water surveys decrease outdoor water use by 15%

MOU estimate is 10% (page 18).

6. Each water survey costs $35.

The estimate includes marketing, contract labor, GSWC labor, overhead and materials. It is assumed that this BMP is done in conjunction with BMP2.

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

A & N Technical Services report (2003, page 2-38) gives life spans for various components of a water survey. Four years selected as a reasonable average value..

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

9. Energy Savings of $44 per ac-ft of water conserved.

Based on GSWC data.

Orange County System
Table D-1. Assumptions Used for Economic Analysis

BMP 2 – Residential Plumbing Retrofit

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. 70% of single-family and 60% of multi-family residences have low-water-use fixtures.

Based on GSWC data

3. Average number of fixtures per residence includes: 2.0 showers, 2.3 toilets, and 4.1 faucets (1 kitchen faucet and 3.1 other faucets).

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

A & N Technical Services report (2003, page 2-38).

5. Water savings from one faucet aerator = 1.5 gpd

A & N Technical Services report (2003, page 2-38).

6. Water savings from one toilet flapper = 8 gpd; assume 20 percent of toilets leak.

A & N Technical Services report (2003, page 2-38).

7. Water savings from kitchen "flip" faucet aerator = 3.0 gpd.

Based on GSWC data.

8. Indoor water savings = 22.3 gpd/unit

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

(2.0*5.5) + (1.0*3.0) + (3.1*1.5) + (2.3*8*0.20).

9. The BMP will cost an average of $48 per residence.

Based on information provided by GSWC.

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

A & N Technical Services report (2003, page 2-38) gives life spans for a various components of a water survey. Four years selected as a reasonable average value.

11. Base year dwelling units include 33,169 single-family and 15,193 multi-family units.

Orange County System
Table D-1. Assumptions Used for Economic Analysis

BMP 3 – System Water Audits, Leak Detection and Repair
Assumptions: **1.** 20% of the distribution system will be surveyed and repaired each year. 2. Leak repairs will result in annual savings of approximately 0.6 acre-feet of water per mile of pipe. Based on information provided by Southern California Water Company 3. System water audits, leak detection and leak repair will cost approximately $1000 per mile of pipe. Based on information provided by GSWC.

Orange County System
Table D-1. Assumptions Used for Economic Analysis

BMP 5 – Large Landscape Conservation Programs and Incentives

Assumptions:

1. Develop Eto-based water use budgets for 90 percent of the CII accounts with dedicated irrigation meters and provide irrigation water use surveys to15 percent of CII accounts with mixed use meters.

MOU (Page 28)

2. Base year values include 913 dedicated landscape and 2170 CII mixed use accounts.

Based on GSWC account summary data.

3. Dedicated landscape accounts are an average size of 1.7 acres

CII mixed use account landscape areas are assumed to be an average of 0.1 acre in size

4. Water use prior to the survey is 4.9 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. Based on California Irrigation Management Information System data.

5. Surveys will reduce water usage by 15%.

MOU, page 30.

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

A & N Technical Services report (2003) gives a life span of four years for turf audits (page 2-34). Water

surveys for large landscapes are assumed to have a similar life span.

7. Each survey will cost $425 per acre. Minimum cost is $150 per account.

The estimate includes labor, administration, evaluation and overhead.

Orange County System
Table D-1. Assumptions Used for Economic Analysis

BMP 6 – High-Efficiency Washing Machine Rebate Programs
Assumptions 1. Coverage Goal is equal to total (single- and multi-family) dwelling units x 0.048. MOU page 35. 2. 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 34). A $50 rebate plus $25 per rebate is assumed for program administration and overhead. 3. Each high efficiency washing machine will reduce water usage by 6,200 gallons per year. MOU, page 38. Based on washing machines with water factor of 8.0. 4. The life span of a high efficiency washing machine is 14 years. MOU, page 38.

Orange County System
Table D-1. Assumptions Used for Economic Analysis

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

Assumptions:

1. Provide water-use surveys to10% of CII accounts within 10 years of the date implementation is to commence. *MOU, pages 43 and 44.*

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

The life span for a CII water survey is the same as the life span for a residential survey.

3. 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 (2003, page 2-51) 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, 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. Only 25% of the maximum potential water savings is assumed to be realized.

4. The average annual water savings resulting from an industrial water survey is 1.9 acre-feet per account.

For purposes of this economic analysis, consultant surveys will be conducted for industrial account surveys. Values for water savings in the A & N 2003 report represent the maximum potential water savings that could occur if a customer were to implement every possible water conservation measure. Only 25% of the maximum potential water savings is assumed to be realized.

5. Each analyst survey (for commercial and institutional accounts) will cost an average of $600 and each consultant survey (for industrial accounts) will cost an average of $1,500.

A & N Technical Services report (2003, page 2-53).

Table D-2 Orange County District
BMP 1. Water Survey Programs for Single-Family and Multi-Family Customers

	Water Saving Calculations								Benefits ($)					Costs ($)					
Calendar Year	Single Family Intervention	Multi-Family Intervention	Percent Units Surveyed	Single-Family Outdoor Savings (ac-ft/yr)	Multi-Family Outdoor Savings (ac-ft/yr)	Total Outdoor Savings (ac-ft/yr)	Total Intdoor Savings (ac-ft/yr)	Annual Water Savings	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	New present Value
Pre 2005	7,645	1,407	17.7%					0.0											
2006	0	0	0.0%	0.0	0.00	0.0	0.0	0.0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2007	0	0	0.0%	0.0	0.00	0.0	0.0	0.0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2008								0.0	$0	$0	$0	$0	$0	$0					$0
2009								0.0	$0	$0	$0	$0	$0	$0					$0
2010								0.0	$0	$0	$0	$0	$0	$0					$0
2011																			
2012																			
2013																			
2014																			
2015																			
2016																			
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2028																			
2029																			
2030																			
Totals	7,645	1,407	18%	0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Credit Table for Previously Performed Surveys					
Year	Single Family Units Surveyed	Multi-Family Units Surveyed	% Credit	Single Family Credits	Multi-Family Credits
Pre-1990			0.0%	0	0
1990			12.5%	0	0
1991			25.0%	0	0
1992			37.5%	0	0
1993			50.0%	0	0
1994			62.5%	0	0
1995			75.0%	0	0
1996	3,069		87.5%	2685	0
1997			100.0%	0	0
1998-2004	4960	1407	100.0%	4960	1407
Total	8,029	1407		7645	1407

Value of conserved water ($/ac-ft) =	482
Discount rate (real) =	6.71%
Indoor water savings (gpd/unit) =	4.1
Outdoor water savings =	15%
Single family outdoor water usage (gpd/unit) =	151
Multi-family outdoor water usage (gpd/unit) =	64
Conservation measure unit cost ($) =	35
1997 Single family units =	34,809
1997 Multi-family units =	16,473
Life span of water survey (years) =	4
Energy savings ($/ac-ft) =	44

Benefit cost ratio =	2.0
Simple pay-back period (years) =	0
Discounted cost/water saved ($acre-feet) =	0
NPV/ water saved (acre-feet) =	0

Table D-2 Orange County District
BMP 2. Residential Plumbing Retrofit

	Water Saving Calculations						Benefits ($)					Costs ($)					
Calendar Year	Single-Family Intervention	Multi-Family Intervention	Percent Units Surveyed Single-Family	Percent Units Surveyed Multi-Family	Incremental Water Savings (ac-ft/yr)	Annual Water Savings	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	New present Value
Pre 2005			70%	60%													
2006	1658	796	5.0%	5.0%	61.3	61.3	$0	$2,697	$29,543	$32,240	$32,240	$0	$0	$117,797	$117,797	$117,797	-$85,557
2007	0	796	0.0%	5.0%	19.9	81.2	$0	$3,571	$39,121	$42,692	$40,008	$0	$0	$38,191	$38,191	$35,790	$4,218
2008	0	796	0.0%	5.0%	19.9	101.0	$0	$4,446	$48,699	$53,145	$46,671	$0	$0	$38,191	$38,191	$33,539	$13,132
2009	0	0	0.0%	0.0%	0.0	101.0	$0	$4,446	$48,699	$53,145	$43,737	$0	$0	$0	$0	$0	$43,737
2010	0	0	0.0%	0.0%	0.0	39.7	$0	$1,749	$19,156	$20,905	$16,122	$0	$0	$0	$0	$0	$16,122
2011	0	0	0.0%	0.0%	0.0	19.9	$0	$874	$9,578	$10,453	$7,554	$0	$0	$0	$0	$0	$7,554
2012	0	0	0.0%	0.0%	0.0	0.0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2013																	
2014																	
2015																	
2016																	
2017																	
2018																	
2019																	
2020																	
2021																	
2022																	
2023																	
2024																	
2025																	
2026																	
2027																	
2028																	
2029																	
2030																	
Totals	1658	2387	75%	75%	101	404	$0	$17,782	$194,797	$212,579	$186,332	$0	$0	$194,179	$194,179	$187,126	-$794

Percent of Residences Having Low-Water-Use Fixtures		
Year	Single-Family	Multi-Family
Pre-2005	70%	60%
Annual Replacement		
2006	5%	5%
2007	0%	5%
2008	0%	5%
2009	0%	0%
2010	0%	0%
2011	0%	0%
2012	0%	0%
2013	0%	0%
2014	0%	0%

Value of conserved water ($/ac-ft) =	482
Discount rate (real) =	6.71%
Water savings (gpd/unit) =	22.3
Conservation measue unit cost ($) =	48
Percent units receiving retrofits =	5%
1991 Single family units =	33,169
1991 Multi-family units =	15,913
Life span of retrofit devices (years) =	4
Energy savings ($/ac-ft) =	44

Benefit cost ratio =	0.996
Simple pay-back period (years) =	7
Discounted cost/water saved ($acre-feet) =	463
NPV/ water saved (acre-feet) =	-2

Table D-2 Orange County District
BMP 3. System Water Audits, Leak Detection, and Repair

	Water Savings		Benefits ($)					Costs ($)					
Calendar Year	Length of Pipe Surveyed (miles)	Annual Water Savings	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	New present Value
Pre 1998													
2006	83.4	50.0	$0	$2,202	$24,119	$26,321	$26,321	$0	$0	$83,400	$83,400	$83,400	-$57,079
2007	83.4	100.1	$0	$4,404	$48,239	$52,642	$49,332	$0	$0	$83,400	$83,400	$78,156	-$28,824
2008	83.4	150.1	$0	$6,605	$72,358	$78,963	$69,345	$0	$0	$83,400	$83,400	$73,241	-$3,896
2009	83.4	200.2	$0	$8,807	$96,477	$105,284	$86,646	$0	$0	$83,400	$83,400	$68,636	$18,010
2010	83.4	250.2	$0	$11,009	$120,596	$131,605	$101,497	$0	$0	$83,400	$83,400	$64,320	$37,177
2011	83.4	250.2	$0	$11,009	$120,596	$131,605	$95,115	$0	$0	$83,400	$83,400	$60,275	$34,839
2012	83.4	250.2	$0	$11,009	$120,596	$131,605	$89,134	$0	$0	$83,400	$83,400	$56,485	$32,648
2013	83.4	250.2	$0	$11,009	$120,596	$131,605	$83,529	$0	$0	$83,400	$83,400	$52,933	$30,596
2014	83.4	250.2	$0	$11,009	$120,596	$131,605	$78,277	$0	$0	$83,400	$83,400	$49,605	$28,672
2015	83.4	250.2	$0	$11,009	$120,596	$131,605	$73,355	$0	$0	$83,400	$83,400	$46,486	$26,869
2016	83.4	250.2	$0	$11,009	$120,596	$131,605	$68,742	$0	$0	$83,400	$83,400	$43,563	$25,179
2017	83.4	250.2	$0	$11,009	$120,596	$131,605	$64,419	$0	$0	$83,400	$83,400	$40,823	$23,596
2018	83.4	250.2	$0	$11,009	$120,596	$131,605	$60,369	$0	$0	$83,400	$83,400	$38,256	$22,112
2019	83.4	250.2	$0	$11,009	$120,596	$131,605	$56,573	$0	$0	$83,400	$83,400	$35,851	$20,722
2020	83.4	250.2	$0	$11,009	$120,596	$131,605	$53,015	$0	$0	$83,400	$83,400	$33,597	$19,419
2021	83.4	250.2	$0	$11,009	$120,596	$131,605	$49,682	$0	$0	$83,400	$83,400	$31,484	$18,198
2022	83.4	250.2	$0	$11,009	$120,596	$131,605	$46,558	$0	$0	$83,400	$83,400	$29,504	$17,053
2023	83.4	250.2	$0	$11,009	$120,596	$131,605	$43,630	$0	$0	$83,400	$83,400	$27,649	$15,981
2024	83.4	250.2	$0	$11,009	$120,596	$131,605	$40,887	$0	$0	$83,400	$83,400	$25,910	$14,976
2025	83.4	250.2	$0	$11,009	$120,596	$131,605	$38,316	$0	$0	$83,400	$83,400	$24,281	$14,034
2026	83.4	250.2	$0	$11,009	$120,596	$131,605	$35,906	$0	$0	$83,400	$83,400	$22,754	$13,152
2027	83.4	250.2	$0	$11,009	$120,596	$131,605	$33,648	$0	$0	$83,400	$83,400	$21,324	$12,325
2028	83.4	250.2	$0	$11,009	$120,596	$131,605	$31,533	$0	$0	$83,400	$83,400	$19,983	$11,550
2029	83.4	250.2	$0	$11,009	$120,596	$131,605	$29,550	$0	$0	$83,400	$83,400	$18,726	$10,824
2030	83.4	250.2	$0	$11,009	$120,596	$131,605	$27,692	$0	$0	$83,400	$83,400	$17,549	$10,143
Totals	2,085	5,755	$0	$253,202	$2,773,717	$3,026,920	$1,433,068	$0	$0	$2,085,000	$2,085,000	$1,064,792	$368,276

Value of conserved water ($/ac-ft) =	482
Discount rate (real) =	6.71%
Annual water savings (ac-ft/mile) =	0.6
Conservation measue unit cost ($) =	1000
Percent of pipe surveyed =	20%
Total length of pipe in system (miles) =	417
Life span of leak repairs (years) =	5
Energy savings ($/ac-ft) =	44

Benefit cost ratio =	1.3
Simple pay-back period (years) =	19
Discounted cost/water saved ($acre-feet) =	185
NPV/ water saved (acre-feet) =	64

Table D-2 Orange County District
BMP 5. Large Landscape Conservation Programs and Incentives

	Water Saving Calculations						Benefits					Costs					
Calendar Year	CII Accounts w/Dedicated Irr. Meters Interventions	CII Accounts w/Mixed Use Meters Offered Surveys	CII Accounts w/Mixed Use Meters % Surveyed	CII Accounts w/Mixed Use Meters Interventions	Incremental Water Savings (ac-ft/Yr)	Cumulative Water Savings (ac-ft/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
			0.18%	4													
2005	0	0	0.00%	0	0	0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2006	411	217	4.71%	102	510	510	$0	$22,450	$245,934	$268,384	$251,508	$0	$0	$312,163	$312,163	$292,534	-$41,026
2007	411	217	4.71%	102	510	1020	$0	$44,901	$491,867	$536,768	$471,386	$0	$0	$312,163	$312,163	$274,139	$197,246
2008	0	217	1.95%	42	3	1024	$0	$45,035	$493,336	$538,371	$443,064	$0	$0	$6,347	$6,347	$5,224	$437,840
2009	0	217	1.95%	42	3	1027	$0	$45,169	$494,804	$539,973	$416,439	$0	$0	$6,347	$6,347	$4,895	$411,544
2010		217	0.75%	16	1	518	$0	$22,770	$249,436	$272,206	$196,730	$0	$0	$2,441	$2,441	$1,764	$194,966
2011		217	0.75%	16	1	8	$0	$371	$4,067	$4,438	$3,006	$0	$0	$2,441	$2,441	$1,653	$1,352
2012		217	0.00%	0	0	5	$0	$237	$2,598	$2,835	$1,800	$0	$0	$0	$0	$0	$1,800
2013		217	0.00%	0	0	2	$0	$103	$1,130	$1,233	$733	$0	$0	$0	$0	$0	$733
2014		217	0.00%	0	0	1	$0	$52	$565	$616	$344	$0	$0	$0	$0	$0	$344
2015																	
2016																	
2017																	
2018																	
2019																	
2020																	
2021																	
2022																	
2023																	
2024																	
2025																	
2026																	
2027																	
2028																	
2029																	
2030																	
Totals:	822	1953	15%	326	1029	4116	$0	$181,088	$1,983,736	$2,164,824	$1,785,009	$0	$0	$641,903	$641,903	$580,210	$1,204,799

Credit Table for Prevoiusly Performed Surveys

Year	# of Surveys	% Credit	Credits
Prior to 7/1/96 with follow up inspection		100%	0
Prior to 7/1/96 without follow up inspection		50%	0
After 7/1/96	4	100%	4
TOTAL			4

Value of Conserved Water ($/ac-ft) =	$482
Discount Rate (Real) =	6.71%
Acres/CII accounts with dedicated irrigation meters =	1.7
Acres/CII accounts with mixed use meters =	0.1
Annual water use (ac-ft/acre) =	4.8
Water Savings =	15%
Conservation Measure Unit Cost ($/Acre) =	$425
Minimum Conservation Measure Unit Cost ($/Account) =	$150
Number of CII accounts with dedicated irrigation meters in 1997 =	913
Number of CII accounts with mixed use meters in 1997 =	2170
Lifespan of Benefit (Years) =	4
Energy savings ($/ac-ft) =	44

Benefit Cost Ratio:	3.1
Simple Pay-Back Period (years):	2.9
Discounted Cost / Water Saved ($/ac-ft):	$141
NPV / Water Saved ($/ac-ft):	$293

Table D-2 Orange County District
BMP 6. High-Efficiency Washing Machine Rebate Programs

				Benefits ($)					Costs ($)					
Calendar Year	Coverage Goal	Incremental Water Savings (ac-ft/yr)	Annual Water Savings	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
2006	1311	24.9	24.9		1,098	12,023	13,170	13,170	0	65,557	32,779	98,336	98,336	-85,166
2007	1311	24.9	49.9		2,195	24,046	26,315	24,661	0	65,557	32,779	98,336	92,152	-67,492
2008		0.0	49.9		2,195	24,046	26,290	23,088	0	0	0	0	0	23,088
2009		0.0	49.9		2,195	24,046	26,290	21,636	0	0	0	0	0	21,636
2010		0.0	49.9		2,195	24,046	26,290	20,276	0	0	0	0	0	20,276
2011		0.0	49.9		2,195	24,046	26,290	19,001	0	0	0	0	0	19,001
2012		0.0	49.9		2,195	24,046	26,290	17,806	0	0	0	0	0	17,806
2013		0.0	49.9		2,195	24,046	26,290	16,686	0	0	0	0	0	16,686
2014		0.0	49.9		2,195	24,046	26,290	15,637	0	0	0	0	0	15,637
2015		0.0	49.9		2,195	24,046	26,290	14,654	0	0	0	0	0	14,654
2016		0.0	49.9		2,195	24,046	26,290	13,732	0	0	0	0	0	13,732
2017		0.0	49.9		2,195	24,046	26,290	12,869	0	0	0	0	0	12,869
2018		0.0	49.9		2,195	24,046	26,290	12,060	0	0	0	0	0	12,060
2019		0.0	49.9		2,195	24,046	26,290	11,301	0	0	0	0	0	11,301
2020		0.0	24.9		1,098	12,023	13,145	5,295	0	0	0	0	0	5,295
2021														
2022														
2023														
2024														
2025														
2026														
2027														
2028														
2029														
2030														
Totals	2622	49.9	698.4		30,730	336637.7	368,116	241,873	0	131,114	65,557	196,672	190,488	51,385

Value of conserved water ($/ac-ft) =	482
Discount rate (real) =	6.71%
Water savings (gpy/unit) =	6200
Amount of rebate =	50
Cost to administer rebate =	25
Water factor value =	8.0
Single family units in year 2005 =	37082
Multi-Family units in year 2005 =	17549
Energy savings ($/ac-ft) =	44

Benefit cost ratio =	1.3
Simple pay-back period (years) =	12
Discounted cost/water saved ($acre-feet) =	273
NPV/ water saved (acre-feet) =	74

Table D-2 Orange County District
BMP 9. Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts

	Water Savings						Benefits ($)					Costs ($)					
Calendar Year	Percent Surveyed	Commercial Interventions	Industrial Interventions	Institutional Interventions	Incremental Savings (Surveys) (ac-ft/yr)	Annual Savings Total (ac-ft/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		3	2	3													
2006	5.00%	72.4	18.70	9.4	107.2	107.2	$0	$4,715	$51,653	$56,368	$56,368	$0	$0	$77,130	$77,130	$77,130	-$20,762
2007	5.00%	72.4	18.70	9.4	107.2	214.3	$0	$9,430	$103,306	$112,737	$105,648	$0	$0	$77,130	$77,130	$72,280	$33,368
2008						214.3	$0	$9,430	$103,306	$112,737	$99,004	$0	$0	$0	$0	$0	$99,004
2009						214.3	$0	$9,430	$103,306	$112,737	$92,779	$0	$0	$0	$0	$0	$92,779
2010						107.2	$0	$4,715	$51,653	$56,368	$43,472	$0	$0	$0	$0	$0	$43,472
2011																	
2012																	
2013																	
2014																	
2015																	
2016																	
2017																	
2018																	
2019																	
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2023																	
2024																	
2025																	
2026																	
2027																	
2028																	
2029																	
2030																	
Totals	10%	148	39	22	214	857	$0	$37,722	$413,224	$450,946	$397,272	$0	$0	$154,260	$154,260	$149,410	$247,862

Credit for Previously Completed Surveys			
Total	Commercial	Industrial	Institutional
8	3	2	3

Value of conserved water ($/ac-ft) =	482
Discount rate (real) =	6.71%
Annual survey - Annual water savings (ac-ft/unit) =	0.83
Annual survey - Conservation measure unit cost ($) =	600
Consultant survey - Annual water savings (ac-ft/unit) =	2.1
Consultant survey - Conservation measure unit cost ($) =	1500
Cost of conservation measure for ULFT replacement ($) =	126
Number of commrcial accounts in 1997 =	1,478
Number of industrial accounts in 1997 =	394
Number of institutional accounts in 1997 =	218
Percent units surveyed =	10%
Life span of water survey (years) =	4
Energy savings ($/ac-ft) =	44

Benefit cost ratio =	2.7
Simple pay-back period (years) =	2
Discounted cost/water saved ($acre-feet) =	174
NPV/ water saved (acre-feet) =	289

Table D-3 Definitions of Terms Used in the Economic Analysis

Term	Definition	Comments
Benefits:		
Avoided Capital Costs	Capital costs that are avoided by implementing the BMP	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.	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.	Example is the cost of purchasing water that would not be required due to implementation of the BMP.
Total Undiscounted Benefits	The sum of avoided capital, variable, and purchase costs.	
Total Discounted Benefits	The present value of the sum of avoided capital, variable, and purchase costs.	The discount rate is used to calculate the present value of avoided costs.
Costs:		
Capital Costs	Capital costs incurred by implementing the BMP.	
Financial Incentives	Financial incentives paid to customers.	Example is the rebate for purchasing low-flow plumbing devices.
Operating Expenses	Operating expenses incurred implementing the BMP.	Example is the administrative cost of conducting surveys.
Total Undiscounted Costs	The sum of capital, financial incentives and operating expenses.	
Total Discounted Costs	The present value of the sum of capital, financial incentives and operating expenses.	The discount rate is used to calculate the present value of incurred costs.
Results:		
Net Present Value	Total discounted benefits minus total discounted costs.	A value greater than zero indicates an economically justifiable BMP.
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 sum of the total discounted costs divided by the average annual total discounted benefits.	Indicates the number of years required for the benefits to pay back the costs of the BMP.
Discounted Cost/Water Saved	The sum of the total discounted costs divided by the total acre-feet of water saved over the study period.	Indicates the present-value cost to save one acre-foot of water. A low value is considered economically attractive.
Net Present Value/Water Saved	The sum of the net present value divided by the total acre-feet of water saved over the study period.	Indicates the net value of saving one acre-foot of water. A high value is considered economically attractive.

Appendix E
Council Annual Reports for Demand Management Measures

Reported as of 4/1

Water Supply & Reuse

Reporting Unit:

Year:
2004

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type

Total AF:

G.C.

2004

Reported as of 4/1

Accounts & Water Use

Reporting Unit Name:	Submitted to CUWCC	Year:
So. California Water Company - Orange County District	**04/01/2005**	**2004**

A. Service Area Population Information:

1. Total service area population 142752

B. Number of Accounts and Water Deliveries (AF)

Type	Metered		Unmetered	
	No. of Accounts	Water Deliveries (AF)	No. of Accounts	Water Deliveries (AF)
1. Single-Family	37082	15712	0	0
2. Multi-Family	1500	4211	0	0
3. Commercial	1568	2725	0	0
4. Industrial	215	376	0	0
5. Institutional	156	1483	0	0
6. Dedicated Irrigation	999	2690	0	0
7. Recycled Water	0	0	0	0
8. Other	20	111	0	0
9. Unaccounted	NA	1395	NA	0
Total	41540	28703	0	0
	Metered		**Unmetered**	

Reported as of 4/1

BMP 01: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

A. Implementation

1. Based on your signed MOU date, 12/11/1991, your Agency STRATEGY DUE DATE is:	12/10/1993
2. Has your agency developed and implemented a targeting/ marketing strategy for SINGLE-FAMILY residential water use surveys?	yes
a. If YES, when was it implemented?	1/1/1998
3. Has your agency developed and implemented a targeting/ marketing strategy for MULTI-FAMILY residential water use surveys?	yes
a. If YES, when was it implemented?	1/1/1998

B. Water Survey Data

Survey Counts:	**Single Family Accounts**	**Multi-Family Units**
1. Number of surveys offered:	1400	0
2. Number of surveys completed:	1694	0
Indoor Survey:		
3. Check for leaks, including toilets, faucets and meter checks	yes	yes
4. Check showerhead flow rates, aerator flow rates, and offer to replace or recommend replacement, if necessary	yes	yes
5. Check toilet flow rates and offer to install or recommend installation of displacement device or direct customer to ULFT replacement program, as neccesary; replace leaking toilet flapper, as necessary	yes	yes
Outdoor Survey:		
6. Check irrigation system and timers	yes	no
7. Review or develop customer irrigation schedule	yes	no
8. Measure landscaped area (Recommended but not required for surveys)	yes	no
9. Measure total irrigable area (Recommended but not required for surveys)	yes	no
10. Which measurement method is typically used (Recommended but not required for surveys)		Pacing
11. Were customers provided with information packets that included evaluation results and water savings recommendations?	yes	yes
12. Have the number of surveys offered and completed, survey results, and survey costs been tracked?	yes	yes

a. If yes, in what form are surveys tracked? database

b. Describe how your agency tracks this information.

Database maintained by contractor &/or staff.

C. Water Survey Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	92200
2. Actual Expenditures	42142	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? yes

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

CUWCC accepted ALAEA of Water Wise School Education and Home Survey/Kit Distribution program.

E. Comments

Reported as of 4/1

BMP 02: Residential Plumbing Retrofit

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

A. Implementation

1. Is there an enforceable ordinance in effect in your service area requiring replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts?	no
a. If YES, list local jurisdictions in your service area and code or ordinance in each:	
2. Has your agency satisfied the 75% saturation requirement for single-family housing units?	no
3. Estimated percent of single-family households with low-flow showerheads:	70%
4. Has your agency satisfied the 75% saturation requirement for multi-family housing units?	no
5. Estimated percent of multi-family households with low-flow showerheads:	60%
6. If YES to 2 OR 4 above, please describe how saturation was determined, including the dates and results of any survey research.	

B. Low-Flow Device Distribution Information

1. Has your agency developed a targeting/ marketing strategy for distributing low-flow devices?	yes
a. If YES, when did your agency begin implementing this strategy?	1/1/1998
b. Describe your targeting/ marketing strategy.	

Water Wise School Education and Home Survey/Kit distribution program. targeting 6, 7 & 8th grades and their households for indoor/outdoor surveys.

Low-Flow Devices Distributed/ Installed	SF Accounts	MF Units
2. Number of low-flow showerheads distributed:	1694	0
3. Number of toilet-displacement devices distributed:	0	0
4. Number of toilet flappers distributed:	0	0
5. Number of faucet aerators distributed:	3388	0

6. Does your agency track the distribution and cost of low-flow devices?	yes
a. If YES, in what format are low-flow devices tracked?	Database
b. If yes, describe your tracking and distribution system :	

Database maintained by contractor &/or staff.

C. Low-Flow Device Distribution Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	92200
2. Actual Expenditures	42142	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? yes

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

CUWCC accepted ALAEA with the Water Wise School Education and Home Survey/Kit Distribution program.

E. Comments

Reported as of 4/1

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	no
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	29061
b. Determine other system verifiable uses (AF)	65
c. Determine total supply into the system (AF)	30520
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.95
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
4. Did your agency complete a full-scale audit during this report year?	no
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
6. Does your agency operate a system leak detection program?	yes

a. If yes, describe the leak detection program:

SCWC maintains an in-house leak detection and repair division, whichalso includes a meter exchange program, testing and calibration of production meters,vigerous response to identified system system leaks.

B. Survey Data

1. Total number of miles of distribution system line.	417
2. Number of miles of distribution system line surveyed.	0

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 4/1

BMP 04: Metering with Commodity Rates for all New Connections and Retrofit of Existing

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

A. Implementation

1. Does your agency require meters for all new connections and bill by volume-of-use?	yes
2. Does your agency have a program for retrofitting existing unmetered connections and bill by volume-of-use?	no
a. If YES, when was the plan to retrofit and bill by volume-of-use existing unmetered connections completed?	
b. Describe the program:	
3. Number of previously unmetered accounts fitted with meters during report year.	0

B. Feasibility Study

1. Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?	no
a. If YES, when was the feasibility study conducted? (mm/dd/yy)	
b. Describe the feasibility study:	
2. Number of CII accounts with mixed-use meters.	1961
3. Number of CII accounts with mixed-use meters retrofitted with dedicated irrigation meters during reporting period.	0

C. Meter Retrofit Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No
a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

E. Comments

Reported as of 4/1

BMP 05: Large Landscape Conservation Programs and Incentives

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

A. Water Use Budgets

1. Number of Dedicated Irrigation Meter Accounts:	999
2. Number of Dedicated Irrigation Meter Accounts with Water Budgets:	0
3. Budgeted Use for Irrigation Meter Accounts with Water Budgets (AF):	0
4. Actual Use for Irrigation Meter Accounts with Water Budgets (AF):	0
5. Does your agency provide water use notices to accounts with budgets each billing cycle?	no

B. Landscape Surveys

1. Has your agency developed a marketing / targeting strategy for landscape surveys?	yes
a. If YES, when did your agency begin implementing this strategy?	1/1/1996
b. Description of marketing / targeting strategy:	
Target home owner associations with 1+ acres of landscaping. Target city parks and sports fields.	
2. Number of Surveys Offered.	0
3. Number of Surveys Completed.	0
4. Indicate which of the following Landscape Elements are part of your survey:	
a. Irrigation System Check	yes
b. Distribution Uniformity Analysis	yes
c. Review / Develop Irrigation Schedules	yes
d. Measure Landscape Area	yes
e. Measure Total Irrigable Area	yes
f. Provide Customer Report / Information	yes
5. Do you track survey offers and results?	yes
6. Does your agency provide follow-up surveys for previously completed surveys?	no
a. If YES, describe below:	

C. Other BMP 5 Actions

1. An agency can provide mixed-use accounts with ETo-based landscape budgets in lieu of a large landscape survey program. Does your agency provide mixed-use accounts with landscape budgets?	no
2. Number of CII mixed-use accounts with landscape budgets.	0

3. Do you offer landscape irrigation training? yes

4. Does your agency offer financial incentives to improve landscape water use efficiency? no

Type of Financial Incentive:	Budget (Dollars/ Year)	Number Awarded to Customers	Total Amount Awarded
a. Rebates	0	0	0
b. Loans	0	0	0
c. Grants	0	0	0

5. Do you provide landscape water use efficiency information to new customers and customers changing services? No

a. If YES, describe below:

6. Do you have irrigated landscaping at your facilities? yes

a. If yes, is it water-efficient? yes

b. If yes, does it have dedicated irrigation metering? yes

7. Do you provide customer notices at the start of the irrigation season? no

8. Do you provide customer notices at the end of the irrigation season? no

D. Landscape Conservation Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	144000
2. Actual Expenditures	0	

E. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

F. Comments

Reported as of 4/1

BMP 06: High-Efficiency Washing Machine Rebate Programs

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

A. Implementation

1. Do any energy service providers or waste water utilities in your service area offer rebates for high-efficiency washers? yes

   a. If YES, describe the offerings and incentives as well as who the energy/waste water utility provider is.

   Municipal Water District of Orange County as a pass through for MWD of Southern California and Southern California Gas Company.

2. Does your agency offer rebates for high-efficiency washers? no
3. What is the level of the rebate? 0
4. Number of rebates awarded. 499

B. Rebate Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

MWDOC managed program for SCWC customers.

Reported as of 4/1

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

We participate in "Protector Del Agua", WEWAC and GBATA. We also conduct our own elementary school program utilizing the "EnviroScape" model as well as water plays and videos. For high school level students, we conduct a water issues course covering water use/conservation and water supply/quality. For adults we expand the water issues course to include rates/regulations and company organization.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	1
b. Public Service Announcement	yes	1
c. Bill Inserts / Newsletters / Brochures	yes	10
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	no	0
f. Special Events, Media Events	yes	2
g. Speaker's Bureau	yes	1
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 4/1

BMP 08: School Education Programs

Reporting Unit:
So. California Water Company - Orange County District

BMP Form Status: **100% Complete**

Year: **2004**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	2	60	0
Grades 4th-6th	yes	50	1500	1
Grades 7th-8th	yes	32	2000	2
High School	yes	0	0	0

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program? 1/1/1992

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	42142	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? yes

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

CUWCC accepted ALAEA with the Water Wise School Education Home Survey/Kit Distribution program.

D. Comments

Participate with MWDSC/MWDOC school programs.

Reported as of 4/1

BMP 09: Conservation Programs for CII Accounts

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

A. Implementation

1. Has your agency identified and ranked COMMERCIAL customers according to use?	no
2. Has your agency identified and ranked INDUSTRIAL customers according to use?	no
3. Has your agency identified and ranked INSTITUTIONAL customers according to use?	no

Option A: CII Water Use Survey and Customer Incentives Program

4. Is your agency operating a CII water use survey and customer incentives program for the purpose of complying with BMP 9 under this option?	no

CII Surveys	Commercial Accounts	Industrial Accounts	Institutional Accounts
a. Number of New Surveys Offered			
b. Number of New Surveys Completed			
c. Number of Site Follow-ups of Previous Surveys (within 1 yr)			
d. Number of Phone Follow-ups of Previous Surveys (within 1 yr)			

CII Survey Components	Commercial Accounts	Industrial Accounts	Institutional Accounts
e. Site Visit	yes	yes	yes
f. Evaluation of all water-using apparatus and processes	yes	yes	yes
g. Customer report identifying recommended efficiency measures, paybacks and agency incentives	yes	yes	yes

Agency CII Customer Incentives	Budget ($/Year)	No. Awarded to Customers	Total $ Amount Awarded
h. Rebates	0	169	42250
i. Loans	0	0	0
j. Grants	0	0	0
k. Others	0	0	0

Option B: CII Conservation Program Targets

5. Does your agency track CII program interventions and water savings for the purpose of complying with BMP 9 under this option?	yes
6. Does your agency document and maintain records on how savings were realized and the method of calculation for estimated savings?	yes
7. Estimated annual savings (AF/yr) from site-verified actions taken by agency since 1991.	29.28
8. Estimated annual savings (AF/yr) from non-site-verified actions taken by agency since 1991.	0

B. Conservation Program Expenditures for CII Accounts

	This Year	Next Year
1. Budgeted Expenditures	0	8500
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Participating in MWDSC's Save-A-Buck Program.

Reported as of 4/1

BMP 09a: CII ULFT Water Savings

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

1. Did your agency implement a CII ULFT replacement program in the reporting year? If No, please explain why on Line B. 10. — No

A. Targeting and Marketing

1. What basis does your agency use to target customers for participation in this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

2. How does your agency advertise this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

B. Implementation

1. Does your agency keep and maintain customer participant information? (Read the Help information for a complete list of all the information for this BMP.)

2. Would your agency be willing to share this information if the CUWCC did a study to evaluate the program on behalf of your agency?

3. What is the total number of customer accounts participating in the program during the last year ?

CII Subsector	Number of Toilets Replaced			
4.	**Standard Gravity Tank**	**Air Assisted**	**Valve Floor Mount**	**Valve Wall Mount**
a. Offices				
b. Retail / Wholesale				
c. Hotels				
d. Health				
e. Industrial				
f. Schools: K to 12				
g. Eating				
h. Government				
i. Churches				
j. Other				

5. Program design.

6. Does your agency use outside services to implement this program?

a. If yes, check all that apply.

7. Participant tracking and follow-up.

8. Based on your program experience, please rank on a scale of 1 to 5, with 1 being the least frequent cause and 5 being the most frequent cause, the following reasons why customers refused to participate in the program.

a. Disruption to business

b. Inadequate payback

c. Inadequate ULFT performance

d. Lack of funding

e. American's with Disabilities Act

f. Permitting

g. Other. Please describe in B. 9.

9. Please describe general program acceptance/resistance by customers, obstacles to implementation, and other isues affecting program implementation or effectiveness.

10. Please provide a general assessment of the program for this reporting year. Did your program achieve its objectives? Were your targeting and marketing approaches effective? Were program costs in line with expectations and budgeting?

Targeting not done and no budget provided.

C. Conservation Program Expenditures for CII ULFT

1. CII ULFT Program: Annual Budget & Expenditure Data

	Budgeted	Actual Expenditure
a. Labor	0	0
b. Materials	0	0
c. Marketing & Advertising	0	0
d. Administration & Overhead	0	0
e. Outside Services	0	0
f. Total	0	0

2. CII ULFT Program: Annual Cost Sharing

a. Wholesale agency contribution	0
b. State agency contribution	0
c. Federal agency contribution	0
d. Other contribution	0
e. Total	0

D. Comments

Reported as of 4/1

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$23561379
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

2. Commercial

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$3212915
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

3. Industrial

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$96475
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

4. Institutional / Government

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$1583775
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

5. Irrigation

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$1018684
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

6. Other

a. Water Rate Structure	Uniform

b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$114644
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Rate increase in this year.

Reported as of 4/1

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

A. Implementation

1. Does your Agency have a conservation coordinator?	yes
2. Is this a full-time position?	yes
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?	no
4. Partner agency's name:	
5. If your agency supplies the conservation coordinator:	
a. What percent is this conservation coordinator's position?	100%
b. Coordinator's Name	Matthew Puffer
c. Coordinator's Title	Administrative Analyst
d. Coordinator's Experience and Number of Years	16
e. Date Coordinator's position was created (mm/dd/yyyy)	1/1/1992
6. Number of conservation staff, including Conservation Coordinator.	1

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	77000	79000
2. Actual Expenditures	77000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 4/1

BMP 13: Water Waste Prohibition

Reporting Unit:	BMP Form Status:	Year:
So. California Water Company - Orange County District	**100% Complete**	**2004**

A. Requirements for Documenting BMP Implementation

1. Is a water waste prohibition ordinance in effect in your service area? yes

   a. If YES, describe the ordinance:

   California Public Utilities Commission Tariff Rule No. 14.1, a copy of which will be provided upon request.

2. Is a copy of the most current ordinance(s) on file with CUWCC? no

   a. List local jurisdictions in your service area in the first text box and water waste ordinance citations in each jurisdiction in the second text box:

   None None

B. Implementation

1. Indicate which of the water uses listed below are prohibited by your agency or service area.

   a. Gutter flooding yes

   b. Single-pass cooling systems for new connections no

   c. Non-recirculating systems in all new conveyor or car wash systems no

   d. Non-recirculating systems in all new commercial laundry systems no

   e. Non-recirculating systems in all new decorative fountains no

   f. Other, please name
   See CPUC rule 14.1 no

2. Describe measures that prohibit water uses listed above:

   California Water Code 10632(a)and section 357.

Water Softeners:

3. Indicate which of the following measures your agency has supported in developing state law:

   a. Allow the sale of more efficient, demand-initiated regenerating DIR models. no

   b. Develop minimum appliance efficiency standards that:

      i.) Increase the regeneration efficiency standard to at least 3,350 grains of hardness removed per pound of common salt used. no

      ii.) Implement an identified maximum number of gallons discharged per gallon of soft water produced. no

   c. Allow local agencies, including municipalities and special districts, to set more stringent standards and/or to ban on-site regeneration of water softeners if it is demonstrated and found by the agency governing board that there is an adverse effect on the reclaimed water or groundwater supply. no

4. Does your agency include water softener checks in home water audit programs? no

5. Does your agency include information about DIR and exchange-type water softeners in educational efforts to encourage replacement of less efficient timer models?	no

C. Water Waste Prohibition Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 4/1

BMP 14: Residential ULFT Replacement Programs

Reporting Unit:
So. California Water Company - Orange County District

BMP Form Status: **100% Complete**

Year: **2004**

A. Implementation

	Single-Family Accounts	Multi-Family Units
1. Does your Agency have program(s) for replacing high-water-using toilets with ultra-low flush toilets?	yes	yes

Number of Toilets Replaced by Agency Program During Report Year

Replacement Method	SF Accounts	MF Units
2. Rebate	0	0
3. Direct Install	0	0
4. CBO Distribution	349	0
5. Other	0	0
Total	**349**	**0**

6. Describe your agency's ULFT program for single-family residences.

MWDOC CBO distribution event program.

7. Describe your agency's ULFT program for multi-family residences.

Same as above.

8. Is a toilet retrofit on resale ordinance in effect for your service area? no

9. List local jurisdictions in your service area in the left box and ordinance citations in each jurisdiction in the right box:

B. Residential ULFT Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	40000
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 4/1

BMP 01 Coverage: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit:
So. California Water Company - Orange County District

Reporting Period:
03-04

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? Yes

A Reporting Unit (RU) must meet three conditions to satisfy strict compliance for BMP 1.

Condition 1: Adopt survey targeting and marketing strategy on time

Condition 2: Offer surveys to 20% of SF accounts and 20% of MF units during report period

Condition 3: Be on track to survey 15% of SF accounts and 15% of MF units within 10 years of implementation start date.

Test for Condition 1

		Single-Family	Multi-Family
So. California Water Company - Orange County District to Implement Targeting/Marketing Program by:	1999		
Year So. California Water Company - Orange County District Reported Implementing Targeting/Marketing Program:		307	307
So. California Water Company - Orange County District Met Targeting/Marketing Coverage Requirement:		YES	YES

Test for Condition 2

			Single-Family	Multi-Family
Survey Program to Start by:	1998	Residential Survey Offers (%)	4.02%	
Reporting Period:	03-04	Survey Offers ≥ 20%	NO	NO

Test for Condition 3

	Completed Residential Surveys	
	Single Family	Multi-Family
Total Completed Surveys 1999 - 2004:		
Past Credit for Surveys Completed Prior to 1999 (Implementation of Reporting Database):	2,685	

Total + Credit	2,685	
Residential Accounts in Base Year	34,809	16,473
So. California Water Company - Orange County District Survey Coverage as % of Base Year Residential Accounts	7.71%	
Coverage Requirement by Year 7 of Implementation per Exhibit 1	7.90%	7.90%
So. California Water Company - Orange County District on Schedule to Meet 10-Year Coverage Requirement	NO	NO

BMP 1 COVERAGE STATUS SUMMARY:
Water supplier has not met one or more coverage requirements for this BMP.

Reported as of 4/1

BMP 02 Coverage: Residential Plumbing Retrofit

Reporting Unit:
So. California Water Company - Orange County District

Reporting Period:
03-04

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? Yes

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An agency must meet one of three conditions to satisfy strict compliance for BMP 2.

Condition 1: The agency has demonstrated that 75% of SF accounts and 75% of MF units constructed prior to 1992 are fitted with low-flow showerheads.

Condition 2: An enforceable ordinance requiring the replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts is in place for the agency's service area.

Condition 3: The agency has distributed or directly installed low-flow showerheads and other low-flow plumbing devices to not less than 10% of single-family accounts and 10% of multi-family units constructed prior to 1992 during the reporting period.

Test for Condition 1

		Single-Family		Multi-Family	
Report Year	Report Period	Reported Saturation	Saturation ≥ 75%?	Reported Saturation	Saturation ≥ 75%?
1999	99-00	53.00%	NO	40.00%	NO
2000	99-00	53.00%	NO	40.00%	NO
2001	01-02	53.00%	NO	40.00%	NO
2002	01-02	54.00%	NO	41.00%	NO
2003	03-04	65.00%	NO	55.00%	NO
2004	03-04	70.00%	NO	60.00%	NO

Test for Condition 2

Report Year	Report Period	So. California Water Company - Orange County District has ordinance requiring showerhead retrofit?
1999	99-00	NO
2000	99-00	NO
2001	01-02	NO
2002	01-02	NO
2003	03-04	NO
2004	03-04	NO

Test for Condition 3

Reporting Period: 03-04

1992 SF Accounts	Num. Showerheads Distributed to SF Accounts	Single-Family Coverage Ratio	SF Coverage Ratio > 10%
33,169	1,694	5.1%	NO

1992 MF	Num. Showerheads Distributed to	Multi-Family	MF Coverage

Accounts	MF Accounts	Coverage Ratio	Ratio > 10%
15,913			NO

BMP 2 COVERAGE STATUS SUMMARY:
Water supplier has not met one or more coverage requirements for this BMP.

Reported as of 4/1

BMP 03 Coverage: System Water Audits, Leak Detection and Repair

Reporting Unit:
So. California Water Company - Orange County District

Reporting Period:
03-04

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet one of two conditions to be in compliance with BMP 3:

Condition 1: Perform a prescreening audit. If the result is equal to or greater than 0.9 nothing more needs be done.

Condition 2: Perform a prescreening audit. If the result is less than 0.9, perform a full audit in accordance with AWWA's Manual of Water Supply Practices, Water Audits, and Leak Detection.

Test for Conditions 1 and 2

Report Year	Report Period	Pre-Screen Completed	Pre-Screen Result	Full Audit Indicated	Full Audit Completed
1999	99-00	YES	95.6%	No	NO
2000	99-00	YES	96.1%	No	NO
2001	01-02	YES	96.8%	No	NO
2002	01-02	YES	96.8%	No	NO
2003	03-04	YES	95.4%	No	NO
2004	03-04	NO	95.4%	No	NO

BMP 3 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 4/1

BMP 04 Coverage: Metering with Commodity Rates for all New Connections and Retrofit of Existing

Reporting Unit:
So. California Water Company - Orange County District

Reporting Period:
03-04

MOU Exhibit 1 Coverage Requirement

No exemption request filed	
Agency indicated "at least as effective as" implementation during report period?	No

An agency must be on track to retrofit 100% of its unmetered accounts within 10 years to be in compliance with BMP 4.

Test for Compliance

Total Meter Retrofits Reported through 2004	
No. of Unmetered Accounts in Base Year	
Meter Retrofit Coverage as % of Base Year Unmetered Accounts	
Coverage Requirement by Year 6 of Implementation per Exhibit 1	42.0%
RU on Schedule to meet 10 Year Coverage Requirement	YES

BMP 4 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 4/1

BMP 05 Coverage: Large Landscape Conservation Programs and Incentives

Reporting Unit:
So. California Water Company - Orange County District

Reporting Period:
03-04

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period?	No

An agency must meet three conditions to comply with BMP 5.

Condition 1: Develop water budgets for 90% of its dedicated landscape meter accounts within four years of the date implementation is to start.

Condition 2: (a) Offer landscape surveys to at least 20% of its CII accounts with mixed use meters each report cycle and be on track to survey at least 15% of its CII accounts with mixed use meters within 10 years of the date implementation is to start OR (b) Implement a dedicated landscape meter retrofit program for CII accounts with mixed use meters or assign landscape budgets to mixed use meters.

Condition 3: Implement and maintain customer incentive program(s) for irrigation equipment retrofits.

Test for Condition 1

Year	Report Period	BMP 5 Implementation Year	No. of Irrigation Meter Accounts	No. of Irrigation Accounts with Budgets	Budget Coverage Ratio	90% Coverage Met by Year 4
1999	99-00	1	852			NA
2000	99-00	2	853			NA
2001	01-02	3	895			NA
2002	01-02	4	901			No
2003	03-04	5	999			No
2004	03-04	6	999			No

Test for Condition 2a (survey offers)

Select Reporting Period:	03-04
Large Landscape Survey Offers as % of Mixed Use Meter CII Accounts	
Survey Offers Equal or Exceed 20% Coverage Requirement	NO

Test for Condition 2a (surveys completed)

Total Completed Landscape Surveys Reported through	
Credit for Surveys Completed Prior to Implementation of Reporting Database	2
Total + Credit	2
CII Accounts in Base Year	2,090
RU Survey Coverage as a % of Base Year CII Accounts	0.1%
Coverage Requirement by Year of Implementation per Exhibit 1	6.3%

RU on Schedule to Meet 10 Year Coverage Requirement	NO

Test for Condition 2b (mixed use budget or meter retrofit program)

Report Year	Report Period	BMP 5 Implementation Year	Agency has mix-use budget program	No. of mixed-use budgets
1999	99-00	1	NO	
2000	99-00	2	NO	
2001	01-02	3	NO	
2002	01-02	4	NO	
2003	03-04	5	NO	
2004	03-04	6	NO	

Report Year	Report Period	BMP 4 Implementation Year	No. of mixed use CII accounts	No. of mixed use CII accounts fitted with irrig. meters
1999	99-00	1	2,946	
2000	99-00	2	2,948	
2001	01-02	3	3,021	
2002	01-02	4	3,040	
2003	03-04	5	1,961	
2004	03-04	6	1,961	

Test for Condition 3

Report Year	Report Period	BMP 5 Implementation Year	RU offers financial incentives?	No. of Loans	Total Amt. Loans
1999	99-00	1	NO		
2000	99-00	2	NO		
2001	01-02	3	NO		
2002	01-02	4	NO		
2003	03-04	5	NO		
2004	03-04	6	NO		

Report Year	Report Period	No. of Grants	Total Amt. Grants	No. of rebates	Total Amt. Rebates
1999	99-00				
2000	99-00				
2001	01-02				
2002	01-02				
2003	03-04				
2004	03-04				

BMP 5 COVERAGE STATUS SUMMARY:
Water supplier has not met one or more coverage requirements for this BMP.

Reported as of 4/1

BMP 06 Coverage: High-Efficiency Washing Machine Rebate Programs

Reporting Unit:
So. California Water Company - Orange County District

Reporting Period:
03-04

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet one condition to comply with BMP 6.

Condition 1: Offer a cost-effective financial incentive for high-efficiency washers if one or more energy service providers in service area offer financial incentives for high-efficiency washers.

Test for Condition 1

Year	Report Period	BMP 6 Implementation Year	Rebate Offered by ESP?	Rebate Offered by RU?	Rebate Amount
1999	99-00	1	NO	NO	
2000	99-00	2	NO	NO	
2001	01-02	3	YES	NO	
2002	01-02	4	YES	NO	
2003	03-04	5	YES	NO	
2004	03-04	6	YES	NO	

Year	Report Period	BMP 6 Implementation Year	No. Rebates Awarded	Coverage Met?
1999	99-00	1		YES
2000	99-00	2		YES
2001	01-02	3		NO
2002	01-02	4		NO
2003	03-04	5	267	NO
2004	03-04	6	499	NO

BMP 6 COVERAGE STATUS SUMMARY:
Water supplier has not met one or more coverage requirements for this BMP.

Reported as of 4/1

BMP 07 Coverage: Public Information Programs

Reporting Unit:
So. California Water Company - Orange County District

Reporting Period:
03-04

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet one condition to comply with BMP 7.

Condition 1: Implement and maintain a public information program consistent with BMP 7's definition.

Test for Condition 1

Year	Report Period	BMP 7 Implementation Year	RU Has Public Information Program?
1999	99-00	2	YES
2000	99-00	3	YES
2001	01-02	4	YES
2002	01-02	5	YES
2003	03-04	6	YES
2004	03-04	7	YES

BMP 7 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 4/1

BMP 08 Coverage: School Education Programs

Reporting Unit:
So. California Water Company - Orange County District

Reporting Period:
03-04

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? Yes

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An agency must meet one condition to comply with BMP 8.

Condition 1: Implement and maintain a school education program consistent with BMP 8's definition.

Test for Condition 1

Year	Report Period	BMP 8 Implementation Year	RU Has School Education Program?
1999	99-00	2	YES
2000	99-00	3	YES
2001	01-02	4	YES
2002	01-02	5	YES
2003	03-04	6	YES
2004	03-04	7	YES

BMP 8 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 4/1

BMP 09 Coverage: Conservation Programs for CII Accounts

Reporting Unit:
So. California Water Company - Orange County District

Reporting Period:
03-04

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

An agency must meet three conditions to comply with BMP 9.

Condition 1: Agency has identified and ranked by use commercial, industrial, and institutional accounts.

Condition 2(a): Agency is on track to survey 10% of commercial accounts, 10% of industrial accounts, and 10% of institutional accounts within 10 years of date implementation to commence.
OR
Condition 2(b): Agency is on track to reduce CII water use by an amount equal to 10% of baseline use within 10 years of date implementation to commence.
OR
Condition 2(c): Agency is on track to meet the combined target as described in Exhibit 1 BMP 9 documentation.

Test for Condition 1

Year	Report Period	BMP 9 Implementation Year	Ranked Com. Use	Ranked Ind. Use	Ranked Inst. Use
1999	99-00	1	YES	YES	YES
2000	99-00	2	YES	YES	YES
2001	01-02	3	NO	NO	NO
2002	01-02	4	NO	NO	NO
2003	03-04	5	NO	NO	NO
2004	03-04	6	NO	NO	NO

Test for Condition 2a

	Commercial	Industrial	Institutional
Total Completed Surveys Reported through 2004			
Credit for Surveys Completed Prior to Implementation of Reporting Databases	3	2	3
Total + Credit	3	2	3
CII Accounts in Base Year	1,478	394	218
RU Survey Coverage as % of Base Year CII Accounts	0.2%	0.5%	1.4%
Coverage Requirement by Year 6 of Implementation per Exhibit 1	4.2%	4.2%	4.2%
RU on Schedule to Meet 10 Year Coverage Requirement	NO	NO	NO

Test for Condition 2a

Year	Report Period	BMP 9 Implementation Year	Performance Target Savings (AF/yr)	Performance Target Savings Coverage	Performance Target Savings Coverage Requirement	Coverage Requirement Met
1999	99-00	1			0.5%	NO
2000	99-00	2			1.0%	NO
2001	01-02	3			1.7%	NO
2002	01-02	4			2.4%	NO
2003	03-04	5	10	0.2%	3.3%	NO
2004	03-04	6	29	0.5%	4.2%	NO

Test for Condition 2c

Total BMP 9 Surveys + Credit	8
BMP 9 Survey Coverage	0.4%
BMP 9 Performance Target Coverage	0.5%
BMP 9 Survey + Performance Target Coverage	0.9%
Combined Coverage Equals or Exceeds Coverage Requirement?	NO

BMP 9 COVERAGE STATUS SUMMARY:
Water supplier has not met one or more coverage requirements for this BMP.

Reported as of 4/1

BMP 11 Coverage: Conservation Pricing

Reporting Unit: Reporting Period:

So. California Water Company - Orange County District **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

---

An agency must meet one condition to comply with BMP 11.

Agency shall maintain rate structure consistent with BMP 11's definition of conservation pricing. Implementation methods shall be at least as effective as eliminating non-conserving pricing and adopting conserving pricing. For signatories supplying both water and sewer service, this BMP applies to pricing of both water and sewer service. Signatories that supply water but not sewer service shall make good faith efforts to work with sewer agencies so that those sewer agencies adopt conservation pricing for sewer service.

a) Non-conserving pricing provides no incentives to customers to reduce use. Such pricing is characterized by one or more of the following components: rates in which the unit price decreases as the quantity used increases (declining block rates);rates that involve charging customers a fixed amount per billing cycle regardless of the quantity used; pricing in which the typical bill is determined by high fixed charges and low commodity charges.

b) Conservation pricing provides incentives to customers to reduce average or peak use, or both. Such pricing includes: rates designed to recover the cost of providing service; and billing for water and sewer service based on metered water use. Conservation pricing is also characterized by one or more of the following components: rates in which the unit rate is constant regardless of the quantity used (uniform rates) or increases as the quantity used increases (increasing block rates); seasonal rates or excess-use surcharges to reduce peak demands during summer months; rates based upon the longrun marginal cost or the cost of adding the next unit of capacity to the system.

Test for Condition 1

Year	Report Period	RU Employed Non Conserving Rate Structure	RU Meets BMP 11 Coverage Requirement
1999	99-00	NO	YES
2000	99-00	NO	YES
2001	01-02	NO	YES
2002	01-02	NO	YES
2003	03-04	NO	YES
2004	03-04	NO	YES

BMP 11 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 4/1

BMP 12 Coverage: Conservation Coordinator

Reporting Unit: **So. California Water Company - Orange County District**

Reporting Period: **03-04**

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

Agency shall staff and maintain the position of conservation coordinator and provide support staff as necessary.

Test for Compliance

Report Year	Report Period	Conservation Coordinator Position Staffed?	Total Staff on Team (incl. CC)
1999	99-00	YES	1
2000	99-00	YES	1
2001	01-02	YES	1
2002	01-02	YES	1
2003	03-04	YES	1
2004	03-04	YES	1

BMP 12 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

Reported as of 4/1

BMP 13 Coverage: Water Waste Prohibition

Reporting Unit:
So. California Water Company - Orange County District

Reporting Period:
03-04

MOU Exhibit 1 Coverage Requirement

No exemption request filed

Agency indicated "at least as effective as" implementation during report period? No

---

An agency must meet one condition to comply with BMP 13.

Implementation methods shall be enacting and enforcing measures prohibiting gutter flooding, single pass cooling systems in new connections, non-recirculating systems in all new conveyer car wash and commercial laundry systems, and non-recycling decorative water fountains.

Test for Condition 1

Agency or service area prohibits:

Year	Gutter Flooding	Single-Pass Cooling Systems	Single-Pass Car Wash	Single-Pass Laundry	Single-Pass Fountains	Other	RU has ordinance that meets coverage requirement
1999	yes	no	no	no	no	no	NO
2000	yes	no	no	no	no	no	NO
2001	yes	no	no	no	no	no	NO
2002	yes	no	no	no	no	no	NO
2003	yes	no	no	no	no	no	NO
2004	yes	no	no	no	no	no	NO

BMP 13 COVERAGE STATUS SUMMARY:
Water supplier has not met one or more coverage requirements for this BMP.

Reported as of 4/1

BMP 14 Coverage: Residential ULFT Replacement Programs

Reporting Unit: **So. California Water Company - Orange County District**

MOU Exhibit 1 Coverage Requirement

A Reporting Unit (RU) must meet one of the following conditions to be in compliance with BMP 14.

Condition 1: Retrofit-on-resale (ROR) ordinance in effect in service area.

Condition 2: Water savings from toilet replacement programs equal to 90% of Exhibit 6 coverage requirement.

An agency with an exemption for BMP 14 is not required to meet one of the above conditions. This report treats an agency with missing base year data required to compute the Exhibit 6 coverage requirement as out of compliance with BMP 14.

Status: Water supplier is meeting coverage requirements for this BMP. as of 2004

Coverage Year	BMP 14 Data Submitted to CUWCC	Exemption Filed with CUWCC	ROR Ordinance in Effect	Exhibit 6 Coverage Req'mt (AF)	Toilet Replacement Program Water Savings* (AF)
1998	Yes			98.17	714.03
1999	Yes	No	No	281.76	951.83
2000	Yes	No	No	539.34	1213.98
2001	Yes	No	No	860.66	1535.43
2002	Yes	No	No	1236.54	1917.69
2003	Yes	No	No	1658.79	2295.33
2004	Yes	No	No	2120.06	2667.10
2005	No	No	No	2613.82	
2006	No	No	No	3134.23	
2007	No	No	No	3676.10	

*NOTE: Program water savings listed are net of the plumbing code. Savings are cumulative (not annual) between 1991 and the given year. Residential ULFT count data from unsubmitted forms are NOT included in the calculation.

BMP 14 COVERAGE STATUS SUMMARY:
Water supplier is meeting coverage requirements for this BMP.

BMP 14 Coverage: Residential ULFT Replacement Programs

Reporting Unit: **So. California Water Company - Orange County District**

BMP 14 Coverage Calculation Detail: Retrofit on Resale (ROR) Ordinance Water Savings

	Single Family	Multi-Family
1992 Housing Stock		
Average rate of natural replacement (% of remaining stock)	.04	.04
Average rate of housing demolition (% of remining stock)	.005	.005
Estimated Housing Units with 3.5+ gpf Toilets in 1997	27073.28	12988.55
Average resale rate	.058	.033
Average persons per unit		
Average toilets per unit		
Average savings per home (gpd; from Exhibit 6)	45.8	46.3

Single Family Housing Units

Coverage Year	Unretrofitted Houses	Houses Sold	Houses Unsold	Sold and Retrofitted	Sold and Already Retrofitted	Unsold and Retrofitted	Gross ROR Savings (AFY)	Nat'l Replacement Only Savings (AFY)	Net ROR Savings (AFY)
1998	24495.86	1562.40	25375.52	1562.40		1015.02	444.89	367.95	76.94
1999	22163.82	1554.59	25248.64	1413.66	140.93	918.39	564.51	421.02	143.49
2000	20053.79	1546.81	25122.39	1279.07	267.74	830.96	672.74	471.98	200.76
2001	18144.63	1539.08	24996.78	1157.30	381.78	751.85	770.67	520.91	249.76
2002	16417.23	1531.38	24871.80	1047.13	484.26	680.27	859.28	567.89	291.38
2003	14854.29	1523.73	24747.44	947.44	576.29	615.51	939.45	613.01	326.44
2004	13440.14	1516.11	24623.70	857.24	658.87	556.91	1011.99	656.33	355.66
2005	12160.61	1508.53	24500.58	775.63	732.90	503.89	1077.62	697.92	379.70
2006	11002.90	1500.99	24378.08	701.79	799.20	455.92	1137.01	737.86	399.15
2007	9955.41	1493.48	24256.19	634.98	858.50	412.52	1190.74	776.21	414.53

Multi Family Housing Units

Coverage Year	Unretrofitted Houses	Houses Sold	Houses Unsold	Sold and Retrofitted	Sold and Already Retrofitted	Unsold and Retrofitted	Gross ROR Savings (AFY)	Nat'l Replacement Only Savings (AFY)	Net ROR Savings (AFY)
1998	12062.18	426.48	12497.13	426.48		499.89	199.68	178.45	21.23
1999	11201.89	424.35	12434.64	396.06	28.28	464.23	244.29	204.19	40.10
2000	10402.95	422.22	12372.47	367.81	54.41	431.12	285.72	228.91	56.82
2001	9661.00	420.11	12310.60	341.58	78.53	400.37	324.20	252.64	71.56
2002	8971.96	418.01	12249.05	317.22	100.79	371.82	359.93	275.42	84.50
2003	8332.06	415.92	12187.81	294.59	121.33	345.30	393.11	297.30	95.80
2004	7737.81	413.84	12126.87	273.58	140.26	320.67	423.92	318.31	105.61
2005	7185.94	411.77	12066.23	254.07	157.70	297.80	452.54	338.49	114.05
2006	6673.42	409.72	12005.90	235.95	173.77	276.56	479.12	357.86	121.26

2007	6197.46	407.67	11945.87	219.12	188.54	256.84	503.80	376.46	127.34

Appendix F
Rule No. 14.1: Mandatory Water Conservation, Restrictions, and Rationing Program

Rule No. 14.1

MANDATORY WATER CONSERVATION, RESTRICTIONS AND RATIONING PROGRAM (N)

A. GENERAL INFORMATION:

If water supplies are projected to be insufficient to meet normal customer demand, and are beyond the control of the Company, the Company may elect to implement voluntary conservation using the portion of this plan set forth in Section C of this rule after notifying the Commission's Water Division of its intent. If, in the opinion of the Company, more stringent water measures are required, the Company shall request Commission authorization to implement the mandatory conservation and rationing measures set forth in Section D.

The Commission shall authorize mandatory conservation and rationing by approving Schedule No. 14.1, Mandatory Water Conservation and Rationing. When Schedule No. 14.1 has expired or is not in effect, mandatory conservation and rationing measures will not be in force. Schedule No. 14.1 will set forth water use violation fines, charges for removal of flow restrictors, and the period during which mandatory conservation and rationing measures will be in effect.

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

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

B. DEFINITIONS

As used in this water rationing plan, the word:

1. "Company" means the Southern California Water Company, California Cities Water, and Arden-Cordova Water Service;
2. "Persons" means an individual customer, resident, business, organizations including commercial, industrial, nonprofit, and government organizations or associations;
3. "Customer" means any person who uses water supplied by the Company;
4. "Water" means water supplied by the Company;

(N)

Rule No. 14.1

(N)

MANDATORY WATER CONSERVATION, RESTRICTIONS AND RATIONING PROGRAM
(Continued)

B. DEFINITIONS (Continued)

5. "Water shortage emergency" means the conditions which constitute a determination that deliveries of potable water supplies have reached a level such that continued unrestricted water use would be detrimental to the public welfare.

C. CONSERVATION – NON-ESSENTIAL OR UNAUTHORIZED WATER USE

No customer shall use Company–supplied water for non-essential or unauthorized uses as defined as follows:

1. Use of water through any connection when the Company 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, driveway, or streets.
3. Use of water for washing aircraft, cars, buses, boats, trailers or other vehicles without a positive shut-off nozzle on the outlet end of the hose. Exceptions include washing 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.
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 watering outside plants, lawn, landscape and turf areas during certain hours if and when specified in the applicable 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. (N)

(Continued)

Rule No. 14.1

(N)

MANDATORY WATER CONSERVATION, RESTRICTIONS AND RATIONING PROGRAM
(Continued)

C. CONSERVATION – NON-ESSENTIAL OR UNAUTHORIZED WATER USE (Continued)

12. Use of water for the filling or refilling of swimming pools.
13. Service of water by any restaurant except upon the request of the patron.

D. RATIONING OF WATER USE

In the event the conservation measures required by Section C are insufficient to control the water shortage, the Company shall, upon Commission approval, impose mandatory conservation and rationing. Rationing shall be in accordance with the conditions set forth in the applicable Schedule No. 14.1 as filed at the time such rationing is approved by the Commission.

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

E. ENFORCEMENT OF MANDATORY CONSERVATION AND RATIONING

1. The water use restrictions of the conservation program, in Section C 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. The Company may, after one verbal and one written warning, install a flow-restricting device on the service line of any customer observed by Company personnel to be using water for any non-essential or unauthorized use as defined in Section C above.

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

4. After the removal of the restricting device, if any non-essential or unauthorized use of water shall continue, the Company may install another flow-restricting device. This device shall remain in place until water supply conditions warrant its removal and until the appropriate charge for removal has been paid to the Company.

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

(N)

(Continued)

Rule No. 14.1

(N)

MANDATORY WATER CONSERVATION, RESTRICTIONS AND RATIONING PROGRAM
(Continued)

Page 4

E. ENFORCEMENT OF MANDATORY CONSERVATION AND RATIONING (Continued)

6. Any money collected by the Company through water use violation fines shall not be accounted for as income, but shall be accumulated by the Company 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 the applicable Schedule No. 14.1.

F. APPEAL PROCEDURE

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

Any customer not satisfied with the Company's response may file an appeal with the staff of the Commission. The customer and the Company 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 Company because of, or as a result of, any matter or thing done or threatened to be done pursuant to the provisions of this water conservation and rationing plan.

G. PUBLICITY

In the event the Company 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, Section 350 through 358, of the California Water Code. The Company 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 Company 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 methods.

(N)

Appendix G
Rate Schedule

Schedule No. R3-OC-1
Orange County Customer Service Area
GENERAL METERED SERVICE

APPLICABILITY

Applicable to all metered water service.

TERRITORY

All or portions of the Cities of Cypress, La Palma, Los Alamitos, Placentia, Seal Beach, Stanton, Yorba-Linda and vicinity, Cowan Heights, Peacock Hills, Orange County.

RATES

Quantity Rates:

For all water delivered, per 100 cu. ft.....	$ 1.5950

Service Charge:	Per Meter Per Month
For 5/8 x 3/4-inch meter.....	$ 13.65
For 3/4-inch meter.....	20.45
For 1-inch meter.....	34.05
For 1 1/2 inch meter.....	68.15
For 2-inch meter.....	109.00
For 3-inch meter.....	204.00
For 4-inch meter.....	341.00
For 6-inch meter.....	681.00
For 8-inch meter.....	1,090.00
For 10-inch meter.....	1,567.00

The Service Charge is a readiness-to-serve charge which is applicable to all metered service and to which is to be added the charge for water used computed at the Quantity Rates.

SPECIAL CONDITIONS

1. All bills are subject to the reimbursement fee set forth on Schedule No. UF. (D)

(D)

2. As authorized by the California Public Utilities Commission, an amount of **$**0.09630 per Ccf is to be added to the Quantity Rate for a period of 12 months, beginning on the effective date of Advice Letter 1181-WB. This surcharge will recover the undercollection in the Balancing-type Memorandum Account for the period of November 29, 2001 thru December 31, 2003. (N) (N) (N) (N)

Schedule No. R3-OC-3M
Orange County Customer Service Area
METERED IRRIGATION SERVICE

APPLICABILITY
Applicable to irrigation service furnished on a metered basis to territory in this schedule.

TERRITORY
The incorporated City of Placentia.

RATES
Quantity Rates:
For all water delivered, per 100 cu. ft..... $ 1.318

	Per Meter Per Year
Service Charge:	
For 2-inch meter.....	$ 215.00
For 3-inch meter.....	245.00
For 4-inch meter.....	575.00
For 6-inch meter.....	777.00
For 8-inch meter.....	1,296.00

The Service Charge is a readiness-to-serve charge applicable to all metered service and to which is added the charge for water used computed at the Quantity Rates.

SPECIAL CONDITIONS

1. All bills are subject to the reimbursement fee set forth on Schedule No. UF.
2. The company shall not be required to install new mains to make this service available.
3. The annual service charge will be paid in advance and bills will be computed and rendered monthly based on the total quantity of water delivered.
4. The customer, when requiring irrigation water, shall notify the Company at least twenty-four (24) hours in advance, indicating the date and hour for commencement of such service.
5. No customer shall be eligible for service under this schedule unless irrigating five (5) or more acres of land for citrus or other commercial crops.
6. Service under this schedule is subordinate to all other service schedule offered in this tariff areas and is subject to interruptions in emergencies or at the Company's discretion. The Company will not be liable for damage occasioned by interruption of service supplied under this schedule.
7. The customer will pay, without refund, the actual cost of the irrigation service. The company will furnish the meter at its expense.

(D)
(D)
8. As authorized by the California Public Utilities Commission, an amount of **$**0.09630 per Ccf is (N)
to be added to the Quantity Rate for a period of 12 months, beginning on the effective date of (N)
Advice Letter 1181-WB This surcharge will recover the undercollection in the Balancing-type (N)
Memorandum Account for the period of November 29, 2001 thru December 31, 2003. (N)

ISSUED BY
F. E. WICKS
President

Date Filed July 5, 2005
Advice Letter No. 1181-WB
Effective Date October 11, 2005
Decision No. 03-06-072
Resolution No. W-4563

Appendix H
Responses to Public Comments

No Public Comments received during Public Review Period.

Appendix I
Groundwater Basin Water Rights Stipulation/Judgment

Appendix I

There is no Groundwater Basin Water Rights Stipulation/Judgment for Cowan Heights System. However, a copy of the Groundwater Management Plan is available at:

Los Alamitos Customer Service Office
Golden State Water Company
10852 Cherry Street
Los Alamitos, CA 90720

Placentia Customer Service Office
Golden State Water Company
500 Cameron Street
Placentia, CA 92870

Appendix J
Summary of Population Based on Census Data

Appendix J: Demographic Information for Cowan Heights System CSA

Table J-1: Census Tracts within the Cowan Heights System CSA

County	Subregion	City Code	City	Census Tract Number	Percentage of Census Tract
Orange	Orange County COG	99999	Unincorporated	75604	30%
Orange	Orange County COG	99999	Unincorporated	75605	95%
Orange	Orange County COG	99999	Unincorporated	75606	5%
Orange	Orange County COG	53980	Orange city	75604	60%

Table J-2: Population, Household and Employment Projections for Year 2000, 2005, 2010, 2015, 2020, 2025 and 2030 for Cowan Heights System CSA

Cowan Heights System CSA Population, Household and Employment Estimates for 2000

County	Subregion	City Code	City	Census Tract	Total Population	Number of Households	Total Employees
Orange	Orange County COG	99999	Unincorporated	75,604	1,494	496	208
Orange	Orange County COG	99999	Unincorporated	75,605	1,967	684	224
Orange	Orange County COG	99999	Unincorporated	75,606	215	72	17
Orange	Orange County COG	53980	Orange city	75,604	1,583	559	209

Cowan HeightsSystem CSA Population, Household and Employment Projections for 2005

County	Subregion	City Code	City	Census Tract	Total Population	Number of Households	Total Employees
Orange	Orange County COG	99999	Unincorporated	75,604	1,542	503	219
Orange	Orange County COG	99999	Unincorporated	75,605	2,026	693	225
Orange	Orange County COG	99999	Unincorporated	75,606	219	73	18
Orange	Orange County COG	53980	Orange city	75,604	1,654	571	211

Cowan Heights System CSA Population, Household and Employment Projections for 2010

County	Subregion	City Code	City	Census Tract	Total Population	Number of Households	Total Employees
Orange	Orange County COG	99999	Unincorporated	75,604	1,592	504	220
Orange	Orange County COG	99999	Unincorporated	75,605	2,044	691	235
Orange	Orange County COG	99999	Unincorporated	75,606	230	72	19
Orange	Orange County COG	53980	Orange city	75,604	1,697	562	214

Cowan Heights System CSA Population, Household and Employment Projections for 2015

County	Subregion	City Code	City	Census Tract	Total Population	Number of Households	Total Employees
Orange	Orange County COG	99999	Unincorporated	75,604	1,608	506	228
Orange	Orange County COG	99999	Unincorporated	75,605	2,063	694	236
Orange	Orange County COG	99999	Unincorporated	75,606	231	73	20
Orange	Orange County COG	53980	Orange city	75,604	1,720	565	216

Cowan Heights System CSA Population, Household and Employment Projections for 2020

County	Subregion	City Code	City	Census Tract	Total Population	Number of Households	Total Employees
Orange	Orange County COG	99999	Unincorporated	75,604	1,621	509	236
Orange	Orange County COG	99999	Unincorporated	75,605	2,080	697	237
Orange	Orange County COG	99999	Unincorporated	75,606	232	73	21
Orange	Orange County COG	53980	Orange city	75,604	1,739	571	217

Cowan Heights System CSA Population, Household and Employment Projections for 2025

County	Subregion	City Code	City	Census Tract	Total Population	Number of Households	Total Employees
Orange	Orange County COG	99999	Unincorporated	75,604	1,634	512	243
Orange	Orange County COG	99999	Unincorporated	75,605	2,095	701	237
Orange	Orange County COG	99999	Unincorporated	75,606	233	73	21
Orange	Orange County COG	53980	Orange city	75,604	1,757	576	218

Cowan Heights System CSA Population, Household and Employment Projections for 2030

County	Subregion	City Code	City	Census Tract	Total Population	Number of Households	Total Employees
Orange	Orange County COG	99999	Unincorporated	75,604	1,646	514	249
Orange	Orange County COG	99999	Unincorporated	75,605	2,109	705	238
Orange	Orange County COG	99999	Unincorporated	75,606	234	73	22
Orange	Orange County COG	53980	Orange city	75,604	1,774	581	220